DURSEY ISLAND CABLE CAR AND VISITOR CENTRE

Environmental Impact Assessment Report

Volume 2 - Main Text

September 2019

Cork County Council
Comhairle Contae Chorcaí

Fáilte Ireland
National Tourism Development Authority

ROD
ROUGHAN & O'DONOVAN

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Chapter 1 Introduction

1.1 General

The following Environmental Impact Assessment Report (EIAR) has been prepared by Roughan & O'Donovan Consulting Engineers (ROD) and a team of specialists, on behalf of Cork County Council (CCC), to assess the proposed Dursey Island Cable Car and Visitor Centre development, hereafter referred to as the 'proposed development'.

The EIAR comprises: *"a statement of the effects, if any, which [the] proposed development, if carried out, would have on the environment"* (Environmental Protection Agency (EPA), 2017).

This EIAR is presented in three volumes: Volume 1 presents a standalone Non-technical Summary; Volume 2 (this volume) contains the main text; and Volume 3 contains the corresponding figures. A separate Natura Impact Statement (NIS), which has assessed the effects of the proposed development on designed European (i.e. Natura 2000) sites, has also been prepared and is available as a separate document. This EIAR forms part of the planning application package for the proposed development, which will be submitted to the competent authority (An Bord Pleanála), who will carry out the Environmental Impact Assessment (EIA).

The contents of this EIAR are set out as follows:

Volume 1: Non–technical Summary

Volume 2: Main Text

Chapter 1: Introduction
Chapter 2: Need for the Proposed Development
Chapter 3: Alternatives Considered
Chapter 4: Description of the Proposed Development
Chapter 5: Traffic and Transport
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1.2 Overview

The Dursey Island CableCar is located at the western tip of the Beara Peninsula in west County Cork. It spans the Dursey Sound, linking the eastern coast of Dursey Island with the mainland at Ballaghboy, Lambs Head. Originally constructed in 1969 to transport islanders, farmers and livestock to-and-from the mainland, the cableway is now predominantly used by tourists, particularly during the summer months. In recent years, limited passenger capacity and turnaround of the cableway have resulted in a supply deficit, with queuing times of up to 2 hours commonplace during the peak months of July and August.

In 2018, CCC, working in partnership with Fáilte Ireland, commissioned ROD to provide multidisciplinary consultancy services for the proposed development, including engineering, architectural, landscaping, quantity surveying, cultural heritage, planning, environmental and tourism consultancy services. The proposed development entails the replacement of the existing cableway, the construction of two new cableway stations, an expanded mainland-side visitor car park, a mainland-side Visitor Centre and a café. It is also proposed to upgrade elements of the associated infrastructure/utilities including telecommunications, drinking water supply and wastewater treatment systems. Localised road improvement works will also be carried out on the primary approach road to the site (the R572), on the 8km stretch between its junction with the R575 (at Bealbarnish Gap) and the cable car site, in order to ease existing congestion and support the increase in traffic anticipated as a result of the proposed development.

The proposed development will allow a greater number of visitors (an annual maximum of 80,000) to make the cable car journey to and from Dursey Island, with up to 100,000 persons expected to visit the mainland side of the site.

Client and Design Team

The multidisciplinary design team, led by ROD, included the following external consultants:

- Scott Tallon Walker Architects – Architecture;
- POMA – Mechanical and Electrical Engineering (Cableway);
- JV Tierney – Mechanical and Electrical Engineering (Buildings);
- Cunnane Stratton Reynolds (CSR) – Landscape Architecture;
- JANVS–VIDAR – Interpretative Design; and
- Tourism Development International – Tourism Development Design.

EIAR Team

A number of specialist contributors have been consulted by ROD and CCC to contribute to the preparation of this EIAR. Relevant qualifications and experience of all contributors are set out in Table 1.1.

Table 1.1 EIAR Contributors – Qualifications and Experience

Topic	Specialist Contributors	Company	Qualifications	Experience (Years)
Introductory Chapters 1-4	Tony Dempsey	ROD	BA, BAI (Civil), PhD CEng MIEI	25
	Joe Kelly	ROD	BA, MSc Civil Eng, CEng	24
	Peter King	ROD	BA, CEng, PgDip, RConsEI, MIOSH	14
	Barry Corrigan	ROD	BSc (Hons), Dip EIA & SEA, MIEMA, CEnv	19
	Christine Murphy	ROD	BSc (Hons), MSc Env Sci, PIEMA	7
	Lorraine Guerin	ROD	BSc (Hons) Ecology, MSc Env Mgmt. & Policy	1
	Yana Bersunukayeva	ROD	BA Env Sci, MSc Global Change, Ecosys Sci & Policy	1
Chapter 5 Traffic and Transport	John Bell	ROD	BEng, CEng	17
	Barry Corrigan	ROD	BSc (Hons), Dip EIA & SEA, MIEMA, CEnv	19
	Joe Kelly	ROD	BA, MSc Civil Eng, CEng	24
	Frances O’Kelly	ROD	BSc, MSc, MIPI	12
Chapter 6 Population and Human Health	Frances O’Kelly	ROD	BSc, MSc, MIPI	12
	Lorraine Guerin	ROD	BSc (Hons) Ecology, MSc Env Mgmt. & Policy	1
	Barry Corrigan	ROD	BSc (Hons), Dip EIA & SEA, MIEMA, CEnv	19
	Joe Kelly	ROD	BA, MSc Civil Eng, CEng	24
Chapter 7 Biodiversity	Lorraine Guerin	ROD	BSc (Hons) Ecology, MSc Env Mgmt & Policy	1
	Owen O’Keefe	ROD	BSc, ACIEEM	3
	Paul Murphy	EirEco Environmental Consultants	BSc, MSc Env Sci, PgDip Aquatic Biology, PgDip Horticulture, CIEEM	25
	Mike Trewby	Woodrow Environmental Consultants	BSc Zoology and Botany; PGDip Env. Studies	>20
	Barry Corrigan	ROD	BSc (Hons), Dip EIA & SEA, MIEMA, CEnv	19

Topic	Specialist Contributors	Company	Qualifications	Experience (Years)
	Joe Kelly	ROD	BA, MSc Civil Eng, CEng	24
	Yana Bersunukayeva	ROD	BA Env Sci, MSc Global Change, Ecosys Sci & Policy	1
Chapter 8 Land and Soils	Fintan Buggy	ROD	BSc, MSc Soil Mechanics, CEng, MICE, PE MIEI	36
	Karlo Martinović	ROD	BEng, MSc Eng, PhD Eng. MIEI	8
	Barry Corrigan	ROD	BSc (Hons), Dip EIA & SEA, MIEMA, CEnv	19
	Joe Kelly	ROD	BA, MSc Civil Eng, CEng	24
Chapters 9 Hydrology	Warren Vokes	ROD	BA, MSc	3
	Patrick Morrissey	ROD	BA, BAI, MSc, PhD, PGDip Stats, MIEI	10
	Barry Corrigan	ROD	BSc (Hons), Dip EIA & SEA, MIEMA, CEnv	19
	Joe Kelly	ROD	BA, MSc Civil Eng, CEng	24
Chapter 10 Hydrogeology	Patrick Morrissey	ROD	BA, BAI, MSc, PhD, PGDip Stats, MIEI	10
	Barry Corrigan	ROD	BSc (Hons), Dip EIA & SEA, MIEMA, CEnv	19
	Joe Kelly	ROD	BA, MSc Civil Eng, CEng	24
Chapter 11 Landscape and Visual	Jim Kelly	CSR	B Agr Sc (Landscape Architecture), Post Grad Dip Landscape Architecture	20
	Evelyn Sikora	CSR	BA, MPlan	12
	Jesper Pederson	Pederson Focus Ltd.	BEng	20
	Lorraine Guerin	ROD	BSc (Hons) Ecology, MSc Env Mgmt & Policy	1
	Barry Corrigan	ROD	BSc (Hons), Dip EIA & SEA, MIEMA, CEnv	19
	Joe Kelly	ROD	BA, MSc Civil Eng, CEng	24
Chapter 12 Noise and Vibration	Stephen Smyth	AWN Consulting Ltd.	BA, BAI, MIEI, MIOA	14
	Lorraine Guerin	ROD	BSc (Hons) Ecology, MSc Env Mgmt & Policy	1
	Barry Corrigan	ROD	BSc (Hons), Dip EIA & SEA, MIEMA, CEnv	19

Topic	Specialist Contributors	Company	Qualifications	Experience (Years)
	Joe Kelly	ROD	BA, MSc Civil Eng, CEng	24
Chapter 13 Air Quality and Climate	Claire Flynn	AWN Consulting Ltd.	BSc, MSc, MIAQM	10
	Lorraine Guerin	ROD	BSc (Hons) Ecology, MSc Env Mgmt & Policy	1
	Barry Corrigan	ROD	BSc (Hons), Dip EIA & SEA, MIEMA, CEnv	19
	Joe Kelly	ROD	BA, MSc Civil Eng, CEng	24
Chapter 14 Archaeological and Cultural Heritage	Grace Corbett	Irish Archaeological Consultancy	BA Archaeology, MA Osteoarchaeology, MIAI	13
	Lorraine Guerin	ROD	BSc (Hons) Ecology, MSc Env Mgmt & Policy	1
	Barry Corrigan	ROD	BSc (Hons), Dip EIA & SEA, MIEMA, CEnv	19
	Joe Kelly	ROD	BA, MSc Civil Eng, CEng	24
Chapter 15 Architectural Heritage	Rob Goodbody	Historic Building Consultants	BA Historical Geography, PgDip Env Planning, MA Urban and Bldg Cons, PgDip App Bldg Repair and Cons MIPI	43
	Lorraine Guerin	ROD	BSc (Hons) Ecology, MSc Env Mgmt & Policy	1
	Barry Corrigan	ROD	BSc (Hons), Dip EIA & SEA, MIEMA, CEnv	19
	Joe Kelly	ROD	BA, MSc Civil Eng, CEng	24
Chapter 16 Material Assets and Land	John Bligh	John Bligh and Associates	BAgrSc, MSc Environmental Systems	21
	Christine Murphy	ROD	BSc (Hons), MSc Env Sci, PIEMA	7
	Barry Corrigan	ROD	BSc (Hons), Dip EIA & SEA, MIEMA, CEnv	19
	Joe Kelly	ROD	BA, MSc Civil Eng, CEng	24
Chapter 17 Interrelationships, Major Accidents and Cumulative Effects	Christine Murphy	ROD	BSc (Hons), MSc Env Sci, PIEMA	7
	Lorraine Guerin	ROD	BSc (Hons) Ecology, MSc Env Mgmt. & Policy	1
	Yana Bersunukayeva	ROD	BA Env Sci, MSc Global Change, Ecosys Sci & Policy	1
	Barry Corrigan	ROD	BSc (Hons), Dip EIA & SEA, MIEMA, CEnv	19
	Joe Kelly	ROD	BA, MSc Civil Eng, CEng	24

Topic	Specialist Contributors	Company	Qualifications	Experience (Years)
Chapter 18 Mitigation Measures	Christine Murphy	ROD	BSc (Hons), MSc Env Sci, PIEMA	7
	Lorraine Guerin	ROD	BSc (Hons) Ecology, MSc Env Mgmt. & Policy	1
	Barry Corrigan	ROD	BSc (Hons), Dip EIA & SEA, MIEMA, CEnv	19
	Joe Kelly	ROD	BA, MSc Civil Eng, CEng	24

1.3 Environmental Impact Assessment (EIA) Legislation

1.3.1 Definition

EIA is defined by Directive 2011/92/EU, as amended by Directive 2014/52/EU, as follows:

"Environmental Impact Assessment" means a process consisting of:

(i) the preparation of an environmental impact assessment report by the developer, as referred to in Article 5(1) and (2);

(ii) the carrying out of consultations as referred to in Article 6 and, where relevant, Article 7;

(iii) the examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer in accordance with Article 5(3), and any relevant information received through the consultations under Articles 6 and 7;

(iv) the reasoned conclusion by the competent authority on the significant effects of the project on the environment, taking into account the results of the examination referred to in point (iii) and, where appropriate, its own supplementary examination; and

(v) the integration of the competent authority's reasoned conclusion into any of the decisions referred to in Article 8a."

1.3.2 EIA in European and National Law

EIA requirements derive from Council Directive 85/337/EEC (as amended by Directives 97/11/EC, 2003/35/EC and 2009/31/EC) and as codified and replaced by Directive 2011/92/EU of the European Parliament and the Council on the assessment of the effects of certain public and private projects on the environment. Directive 2011/92/EU has since been amended by Directive 2014/52/EU of the European Parliament.

The requirements of these directives have been transposed into Irish law through the *Planning and Development Acts* (2000 – 2018) and the Regulations made under the *European Communities Act* (1972) including the *European Communities (Environmental Impact Assessment) Regulations 1989 – 2006*, the *European Union (Environmental Impact Assessment and Habitats) Regulations 2011* and the *European Communities (Birds and Natural Habitats) Regulations 2011*. Directive 2014/52/EU of the European Parliament has been transposed into Irish law through the *European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018)*.

1.3.3 Requirement for EIA for the Proposed Development

The proposed development does not meet the thresholds for which the preparation of an EIAR is a mandatory requirement under Schedule 5 of the *Planning and Development Regulations 2001 - 2019*. However, the footprint of the proposed development is in direct proximity to the foreshore and the proposed cableway will traverse the foreshore. Therefore, Section 226 of the *Planning and Development Act 2000* is applicable and an EIAR is required. As stated in Section 226:

"*Where development is proposed to be carried out wholly or partly on the foreshore—*

(a) by a local authority that is a planning authority, whether in its capacity as a planning authority or otherwise, or

(b) by some other person on behalf of, or jointly or in partnership with, a local authority that is a planning authority, pursuant to an agreement entered into by that local authority whether in its capacity as a planning authority or otherwise […]

[…] Section 175 shall apply to proposed development belonging to a class of development, identified for the purposes of Section 176"

Further, Section 175 of the *Planning and Development Act 2000* stipulates that:

"*Where development belonging to a class of development, identified for the purposes of Section 176, is proposed to be carried out—*

(a) by a local authority that is a planning authority, whether in its capacity as a planning authority or in any other capacity, or

(b) by some other person on behalf of, or jointly or in partnership with, such a local authority, pursuant to a contract entered into by that local authority whether in its capacity as a planning authority or in any other capacity, within the functional area of the local authority concerned (hereafter in this section referred to as "proposed development"), the local authority shall prepare, or cause to be prepared, an environmental impact statement [EIAR] in respect thereof."

Therefore, preparation of an EIAR for submission as part of the planning application to An Bord Pleanála is a mandatory requirement for the proposed development.

1.4 Scope of the Environmental Impact Assessment Report (EIAR)

The preparation of an EIAR for a proposed development is a systematic and iterative process in which the collation and assessment of environmental data and predicted impacts are essentially linked to the development of the design. Chapter 3 of this EIAR summarises the processes that led to the development of the proposal that is described in Chapter 4. Once a design was developed, the process of scoping this EIAR commenced and an informal EIA Scoping Report was prepared and issued to relevant statutory and non-statutory consultees. Further scoping and consultations were undertaken with relevant bodies, specifically with the National Parks and Wildlife Service (NPWS) in relation to biodiversity and Natura 2000 sites. Any responses received have been addressed in this EIAR and informed the design of the proposed development, where feasible and appropriate.

1.5 Environmental Protection Agency (EPA) Guidelines

The following EPA guidelines have informed this EIAR:

- *Guidelines on the Information to be contained in Environmental Impact Statements* (2002);
- *Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)* (2003);
- *Draft Advice Notes for Preparing Environmental Impact Statements* (2015); and,
- *Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (2017).

1.6 Non-Statutory Public Consultation Events

A non-statutory public consultation event for the proposed development was held on the 27th of March 2019 between 6pm and 8pm in the Eccles Hotel in Glengarriff, Co. Cork. The design of the proposed development was exhibited to the public. Representatives of CCC and the design team were present to explain the information presented. The consultation event was advertised in the Southern Star on the 23rd of March and on local radio (C103) throughout the week preceding the event. Additionally, over 150 stakeholders were informed directly of the event via email and/or phone call. Information leaflets were presented to the attendees at the event. The design drawings which were presented at the event were also made available on the CCC website at https://www.corkcoco.ie/, and hard copies were available for viewing in CCC Head Offices at County Hall until the 24th of April 2019.

The purpose of the public consultation was to:

- Inform public stakeholders of the proposed development (particularly members of the local community);
- Allow public stakeholders an opportunity to engage with the project team at the pre-planning stage of the proposed development;
- Obtain the opinions of public stakeholders in relation to the proposed development and potential environmental, engineering and economic constraints that may influence it;
- Obtain local knowledge that would help in the identification of possible constraints; and,
- Identify any alternative design recommendations suggested by public stakeholders.

The public were invited to submit observations and comments regarding the proposed development. Feedback was invited via feedback forms on the day of the consultation and by email or letter until the 24th of April 2019.

A total of 7 no. submissions were received from the general public during the 4-week consultation period, the majority of which were positive. The main feedback received at the consultation event and in subsequent written submissions was as follows:

- Strong overall support for the project;
- The operation of the online booking system was queried;
- A desire for the preservation of the natural landscape, ecology and community spirit was expressed;
- The provision for the movement of heavy goods to-and-from the island by islanders was queried;
- The requirement for road improvement works along the approach road and on the island was highlighted;
- The provision of an electric bike rental service was suggested;
- The need for toilet facilities on the island was expressed;
- The requirements for wheelchair access, maintenance access and emergency access were highlighted;
- The potential for a shuttle bus service from Castletownbere and nearby towns was suggested;

- The potential adverse impact on existing catering facilities was highlighted; and,
- Concern was expressed that pre-planning ecological surveys may not be extensive enough to capture the baseline ecological scenario.

On 23rd of April 2019, CCC held an informal, non-statutory public consultation event at the Lehanmore Community Centre, Beara, Co. Cork. The purpose of the event was to prevent the proposed development to members of the local community (particularly those who may not have been able to make it to the Glengarriff event) and obtain their feedback on the proposal. The same materials presented at the Glengarriff event were also presented on this occasion.

A total of 6 no. submissions were received from attendees of the Lehanmore consultation event. The main feedback received at the event and in subsequent written submissions was as follows:

- Potential economic benefits for the local community as a result of the proposed development were regarded positively by several attendees;
- Existing and future traffic problems (with respect to congestion, safety and informal parking) on the R572 were key concerns and the need for appropriate road improvement works was emphasised;
- Concerns were raised regarding the condition of the existing public road on Dursey Island;
- The pricing of the proposed ticketing system (particularly rates for islanders) was queried;
- A desire to see improved broadband connectivity, waste collection and mobile phone coverage for the local community was expressed;
- A desire to see the needs of islanders (i.e. in terms of parking, domestic waste collection and use of the cableway) accommodated was expressed
- A desire to see the local flora and fauna conserved was expressed; and,
- Queries were raised regarding the proposed CPO of private lands for the completion of road improvement works (with respect to compensation, locations of proposed works, and restoration of land prior to works).

The responses received during the public consultation informed the design of the development and the environmental assessments. The concerns raised have been addressed, where appropriate, throughout this EIAR.

1.7 Statutory Consultations

A copy of this EIAR is being provided to the prescribed bodies as required by Part 18, Article 213 of the *Planning and Development Regulations 2001-2019*. Additionally, the EIAR and NIS will be available for inspection by interested parties at the following locations, as detailed in the published newspaper notices:

- CCC Head Offices, County Hall, Carrigrohane Road, Cork (Office Hours 9am - 5pm, Monday to Friday);
- CCC West Cork Area Office, Foildarrig, Castletownbere, Co. Cork, (Office Hours: 9am – 5pm, Monday to Friday, closed 1-2pm each day); and,
- CCC Planning Department, Norton House, Skibbereen, Co. Cork (Office Hours 9am - 5pm, Monday to Friday).

All 3 volumes of this EIAR may also be purchased from the CCC Head Offices at County Hall. Alternatively, the EIAR can be viewed on the CCC website at www.corkcoco.ie.

1.8 Difficulties Encountered

No significant difficulties have been encountered in compiling the required information to complete this EIAR. It should be noted that the surveys, assessments and information that form the basis of this EIAR are based on the current design of the proposed development, which has been developed to a stage that permits a fully informed EIA. While some developments and refinements of the current design may occur during the detailed design stage, any such iterations of the development, if approved, will not include any significant adverse impacts on the environment not addressed within this EIAR.

1.9 References

EPA (2017). *Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports*.

Chapter 2 Need for the Proposed Development

2.1 Introduction

This Chapter sets out the need for the proposed Dursey Island Cable Car and Visitor Centre development and provides an overview of the planning and development policy context under which the proposed development is being progressed. It also presents a description of the existing context of the site and an overview of the studies which have informed the design progression of the proposed development. The objectives of the proposed development are also presented herein.

2.2 Existing Environment

The site of the proposed development is that of the existing Dursey Island Cable Car, situated on the Beara Peninsula, in west Co. Cork. The cableway connects the western end of the peninsula (at the townland of Ballaghboy) with the easternmost tip of Dursey Island. It is the only cableway in Ireland, and one of the only aerial ropeways in Europe to traverse open ocean. The mainland-side cable car site is at a distance of approx. 22km from the nearest major town of Castletownbere, approx. 145km from Cork City, and approx. 12km from the smaller village of Allihies. Primary access to the site is via the R572 Regional Road from Castletownbere.

The cableway is situated in the rural electoral division (ED) of Kilnamanagh, which takes in the western tip of the Beara Peninsula and Dursey Island. The ED has an area of 37km^2 and, in 2016, had a population of 342 (CSO, 2017a). Of these, just two individuals currently live permanently on Dursey Island. The population of the island, which has decreased dramatically from 53 in 1966 (CSO, 2017b), is now in danger of disappearing completely.

The cableway conveys visitors and tourists – and to a much lesser degree, islanders – to-and-from the island. Island residents are entitled to skip queues (which at times are very long) and also travel on the cable car free-of-charge. The existing cableway consists of a pair of pylons, the cable car itself, the steel ropeway upon which it travels, a mainland-side driving station (which houses the operator, cableway hauling mechanism and welfare facilities), an island-side return station, landing platforms with steel guardrails on both mainland and island, an informal 70-space visitor car park on the mainland, and a small (approx. 10-space) residents' car park on the island. The cable car (which carries a maximum of six passengers) departs from the mainland landing platform (adjacent to the station) and travels approx. 374m over the visitor car park and the Dursey Sound to the Dursey Island landing platform in 6 – 7.5 minutes (one direction).

British Ropeway Engineering Co. Ltd. provided the original cable car (in 1969), which was subsequently replaced in 1981 and again in 2004, making the current cable car the third incarnation. Due to corrosion of the steelwork, the pylons were dismantled, and two new galvanised steel structures were erected in their place in 1977. Apart from these upgrades, and the replacement of serviceable components such as ropes and fixings, many of the original components remain. The cableway is situated on Cork County Council (CCC) lands and the service itself is operated by the County Council. The landmark cableway and its history constitute an important part of the area's cultural heritage.

Plate 2.1 Existing Dursey Island Cableway and site of proposed development

The surrounding environment is one of exceptional natural beauty. The rugged, treeless landscape is dominated by undulating landforms, indented rocky coastline and open Atlantic seascapes. Thin soils are punctuated by exposed purple and green sandstone and siltstone. CCC have classified the local landscape type as 'Rugged Peninsulas' under their Draft Landscape Strategy (2007) – a landscape type considered to be of national importance, with 'Very High' value and 'Very High' sensitivity. Holiday homes and farmsteads are scattered along the approach road from Castletownbere. Both the island and mainland are highly scenic, and panoramic views abound. At the mainland side of the site, the landform slopes steeply towards and overlooks Dursey Sound, creating an impressive vista of the island and cableway. On a clear day, the Skelligs can also be made out when looking north-west from this point.

The vegetation on both mainland and island is a mosaic of dry siliceous heath and dry-humid acid grassland habitats. Grazing pressure is particularly heavy on the island, where vegetation is consequentially somewhat stunted. There are a number of designated protected sites of ecological importance within and/or in the vicinity of the study area, including the Beara Peninsula Special Protection Area (SPA) and the Kenmare River Special Area of Conservation (SAC). A number of protected species of flora and fauna are found in the area, including Betony (*Betonica officinalis*), red-billed chough (*Pyrrhocorax pyrrhocorax*), fulmar (*Fulmarus glacialis*), peregrine falcon (*Falco peregrinus*), common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*Pipistrellus pygmaeus*).

Dursey Island itself has an area of approx. 5.98km² (Google Maps, 2019) and is orientated in a north-westerly to south-easterly direction. It is separated from the mainland by the Dursey Sound – a rocky and dangerous tidal channel seldom traversed by boat. A high elevation spine runs along the length of the island, from its south-western to its north-eastern points. Punctuating this spine from south-west to north-east are a series of distinct peaks at 144m, 252m, 193m, 152m and 171m AOD, respectively. Farmland is concentrated on the sheltered south-eastern flank of the island, while the less accessible, windswept north-western flank and hilltops are dominated by open heathland. Access to residences is via a tarmacadam road which runs from the cable car landing point through the settlements of Ballynacallagh and Kilmichael and terminating at Tilickafinna – the most westerly settlement on the island. The built environment consists of scattered ruinous houses, renovated houses and traditional farm buildings. Field boundaries are low, stone-faced, earthen embankments or dry-stone walls – some surmounted by post-and-wire fencing.

Principal land uses in the area are transportation (automotive and cable car), recreation/amenity/tourism and agriculture. The recreation value of the site is high. The cableway itself is the primary visitor attraction. Additionally, both the island and mainland are popular with hikers following the Beara-Breifne Way (also refers to the overlapping Beara Way). This national waymarked walking route – which follows the legendary 1603 march of O'Sullivan-Beare and his supporters from Cork to Leitrim – starts on Dursey before crossing onto the mainland – and, as such, taking in the cable car journey. The island also offers a number of sight-seeing and recreational activities to visitors, including St. Mary's Abbey, the 360° views at the old signal tower, and sign-posted whale-watching and rock fishing spots. Farming in the area is almost exclusively pastoral, with both dry stock cattle and sheep farming represented.

Infrastructure in the area is limited. On the mainland, there is no public water supply system – although there is a well at the site of the existing visitor car park. There is no public wastewater treatment drainage network. Existing public toilets at the mainland cableway station are serviced by a septic tank which is periodically desludged. On the island, there is a small-scale water supply network serving approximately 25 properties, but not extending to the eastern end of the island. The island has a single phase electricity supply network. There is no gas networks supply to either the mainland or island sides of the site. There is no formal waste collection service on Dursey Island.

2.3 Overview of Proposed Development

The proposed development will include the construction/completion of the following elements at the site of the existing Dursey Island Cable Car and on the R572:

- Erection of a two-car desynchronised reversible ropeway cableway ('cableway' hereafter)[1] with a capacity of 200-300 passengers per hour in each direction;
- Erection of two supporting line structures ('pylons' hereafter) - one on the mainland and one on the island;
- Construction of a mainland-side drive station ('mainland station' hereafter) including all necessary operating machinery, facilities for operating staff, and a platform for embarking/disembarking;
- Construction of an island-side return station ('island station' hereafter) including all necessary operating machinery, platform for embarking/disembarking, a sheltered waiting area and welfare facilities;
- Construction of a mainland-side interpretive exhibition centre with a gift shop ('Visitor Centre' hereafter);
- Construction of a mainland-side café with seating for 40 indoors, an additional 44 seats on an outdoor terrace/balcony overlooking the Dursey Sound, and welfare facilities;
- Construction of a mainland-side visitor car park with approx. 100 no. parking spaces and 1 no. bus bay;
- Retention of the existing residents' car park on Dursey Island;

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[1] The term 'Cable Car' refers to the carrier cabin which conveys passengers to and from the island via the cableway.

- Upgrades of associated utilities infrastructure (including mainland water supply and telecommunications connectivity and mainland and island wastewater treatment systems);
- Completion of road improvement works (construction of 10 no. passing bays and 1 no. visibility splay, and completion of a number of local improvements to enhance forward visibility) on an 8km stretch of the R572 (between the R572-R575 junction at Bealbarnish Gap and the mainland side of the cable car site);
- Demolition/removal of some elements of the existing cableway infrastructure (ropeway, island-side pylon), mainland-side visitor car park and island and mainland station buildings;
- Erection of interpretive/informative signage at strategic locations;
- Erection of 4 no. Variable Message Signs (VMS) at four locations along the approach roads to the site:
    1. Bealbarnish Gap;
    2. R572 at Castletownbere;
    3. R575 at Eyeries Cross; and
    4. N71 at Glengarriff;
- Retention of the cable car, mainland pylon and a section of the mainland-side hauling machinery of the existing cableway in order to facilitate ongoing appreciation of their industrial architectural and cultural heritage value;
- Soft and hard landscaping; and
- All other ancillary works.

2.4 Objectives of the Proposed Development

The overriding objective of the proposed development is to create a coherent, distinct environmentally sensitive and considered tourism destination at the existing location of the Dursey Island Cable Car.

CCC's vision for the proposed development, as set out in the project brief, includes the following:

- The Council expects *"a design led integrated approach […] having regard to the unique and sensitive site context"* and *"a strong embedded sustainable and contemporary engineering and architectural design ethos, informed by the unique and sensitive context which will deliver an iconic and award-winning design outturn for a unique location"*.
- The design of the mainland-side visitor interpretive centre *"is to be simple and respectful of the site context and with an expression that reflects its function, with robust architectural language that is appropriate to its function and relates to its context. The building is to offer a unique and dramatic heritage destination that will deliver a compelling experience offering discovery and informative opportunities for the visitor and local people alike. […] The external finishes and layout shall be sympathetic and in harmony with the surrounding landscape […] The building shall be bespoke and be of a very high architectural standard befitting the unique nature of the site and project. The building shall be an iconic landmark destination point on the [WAW]"*.
- The island-side visitor waiting area *"shall at a minimum, comprise of a large seated open space, audiovisual and information/interpretative display area and internal toilet block. […] The building, although basic in function, shall be of a*

very high architectural standard befitting the unique nature of the site and project. The building shall be an iconic welcoming landmark for visitors onto the island".

- The external finishes of all structures *"shall be sympathetic and in harmony with the surrounding landscape [and] capable of withstanding a severe marine environment with minimal yearly maintenance. […] The major structural elements are to have a 50 year design life with all other components to meet the design life of the applicable Regulations and Standards with necessary increases in specifications to reflect the exposure conditions".*
- The site shall be *"fully landscaped [and] low maintenance".*

2.5 Need for the Proposed Development

Originally constructed primarily for the use of local inhabitants and farmers, the cableway is now predominantly used by tourists, many of whom visit the island to use its walking routes (including a section of the national, waymarked Beara-Briefne Way). The site itself is located on the Wild Atlantic Way (WAW) tourist route (which runs the length of the west coast) and Dursey Island is one of fifteen 'Signature Discover Points' of the route.

However, in recent years, the limited capacity and the slow turnaround of the cable car have resulted in substantial untapped tourism potential. In the peak in-season months of July and August, the cableway is currently operating continuously during its opening hours, transporting approx. 4,650 persons to-and-from Dursey Island per month. This number is roughly the upper monthly limit which can be accommodated by the existing infrastructure (assuming it continues to operate with the same hours). Thus, the existing infrastructure is incapable of meeting current or future demand at peak times.

Plate 2.2 Portion of existing cableway infrastructure, including the cable car and the pylon

Additionally, in its current state, the attraction provides site visitors with a suboptimal – and, at times, unpleasant – visitor experience. During the peak months of July and August, there are substantial wait times, with some visitors queuing for over two hours to use the cable car on mainland and island, sometimes in inclement weather. Protracted waiting times are the principal complaint of site visitors. Furthermore, there is inadequate shelter and seating for site visitors on both the island and mainland, and there are no public toilets on Dursey Island. Visitors have also complained about the lack of practical and interpretive information at the site and on Dursey Island. There is insufficient signage, for instance, regarding the routes, durations and difficulty levels of walking trails on the island.

Furthermore, inspections of the existing cableway carried out by ROD have found evidence of substantial corrosion on the structures, including both pylons. While there are no immediate safety concerns for cable car users, the existing infrastructure is not (and cannot be) compliant with the European Standards for '*The Safety Requirements for Cableway Installations Designed to Carry Persons*', S.I. No. 470/2003 or S.I. 766/2007. As such, to ensure the continued safe transportation of persons (particularly island residents and farmers) and goods/services to-and-from the island, the Dursey Island Cable Car will need to be upgraded/replaced in the short to medium-term.

While the island's population increases during the summer months, there are currently just two permanent residents on Dursey Island. According to the *West Cork Islands Integrated Development Strategy 2010*, the island is "*threatened by permanent depopulation*" (p. 96). Abandonment of agricultural land (and subsequent encroachment of scrub) is also in evidence on the island – and this poses a threat to the resident population of red-billed chough (*Pyrrhocorax pyrrhocorax*), which requires a tightly grazed sward for its foraging habitat. In order to prevent total depopulation and further land abandonment, it is imperative that the cableway continue to operate in the long-term.

In light of the current scenario, the proposed development will be beneficial principally in the following ways:

1. It will allow a greater number of visitors to travel on the cableway to Dursey Island and will attract a greater number of visitors to the site in general. As a result, following the payback period, the site will generate greater revenue for CCC. It will also create direct and indirect economic benefits for the locality, region and broader area (particularly along the WAW). On Dursey Island, in particular, where annual visitor numbers will increase substantially, there will be opportunities for the establishment of new businesses. There will be a greater number of employees at the proposed development (20 – 30 at any one time during the construction phase and 3 – 5 more full-time roles during the in-season months of the operational phase). Additionally, a survey of visitors carried out for the purposes of this EIAR indicates that many site visitors also visit other attractions in the locality, region and/or on the WAW in the same trip. As such, increasing visitor numbers at the site is also likely to result in increased visitor numbers elsewhere.
2. Completion of the proposed development will substantially enhance the overall experience for site visitors. Comfort and welfare of guests will be significantly improved by the provision of proper welfare facilities, shelter, seated waiting areas, and heated buildings (including a café) on the mainland. Additionally, the provision of interpretive information on the cultural and natural heritage of the area, and practical information on available activities on the island – all presented in a state-of-the-art Visitor Centre – will serve to enrich the overall

experience. Since Dursey Island is a Signature Discovery Point of the WAW, completion of the proposed development will also serve to enhance the quality of the overall offering of the WAW experience brand.

3. Unlike the existing infrastructure, the proposed cableway will be fully compliant with all relevant European safety codes. Its completion will substantially improve the safety and comfort of visitors and local persons travelling in the cable car over the years to come.
4. Completion of the proposed development will ensure the future provision of a safe, comfortable, sustainable means of access and transportation of essential goods and service to-and-from the island for island residents and farmers. When visitors are not traveling on the outbound journey, and in general on the return journey (i.e. island to mainland), the cable car journey will also be faster for residents (max speed of 6 m/s as opposed to 0.8 m/s at present). As a result, the proposed development may increase the viability of full-time residence/work on the island, thereby acting against the ongoing trend of population decline and land abandonment on Dursey Island. At the very least, it will ensure that the declining quality of the existing infrastructure does not exacerbate the ongoing depopulation problem.

2.6 Policy Context

A range of multilateral, European, national, regional and local planning policy documents have been reviewed in order to inform the design progression of the proposed development. The review established that the proposed development is consistent with objectives of Irish planning policy and supports the sustainable development of Dursey Island. The key policy documents that have informed the proposed development are outlined in the following sections.

Table 2.1 Planning policies with which the proposed development is consistent

	Policy Documents:
Multilateral Policy	United Nations 2030 Agenda for Sustainable Development
European Policy	Europe 2020 Strategy
National Policy	Project Ireland 2040: National Planning Framework (2018) and the National Development Plan (2018-2027)
	Rural Development Plan (2014 – 2020)
	Realising Our Rural Potential – Action Plan for Rural Development (2017)
	People, Place and Policy - Growing Tourism to 2025 (2015)
	Building on Recovery – Infrastructure and Capital Investment (2016 – 2021)
	National Spatial Strategy (2002-2020)
Regional Policy	Draft Southern Regional and Spatial Economic Strategy (2019 – 2031)
Local Policy	Cork County Development Plan (2014 – 2020)
	Kerry County Development Plan (2015-2021)
	Cork Tourism Strategy 2016: Growing Tourism in Cork – A Collective Strategy
	West Cork Municipal District Local Area Plan (2017)

	Policy Documents:
	West Cork Islands Integrated Development Strategy (2010)

The respective objectives of these policy documents and how the proposed development aligns with these objectives is outlined in the following sections.

2.6.1 Multilateral Policy Context

United Nations 2030 Agenda for Sustainable Development

Since 2015, Ireland has been a signatory to the United Nations (UN) 2030 Agenda for Sustainable Development, which enshrines the 17 'Sustainable Development Goals' (SDGs) in UN policy. The SDGs frame national agendas and policies to 2030. By facilitating increased visitor numbers at the site and on Dursey Island, the proposed development is consistent principally with SDG no. 8, 'Decent work and economic growth'. The proposed development is also consistent with SDG No. 9 "Industry, Innovation and Infrastructure" and SDG No. 11 "Sustainable Cities and Communities".

2.6.2 European Policy Context

Europe 2020 Strategy

The Europe 2020 Strategy is the European Union's agenda for growth and jobs for the current decade. The strategy outlines five key targets which promote *"smart, sustainable and inclusive growth"*. Among them is the target of 75% employment among the population aged 20-64. By facilitating greater visitor numbers, promoting local economic growth and introducing new amenities to the site in question (namely, a Visitor Centre and café), the proposed development will create direct and indirect employment opportunities and will be consistent with the objectives of the Europe 2020 strategy.

2.6.3 National Policy Context

Project Ireland 2040: National Planning Framework (2018) and the National Development Plan (2018-2027)

'Project Ireland 2040' is comprised of (i) the National Planning Framework (NPF) and (ii) the National Development Plan (NDP) 2018-2027 of the Irish government. The NDP sets out the state capital investment required to support the implementation of the NPF.

The overarching aim of the NPF is *"to cater for the extra one million people that will be living in Ireland, the additional two thirds of a million people working in Ireland and the half a million extra homes needed in Ireland by 2040"* (p. 8). Its objectives primarily address housing, employment, education and connectivity between regions and municipalities.

The proposed development is consistent with a number of the NPF's National Policy Objectives (see Table 2.2) and two of the NDP's ten 'National Strategic Outcomes' (NSOs) – 'Strengthened Rural Economies and Communities' (NSO No. 3) and 'Enhanced Amenity and Public Heritage' (NSO No. 7).

NSO No. 3 – Strengthened Rural Economies and Communities

According to the NDP, investment in *"activity-based tourism"*, is required in order to support rural economies, and constitutes a *"priority"* of the plan (p. 49). Additionally, with respect to NSO No. 3, the NDP states that *"The maintenance of sustainable* *island communities off our coast is closely aligned with the National Planning Framework's national policy objective of supporting the growth and development of the maritime economy in coastal communities and on the islands. Safe access by sea for island communities is crucial to the achievement of this aim"* (p. 51). By facilitating economic growth and providing safer, more comfortable and faster access to-and-from Dursey Island, the proposed development supports NSO No. 3.

NSO No. 7 – Enhanced Amenity and Public Heritage

With respect to NSO No. 7, the NDP expresses the government's commitment *"to maintain and protect heritage assets that are precious to local communities and important contributors to wellbeing and social cohesion"* (p. 72). The Dursey Island Cable Car constitutes an important regional landmark of significant historical and cultural heritage value to the local community. By re-developing the existing cableway, providing access to the natural and cultural heritage of Dursey Island, retaining key elements of the existing cableway, and providing interpretive information on the history of the cableway and the locality, the proposed development is aligned with NSO No. 7.

Table 2.2 National Policy Objectives of the NPF with which the proposed development is consistent

	National Policy Objectives:
1c	The Southern Region: around 220,000 (0.22m) additional jobs, i.e. at least 880,000 (0.88m) in total.
13	Protect and promote the quality, character and distinctiveness of the Irish landscape, the sense of place and culture that make Ireland's rural areas authentic and attractive as places to live, work and visit.
16	Enhance, integrate and protect the special physical, social, economic and cultural value of built heritage assets through appropriate and sensitive use now and for future generations.
41	Support the growth and development of the maritime economy, particularly in remote coastal communities and islands.
70	Ensure that all plans, projects and activities requiring consent arising from the [NPF] are subject to the relevant environmental assessment requirements including SEA, EIA and AA as appropriate.

Rural Development Plan (2014 – 2020)

The Rural Development Plan (RDP) of the Department of Agriculture, Food and the Marine (DAFM) aims to (i) promote the competitiveness of the Irish agri-food sector, (ii) bring about more sustainable management of natural resources, and (iii) ensure more balanced development of rural areas.

The RDP outlines six priorities for rural development. Among them is Priority 6, which sets out "*the need to support social inclusion, poverty reduction and economic development in rural areas.*" (p. 66). As stated in the policy document, *"there is a body of evidence suggesting that rural towns and their hinterlands have felt the negative impacts of the economic downturn in the recent past more than other areas. […] In this context, locally based initiatives to stimulate local/rural development are required"* (p. 63). An explicit target of the plan is the creation of new rural jobs, and tourism is cited as one sector which has scope for generating local economic growth.

By creating new jobs in the tourism and hospitality sectors and creating opportunities for economic growth, the proposed development is likely to promote local economic development on the Beara Peninsula and is thus aligned with Priority 6 of the RDP.

Realising Our Rural Potential – Action Plan for Rural Development (2017)

Building on the recommendations of the Commission for the Economic Development of Rural Areas (CEDRA) in their 2014 report, 'Energising Ireland's Rural Economy', and the subsequent Charter for Rural Ireland (2016), the government developed its Action Plan for Rural Development (APRD) in 2017. The plan aims to promote "*the economic, social and cultural development of rural Ireland*" (p. 9).

The APRD sets out five thematic pillars and corresponding suites of objectives. Pillar 3, 'Maximising our Rural Tourism and Recreation Potential', has four objectives, the first two of which are considered to be of relevance to the proposed development (Table 2.3). By facilitating greater visitor numbers at the site in question, bringing about the creation of new jobs, and building on the success of the WAW experience brand, the proposed development supports the first two objectives under Pillar 3 of the APRD.

Table 2.3 Objectives associated with Pillar 3 of the APRD which are supported by the proposed development

	Pillar 3: Maximising our Rural Tourism and Recreation Potential – Objectives:
1	Increase tourist numbers to rural Ireland by 12% by 2019.
2	Support sustainable jobs through targeted rural tourism initiatives, including through the support of key marketing initiatives such as Ireland's Ancient East and the [WAW], as well as developing the potential of Ireland's Lakelands.

People, Place and Policy Growing Tourism to 2025 (2015)

This policy document outlines the government's *"long term vision"* for the tourism sector in Ireland (p. 5). It sets out three overarching goals:

(i) By 2025, revenue from overseas visitors, excluding carrier receipts, will increase to €5 billion in real terms;

(ii) Employment in the tourism sector will be 250,000 by 2025, compared with around 200,000 at present; and

(iii) There will be 10 million visits to Ireland annually by 2025.

The document outlines a series of Policy Proposals that it believes will contribute to the achievement of the aforementioned goals. Policy Proposals of the plan which have been deemed to be of relevance to the proposed project are listed in Table 2.4, below.

Table 2.4 The Policy Proposals of 'People, Place and Policy Growing Tourism 2025' which are supported by the proposed development

	Policy Proposals:
1.1.1	Tourism Ireland's marketing of Ireland as a visitor destination will be evidence based and <u>targeted at a range of geographical and segmental markets</u> with the highest revenue growth potential, and the evidence for these decisions will be shared with industry partners.

	Policy Proposals:
1.3.1	The provision of future State supports for capital investment in tourism shall be designed to <u>support development that fits within the brand architecture and consumer segmentation model</u> and will require that supported projects are compliant with the requirements of relevant European and national environmental regulations.

In accordance with the government's vision for the overall tourism sector, the proposed development has been designed with the national experience brand framework (the WAW, in this case) and the associated marketing segments (Culturally Curious, Social Energisers and Great Escapers) in mind.

Building on Recovery – Infrastructure and Capital Investment (2016-2021)

'Building on Recovery' is the government's framework for infrastructure investment in Ireland over the period from 2016 to 2021. It states that "*The Exchequer transport capital allocation is largely framed by the recommendations and priorities set out in the recently published Strategic Investment Framework for Land Transport. These priorities are threefold: to maintain and renew the strategically important elements of the existing land transport system; to address urban congestion; and to improve the efficiency and safety of existing transport networks*". By improving the efficiency and safety of the principal means of transportation to-and-from Dursey Island, the proposed development contributes the achievement of these objectives.

National Spatial Strategy (2002-2020)

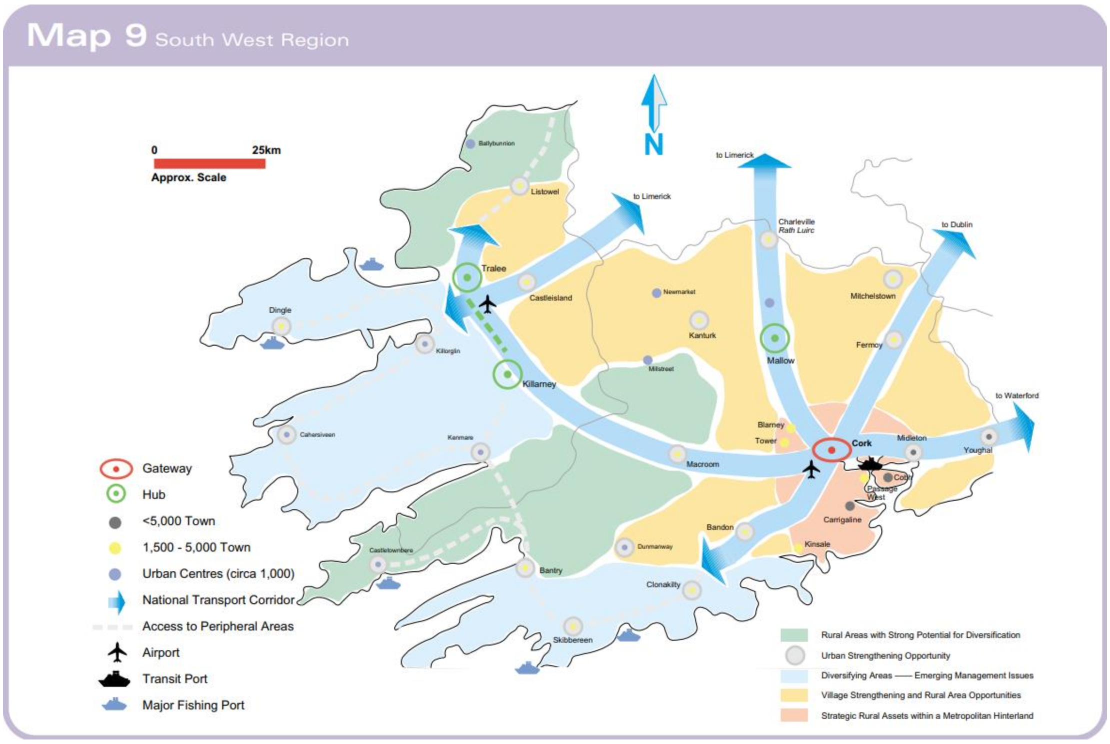

Plate 2.3 National Spatial Strategy – South West Region

The National Spatial Strategy 2002-2020 (NSS) aims to deliver a better balance of social, economic, physical development and population growth between regions. The strategy focuses on people, places and building communities. It recognises that, through closer matching of where people live with where they work, Ireland will be able to sustain (i) a better quality of life for people, (ii) a strong, competitive economic position, and (iii) an environment of the highest quality.

Co. Cork is located in the South West Region of the NSS (Plate 2.3). Dursey Island is identified within an area which falls into the category, 'Rural Areas with Strong Potential for Diversification'. In these areas, there is potential for rural economic diversification and development in the tourism, forestry, enterprise or marine sector, or a mix thereof. The Strategy states that identifying *"such potential and activating it needs to be a focus in these areas for local communities and business groups supported by bodies such as the County Development and County Enterprise Boards and relevant government departments and agencies"* (p. 76). By activating the latent tourism potential of Dursey Island, the proposed development supports the aims of the NSS with respect to rural areas.

2.6.4 Regional Policy Context

Draft Southern Regional, Spatial and Economic Strategy (2019 – 2031)

Each of the three regional assemblies – Southern, Eastern & Midlands and Northern & Western – are tasked with developing their own Regional, Spatial and Economic Strategies (RSESs) to facilitate the implementation of the NPF and NDP. The Southern Assembly – whose jurisdiction includes the site of the proposed development – has published a draft RSES. The draft RSES provides a 12-year strategic framework for planning and economic development. It sets out over 200 Regional Policy Objectives (RPOs). The proposed development supports the achievement of many of these RPOs. The most relevant of these are listed in Table 2.5, below.

Table 2.5 Selection of RPOs of the Draft Southern RSES whose achievement is supported by the proposed development

	Regional Policy Objectives:
51.	**Tourism** It is an objective to: a. Enhance provision of tourism and leisure amenity to cater for increased population in the Region including recreation, entertainment, cultural, catering, accommodation, transport and water infrastructure inter alia; b. Promote activity tourism; c. Sustainably develop the road network and public transport services and facilities for improved visitor access, longer dwell times due to improved connectivity to ports and airports and tourism growth; […]
52.	**Tourism and the Environment** Development of new or enhanced tourism infrastructure and facilities should include an assessment of the environmental sensitivities of the area including and Environmental Impact Assessment (EIA); Appropriate Assessment (AA) and Strategic Flood Risk Assessment (SFRA) if required in order to avoid adverse impacts on receiving environment. Where such tourism infrastructure or facilities are developed, the managing authority/agency should ensure that effective monitoring protocols are put in place to monitor and assess the ongoing effects of tourism on sensitive features with particular focus on natural, archaeological and built heritage assets.

	Regional Policy Objectives:
81.	**Island and Coastal Communities** It is an objective to seek investment in the sustainable development of infrastructure (physical and social), access (upgraded pier infrastructure, landing facilities, and passenger and cargo ferry services), regional connectivity (transport networks and digital), enterprise growth and deliver initiatives by Local Authorities, UnG, local communities and other stakeholders to strengthen and sustainably grow our region's island and coastal communities. Robust site selection and environmental feasibility is required in advance of seeking investment including all necessary flood risk assessments.
153.	**Intra-regional Rural Connectivity** Investment in the sustainable development of fully accessible infrastructure that strengthens intra-regional rural connectivity including rural public transport services as 'lifelines' which are important routes on the road network <u>connecting communities in remote locations and smaller scaled settlements with larger scaled settlements to access important services.</u>
165.	**Tourism Corridors** Invest in the sustainable development of infrastructure and service improvements on the transport networks along our region's key tourism corridors, subject to robust feasibility studies to reduce impacts on the environment and required appraisal, planning and environmental assessment processes, including the [WAW], Ireland's Ancient East and Ireland Hidden Heartland Corridors.
194.	**Natural Heritage, Biodiversity and Built Heritage Assets** To support initiatives that enhance and protect our region's unique natural heritage, biodiversity and <u>built heritage assets.</u>
196.	**Better Public Access** To promote initiatives that provide better public access for abled and disabled visitors to our historic, built and natural environment. Local authorities should ensure that decision making on projects/developments to improve public access and facilities are informed by an appropriate level of environmental assessment.

2.6.5 Local Policy Context

Cork County Development Plan (2014 – 2020)

Local Authorities are tasked with developing 6-year development plans, outlining county planning and development strategy in accordance with regional and national-level policy. The Cork County Development Plan is the county's principal planning and development policy document.

Under the Plan, the County has been subdivided into four 'Strategic Planning Areas': (i) County Metropolitan, (ii) Greater Cork Ring, (iii) North Cork and (iv) West Cork – the site of the proposed development belonging to the latter. Eleven objectives have been set out for the West Cork Strategic Planning Area. Of these, two are of relevance to the proposed development (see Objectives CS 4-4(g) and CS 4-4(i) in Table 2.6, below).

Objectives have also been outlined for a number of key planning and development subject areas, including 'Rural, Coastal and Islands', 'Economy and Employment' and 'Tourism'. Of these, relevant objectives are presented in Table 2.6.

The proposed development, which will facilitate greater access to Dursey Island for both islanders and visitors, promote local economic development, and will do so in a manner that is informed by environmental and cultural heritage considerations, is in line with the objectives set out in the County Development Plan.

Table 2.6 Objectives of the Cork County Development Plan which are of relevance to the proposed development

	Objectives
CS 4-4 (g)	Recognise the need to encourage the diversification of the rural economy by promoting a stronger tourism and leisure economy both through the protection of [West Cork's] natural and built heritage and by encouraging appropriate new forms of employment development
CS 4-4 (i)	Protect and enhance the natural heritage of the areas coast including the West Cork Islands
RCI 10-1	**Supporting the Islands** Support the inhabited islands in County Cork and to recognise the special planning and development needs of islands and island communities, particularly access, infrastructure and services.
RCI 10-2	**Economic Development on the Islands** Support the economic development of the islands for the benefit of island communities generally and to encourage the development of speciality or niche economic sectors that might be appropriate to different islands in a manner that is compatible with environmental and landscape sensitivities as well as nature conservation designations pertaining to the islands.
RCI 10-3	**Development Proposals on the Islands** a. Support sustainable development proposals that are compatible with environmental and landscape sensitivities as well as nature conservation designations pertaining to the islands; and contribute to the long term economic and social development of the islands. b. Prioritise development that contributes to retention of the year-round population on the islands, that has a clear and identifiable economic and social benefit (that endures beyond the construction phase), and that is compatible with the capacity of the local community to accommodate it. […] Ensure that new development of any kind is sympathetic to the individual form and character of the islands' landscapes and traditional building patterns.
TO 1-2	**Tourism Opportunities** Facilitate the development of the tourism sector and provide for the delivery of a unique combination of tourism opportunities drawing on the network of attractions in Cork County and potential future attractions.
TO 2-1	**Protection of Natural, Built and Cultural Heritage** Protect and conserve those natural, built and cultural heritage features that form the resources on which the County's tourist industry is based. These features will include areas of important landscape, coastal scenery, areas of important wildlife interest, historic buildings and structures including archaeological sites, cultural sites including battlefields, the Gaeltacht areas, arts and cultural sites and the traditional form and appearance of many built up areas.
HE 5-1	**Cultural Heritage** Protect and promote the cultural heritage of County Cork as an important economic asset.

Kerry County Development Plan 2015-2021

The Kerry County Development Plan is the county's principal planning and development policy document. It sets out aims, objectives and policies which provide the framework for the sustainable economic and social development of the county, in accordance with higher level national and regional development policy. The proposed development is situated approx. 13km from Co. Kerry, as the crow flies. Due to the close proximity of the proposed development to Kerry – and, as a result, the potential for direct and indirect effects on development in the County – it is important that the proposed development is in line with the County Development Plan.

A survey of visitors to the Dursey Island Cable Car, conducted for the purposes of this EIAR, in June and July 2019, found that 14% of respondents also travelled to tourism destinations within Co. Kerry (including Kenmare town, the Ring of Kerry, and the Healy Pass) on the same trip. It follows that increasing the number of visitors to the Dursey Island Cable Car is likely to concurrently increase visitor numbers at similar tourist attractions in neighbouring Co. Kerry – and, indeed, at tourist attractions on the greater WAW. In doing so, the proposed development will contribute to the achievement of the strategic aim to *"Support sustainable tourism development in Kerry and strengthen the contribution that tourism makes to the local communities, culture and economy of the County"* (Core Strategy, p.13), and a host of tourism-related objectives of the County Development Plan, a selection of which is presented in Table 2.7.

Table 2.7 Objectives of the Kerry County Development Plan 2015-2021 which are most of relevance to the proposed development

	Objectives
ES-9	Promote and support the development of a sustainable tourism economy throughout the County and ensure Kerry develops as a centre of excellence in tourism.
T-2	Maximise the potential of tourism as a 'pillar of economic growth' which will contribute to the balanced economic development of the County and the tourism industry in the South West Region.
T-29	Sustainably promote the [WAW] tourism initiative which incorporates the entire Kerry coastline in partnership with Fáilte Ireland.
H-10	Promote sustainable recreational use of the countryside, marine and coastal areas within Co. Kerry.

Cork Tourism Strategy 2016: Growing Tourism in Cork – A Collective Strategy

The 2016 Cork Tourism Strategy seeks to increase the county's volume of domestic and international visitors by aligning the region closely with the immensely successful WAW experience brand. It aims to market Cork as 'Ireland's Maritime Paradise' and target three core market segments – the 'Culturally Curious', 'Social Energisers', and 'Great Escapers'.

The proposed development is very much aligned with the objectives of the county Tourism Strategy. The site – which is situated on the WAW coastal route – is well placed to match the vision set out in the Strategy. The tourism proposition of 'Ireland's Maritime Paradise' with supporting experience themes of maritime and outdoor leisure activities and a local, creative vibe engaging all of the senses, fits well with the proposed development. The proposed development has been designed to appeal to the aforementioned market segments.

West Cork Municipal District Local Area Plan (2017)

Local authorities are tasked with developing Local Area Plans (LAPs) for all of the municipal districts within their jurisdictions. The LAP sets out the detailed planning and development policy for the municipal district in question in accordance with the national and regional policies.

The site of the proposed development is within the jurisdiction of the West Cork Municipal District LAP. Certain objectives of the LAP point out that developments in the municipal district should be executed in accordance with the County Development Plan. Since the Cork County Development Plan has been discussed above, these particular objectives of the LAP will not be discussed here. The LAP also elucidates some general objectives for West Cork islands and specific objectives for Dursey Island. Of these, relevant objectives have been listed in Table 2.8, below.

Table 2.8 Objectives of the West Cork Municipal District LAP which are of relevance to the proposed development

	Objectives
GO-01	**General Objectives for West Cork Island Communities** […] c. Development proposals on the islands should be designed to ensure that water resources and the natural environment are protected. Protection and enhancement of biodiversity resources of the islands will be encouraged. Development on the islands will only be permitted where it is shown that it is compatible with the protection of sites designated or proposed to be designated for natural heritage. […] i. Maintain existing levels of services on the island and facilitate increased medical, emergency and recreational facilities, expanding community facilities where appropriate. j. Encourage sustainable tourist related development based on the natural and cultural heritage of the islands. k. Encourage and support where appropriate the implementation of objectives and actions outlined in the West Cork Islands Integrated Development Strategy, 2010 as it relates to the West Cork Island Communities where these are compatible with the objectives and policies of the West Cork Municipal District Local Area Plan, the Cork County Development Plan […] and the Conservation Objectives of any Natura Sites. […] m. Support rural transport initiatives and services on the Islands. […] p. Support and promote sustainable economic development on the islands. […]
General Development Objectives for Dursey Island	
GDO-01	Retain a sustainable population base of the Island and build on the existing facilities and economic activities on the Island […]
GDO-02	Conserve the landscape and cultural quality of Dursey while recognising the needs of its occupants and improving service provision to the island.
GDO-03	Support the development of sustainable tourism, <u>capitalising on the upgrading of the cable car</u> including the development of coastal and looped walks, and other forms of indigenous employment uses on the island where they can be suitably integrated into the setting of the island in a manner that is compatible with the conservation designations on and around the Island.

	Objectives
GDO-05	This Island is surrounded by the Kenmare River [SAC] and parts of the Island are within the Beara Peninsula [SPA]. This plan will protect the favourable conservation status of these sites. Development proposals as set out above should not be located within the SPA. Development on the island will only be permitted where it is shown that it is compatible with the requirements of the Habitats Directive and the protection of these sites.
GDO-06	Support the provision of public toilet facilities on the Island on a suitable site.

With respect to Dursey, the LAP states that *"the strategic aim for Dursey Island is to ensure that the island community can pursue their economic, social and cultural development, preserve and enhance their unique cultural heritage and engage in viable socio-economic development in order that the permanent population will be sustained and further increased"* (p. 212). It identifies "*the need to stabilise and increase the permanent population*" (p. 212) as the key issue facing the island. The lack of public toilets is flagged as an issue for visitors. According to the LAP, maximisation of Dursey Island's underexploited tourism potential through the replacement of the cable car is considered to be the most appropriate "*means of attracting residents, visitors and activity to the island*" (p. 213). It is also pointed out that "*sensitivity must be exercised in the consideration of appropriate and sustainable forms of development and a balance must be sought between recognising the needs of occupants and visitors alike whilst respecting the character and sense of place of the island*" (p.213).

The proposed development is fully aligned with this vision for Dursey Island. The anticipated increase in visitor numbers associated with the new cableway and visitor centre will bring economic development and new job opportunities to the area. It will also increase ease of access and transportation of goods/services to the island for residents and farmers. The proposed development will also involve the construction of island-side public toilets, in accordance with GDO-06 (see Table 2.7). The development will be designed and executed in a manner so as to minimise and, where necessary, mitigate against any adverse effects on natural and cultural heritage identified in this EIAR. The potential effects of the proposed development will be considered in an Appropriate Assessment, and a corresponding NIS will be submitted to An Bord Pleanála (along with this EIAR) as part of the planning application for the proposed development.

West Cork Islands Integrated Development Strategy (2010)

In 2010, the West Cork Islands Interagency Group and RPS Planning and Environment published a 10+ year strategy for the physical, economic, social and cultural development of seven West Cork Islands – Dursey Island among them. Similarly to the vision set out for Dursey in the West Cork LAP, the overarching aim for the island expressed in this Strategy is "*to conserve the landscape and cultural quality of Dursey, while recognising the needs of its occupants and improving service provision to the island*" (p. 2). A number of general objectives for all seven islands have been elucidated. Those of relevance to the proposed development are listed in Table 2.9 below.

Table 2.9 General island objectives of the West Cork Islands Integrated Development Strategy which are of relevance to the proposed development

	Objectives
PD7	To improve facilities at island and mainland access points and develop clear programmes for use of infrastructure.
PD9	To improve ferry/cable car services.
PD12	To instil pride of place on islands through appropriately scaled and developed public realm improvements and ongoing maintenance of the islands' built and natural environment.
PD13	To promote and support the conservation and protection of the islands' landscape while acknowledging the challenge that this landscape can present for island communities.
ED5	To support the competitiveness and continued development of existing local business on the islands.
ED7	To expand on the tourist potential of all islands and to ensure a strategic approach to the delivery of tourist facilities on each island.
SC1	To retain and enhance population levels on the islands.

With respect to the Dursey Island Cable Car, the Strategy states:

> *"The cable car to Dursey Island represents a significant piece of infrastructure that is of strategic importance in terms of tourism in the South West of Ireland. The cable car, which was replaced in 2009, is Ireland's only such facility. The cable car trip in itself is a unique experience in Ireland and its tourist potential should be maximised. It could attract additional visitors to Dursey, Beara and West Cork, with clear spin-off benefits for the West Cork Islands. A review of operating hours, pricing and promotion would support this objective."*

Additionally, a suite of Dursey Island-specific actions have been developed as part of an island action plan in the Strategy. Those considered to be of relevance to the proposed development are as follows:

- Ensure accurate timetable information for the cable car is displayed year-round;
- Review pricing scheme for the cable car;
- Investigate feasibility of securing additional core staff for the cable car;
- Maintain cable car shelter on the island in a clean condition;
- Ensure protection of the sensitive landscape setting of the island;
- Promote Dursey as a location for bird, whale and dolphin watching and for rock fishing;
- Continue to develop visitor facilities on the island in a sustainable manner; and
- Develop interpretation and education of the island's history.

The proposed development is very much in line with the objectives and action plan presented in the Strategy. It will provide enhanced access to-and-from the island for residents and visitors alike. By increasing visitor numbers on Dursey Island, it will contribute to local economic growth and job creation. In accordance with the Strategy's Dursey Island Action Plan, it has been proposed to feature historical information and information promoting the island-side whale, dolphin and birdwatching opportunities in the proposed visitor centre. It is also proposed to marginally increase the price of the cable car fare (although the precise prices have not been set out yet). The proposed development will be designed and executed so as to prevent, minimise and, where necessary, mitigate against any adverse effects on the environmental and cultural heritage of the site. It is hoped that the completed development will contribute to pride of place among local residents of both the island and mainland, and facilitate the preservation and dissemination of knowledge on the heritage of the area.

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Chapter 3 Alternatives Considered

3.1 Introduction

Directive 2011/92/EU (as amended by Directive 2014/52/EU), Article 5(d) states that the information to be provided by the developer shall include "*a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment*".

Accordingly, this chapter describes the options which have been considered for the proposed Dursey Island Cable Car and Visitor Centre Development and which have led to the chosen design. The options fall under the following categories:

- Cableway Technology Options (4 no.)
- Cableway Alignment Options (3 no.)
- Architectural Design Options (3 no.)
- Overall Design Options (5 no.)

This chapter also outlines the multi-criteria analysis (MCA) appraisal process which was employed to select the most suitable option to advance. Additionally, the factors which influenced the design of the options, the constraints within the study area and the project brief itself are outlined.

3.2 Project Brief

Cork County Council developed the project brief for the proposed Dursey Island Cable Car and Visitor Centre Development to be executed at the site of the existing cableway. The brief sets out the Council's vision for the proposed development, including (i) the structural elements that they wish to be included in the design masterplan, and (ii) the principles upon which they wish the design to be based.

3.2.1 Requirements for Structural Elements

The Council set out a number of core structural elements which they wished to be included in the design for the proposed development (Table 3.1).

Table 3.1 Structural elements to be included in the proposed development and associated design requirements. Source: Cork County Council

Structural Element:	Brief Requirements:
Mainland-side Visitor Centre	• The building shall contain a large, open exhibition space, seated waiting area, information display area, ticket purchasing area, canteen, space for a café and retail units, toilets, interpretive panels detailing history and wildlife of the island, and a sheltered viewing area overlooking Dursey Sound and the new cableway • It shall have wireless internet connectivity • It may be separate from or connected with the mainland cableway station. • It shall be "simple and respectful of the site context and with an expression that reflects its function and relates to its context"

Structural Element:	Brief Requirements:
	• Its internal dimensions shall comfortably accommodate approx. 50,000 visitors annually • It shall be "bespoke" and "of a very high architectural standard befitting the unique nature of the site" • "The building shall be an iconic landmark destination point on the Wild Atlantic Way." • It shall "also provide space for community activities & special events such as lectures, readings, touring exhibitions, etc"
Island-side visitor waiting area	• Structure shall "offer shelter and discovery & information opportunities for the visitor and local people alike." • It shall "at a minimum, comprise of a large seated open space, audiovisual and information/interpretative display area and internal toilet block." • Internal dimensions of the structure shall accommodate 50,000 visitors annually. • "The building, although basic in function, shall be of a very high architectural standard befitting the unique nature of the site and project. The building shall be an iconic welcoming landmark for visitors onto the island." • It shall be capable of withstanding the "severe marine environment" while simultaneously not compromising appearance in any way.
Island station	• Building shall contain "all mechanical & electrical equipment & controls necessary for the safe operation of the cable car" • Its internal dimensions shall be sufficient to "facilitate on-going and future maintenance & servicing requirements"
Mainland station	• The building shall house "all mechanical & electrical equipment & controls necessary for the safe operation of the cable car, together with a small office/canteen area for the car operator." • Internal dimensions "shall be of sufficient size to facilitate on-going and future maintenance & servicing requirements"
Cableway	• To have 2 no. cable cars • Cable cars shall incorporate "potentially transparent elements and as a minimum, windows & information on sights visible from the cars" • "The major structural elements [of the cableway] are to have a 50-year design life with all other components to meet the design life of the applicable Regulations and Standards with necessary increases in specifications to reflect the exposure conditions." • "The cableway shall be capable of operating at the maximum speeds allowed by the EU and National Regulations and Standards."
Ancillary infrastructure	• Pathways • Hard and soft landscaping • Sufficient car parking on both mainland and island • Information and interpretive signage at strategic locations • Supporting water and wastewater infrastructure

3.2.2 Design Principles

In addition to the requirements set out for the various structural components, the following overarching design principles have also been outlined in the design brief:

- The development shall have “a design led integrated approach” […] “having regard to the unique and sensitive site context” (p.10)
- It shall advance “integrated and innovative design solutions that will be specific to the site.” (p.10)
- The “external finishes and layout [of all structures] shall be sympathetic [and] in harmony with the surrounding landscape” (p.11)
- All structures shall be “capable of withstanding a severe marine environment with minimal yearly maintenance” (p.11)
- The site shall be “Fully landscaped [and] low maintenance” (p.12)

3.3 Design Constraints

This section describes the environmental context of the study area and identifies key constraints – environmental and otherwise – that have been taken into consideration in the design and appraisal of the options presented in this chapter.

3.3.1 Geometric Constraints

The total area of the site of the proposed development is 1.8ha – with 1.79ha on the mainland and 0.01ha on the island.

Immediately after departing the mainland station, the cableway crosses a trafficked area on the mainland and, as such, a minimum clearance from the bottom of the carrier cabin to the surface of the road of at least 6.3m will need to be maintained. Additionally, Dursey Sound itself is – although dangerous – a navigable waterway. Here too, sufficient clearance will need to be maintained for navigable vessels using Dursey Sound (although there are no formal guidelines or standards which specify mandatory minimum clearances). Vertical clearance of the existing cableway over the Dursey Sound is approximately 25.2m above ordnance datum (AOD). Sufficient lateral clearance will also need to be allowed in order to prevent carrier cabins colliding with each other or with pylons when swaying due to wind.

3.3.2 Meteorological Constraints

Wind conditions have the potential to interfere with the operation of the proposed cableway development. A preliminary wind analysis has been carried out to compare the expected wind conditions at Dursey Island and the proposed cableway installation operational wind velocities. It is assumed that the cableway should cease operations during periods when wind speeds are equal to or exceed 30 metres per second (m/s) (Table 3.2).

Table 3.2 Assumed cableway levels of operational response associated with high wind speeds, as determined by preliminary wind analysis.

Wind Speed (metres per second):	Operational Response:
≥22m/s	Operator to monitor wind speed but cableway still in operation
≥25m/s	Operator to decrease carrier cabin speed and visually monitor their passage at pylons and landing platforms
≥30m/s	Operator to decrease carrier cabin speed to minimum and return them to nearest landing points before fully stopping cableway operation

Wind data from meteorological stations at Sherkin Island and Valentia Observatory indicate that, at the site of the proposed development, wind speeds of 30m/s have rarely been exceeded in the period 2005 to 2018, and only as a gust speed, with the exception of 2014 where on one day in mid-February, the highest 10 minutes mean speed exceeded 30m/s. Gust wind speeds of 25m/s and 30m/s are primarily exceeded between October and March. During Spring and Summer, the gust speed rarely exceeds 25m/s or 30m/s. Wind direction in the study region is predominantly south-westerly.

3.3.3 Infrastructure and Utility Constraints

Supporting infrastructure and utilities are limited in the study area. There is currently no broadband network connectivity and no gas network supply to either the mainland or island sides of the site.

Island-side Water Supply

On the island, there is a small-scale water supply network serving approximately 25 properties, but not extending to the western end of the island. In this delivery system, spring water is stored in a holding tank and disinfected on demand using chlorination and UV reactor treatments.

Island-side Wastewater Treatment

There are no public toilets available to visitors on the island side of the site. There is no formal wastewater drainage and treatment system in place on the island. Residences are serviced by private septic tanks.

Mainland-side Water Supply

At the mainland side of the site, there is a very limited water supply system – although there is a well at the site of the existing visitor car park.

Mainland-side Wastewater Treatment

There is no formal wastewater drainage and treatment system at the mainland side of the site. Existing public toilets at the mainland line station are serviced by a septic tank which is periodically de-sludged.

Electrical Services

Utility power for the existing cableway is routed directly into the mainland line station. The island has a single-phase electricity supply network.

Approach Road and Site Car Park

Access to the site is via the regional road (R572), much of which is wide enough only for one-way traffic, necessitating opposing traffic to give way. At times, vehicles are forced to reverse to suitable passing locations. Additionally, the winding nature of the road, which skirts around the peninsula's rocky outcrops, has resulted in limited forward visibility. Traffic congestion occurs during busy periods. The informal 70-space car park at the mainland landing point is often oversubscribed and its design is also known to cause traffic congestion at times.

3.3.4 Archaeological and Cultural Heritage Constraints

There are no protected archaeological or architectural elements within the site of the proposed development. However, there are a number of protected sites nearby. To the north of the proposed mainland landing point are the remains of an enclosure (CO126-043----). On Dursey Island, there is a cluster of protected sites to the south-west of the proposed landing point. Among them are the ruins of a church (CO126-012005-) and associated graveyard (CO126-012003-). On an islet just due south-west of this church, also recorded are the remains of at least seven huts (codes: CO126-030001- through CO126-030007-), a promontory fort (CO126-050----) and castle (CO126-012001-), the latter of which is associated with the famed historic local family of O'Sullivan-Beare. Other recorded protected sites to be found among this cluster are a set of steps hewn into rock (CO126-012002-) and a burial site from the late-1700s (CO126-012004-).

There are a number of protected archaeological sites adjacent to the approach road, R572 – an underground souterrain which is not visible at the surface (CO126-021----), a holy stone cemented to a stone wall (CO126-031----), and a 'coffin-resting stone' which resembles a flat-topped boulder (CO126-031001-). The latter is very close to the road. Just off the road at Scrivoge, there is also a protected building (reg. no. 20912605). These archaeological and cultural heritage sites are described in detail in Chapter 14 Archaeological and Cultural Heritage of this EIAR.

The national waymarked walking route, the Beara-Breifne Way, passes through the site of the proposed development.

While it is not a protected structure, the existing cableway is itself a west Cork landmark of substantial cultural heritage and historic value to communities in the region. It is the only operational passenger cableway in Ireland, and one of the only cableways in Europe to traverse open ocean.

3.3.5 Population and Land Use

The proposed development is situated in the Kilnamanagh electoral division. This electoral division takes in an area of 37km² including Dursey Island and the western end of the Beara Peninsula. In 2016, it had a population of 342. Of these, just two individuals have permanent residences on the island at present. It is considered under the West Cork Islands Integrated Development Strategy 2010 that the island is threatened with permanent depopulation.

Principle land use types in the vicinity of the proposed development are transportation, recreation and agriculture. With respect to transportation, infrastructure consists of the regional and local road network and the cableway itself. Residents of the island rely on the cableway infrastructure in order to move freely between Dursey and the mainland. A public road – which provides public access – cuts across the mainland side of the existing site.

With respect to recreation, the area is popular for walking and hiking, birdwatching and whale/dolphin watching. The Beara-Breifne Way, a waymarked national walking trail, passes through the site of the proposed development. Birdwatching and whale/dolphin watching activities are dependent on the preservation of local wildlife. The predominant type of agriculture in the area is pastoral, with both sheep and dry stock cattle grazing on private and commonage land.

3.3.6 Landscape and Visual Amenity

The study area is situated in a remote, picturesque, rural and coastal area. The surrounding landscape, which has been classified as Type 4 'Rugged Ridge Peninsulas' under the Cork County Council Draft Landscape Strategy (2007), is dominated by undulating landforms, indented rocky coastline and open Atlantic seascapes. This landscape character type is considered to be of 'very high' value ("Scenic landscapes with highest natural and cultural quality, areas with conservation interest and of national importance.", p.3) and 'very high' sensitivity ("extra vulnerable landscapes […] likely to be fragile and susceptible to change", p.3). Under the Landscape Strategy, Dursey Island is also classified as a distinct 'Landscape Character Area' (LCA). Tourism is identified as both a potential threat to this landscape type, and also a source of "potential progress". A number of recommendations are set out in the Landscape Strategy (p.32), including the following:

- "Encourage sustainable tourism by maximising the potential amenity value of water bodies within this [Landscape Character Type]."
- "Ensure that new development of any kind is sympathetic to the individual form and character of the islands' landscapes and traditional building patterns."
- "Support the development of rural Cork's inland and coastal marine leisure facilities."
- "Protect the scenic rocky promontories of Mizen Head, Beara and Sheeps head."
- "Have regard to the coastline's rich and diverse natural heritage and the concentration of NHA's and SAC's that are designated for protection."

It is an objective of the Cork County Development Plan 2014 to preserve the character of such high value landscapes set out in the Landscape Strategy.

The Cork County Development Plan 2014 sets out a series of scenic routes whose nature it aims to preserve. Of these, Route S118 is the only one which takes in views of the site of the proposed development: "R572 Regional Road from Castletownbere via Cahermore to Garnish Views of Bear Haven, Bear Island, Firkeel Bay, Dursey Sound & Island, the sea, Slieve Miskish Mountains & surrounding hills" (Volume 2, p. 109). It is an explicit objective of the County Development Plan to ensure that developments in the environs of scenic routes do not result in degradation of associated views, and to encourage appropriate landscaping and screen planting of such developments in order to minimise their visual impacts.

The Kerry International Dark-Skies Reserve is situated approx. 29km north-west of the site of the proposed development, on the Iveragh Peninsula, Co. Kerry. It is one of thirteen global International Dark-Sky Association certified reserves. The absence of light pollution at the site makes it ideal for star-gazing and astronomy. The continued success of the site depends on its un-light-polluted status.

3.3.7 Soils, Geology and Topography

Subsoil depths across the study area are low (up to 0.3m) with much exposed bedrock. According to the subsoil maps of the Geotechnical Survey of Ireland (GSI) and Teagasc, the prevailing subsoil classification across the area is 'Rock – Bedrock at surface'. The bedrock in question primarily consists of purple and green sandstone and siltstone of the Caha Formation.

The topography at the site of the proposed development – which is to be situated in the nearshore with some potential outfall into the foreshore – rises very steeply from the shoreline for approx. 2 – 5m, after which it transitions into a gentler slope of under 30° - although the slope is somewhat gentler on the island side. Elevation varies by a margin of 28 vertical metres across the site.

A geological fault of north-west to south-east orientation passes in the immediate vicinity of the proposed development on both mainland and island sides. An assessment of photographic evidence indicates that bedrock in the study area is very thinly bedded to laminated, with near vertical bedding planes oriented in a north-west to south-easterly direction. Discontinuities in the predominant discontinuity set (bedding) are generally planar, closed, slightly weathered and very closely spaced.

No landslide events have been recorded in the study area.

3.3.8 Hydrology and Hydrogeology

The site of the proposed development is immediately adjacent to the Atlantic Ocean and, more specifically, the shallow coastal waters of the Dursey Sound. These waters are included in the footprint of the protected Kenmare River SAC (see Section 3.3.9, below).

The study area is situated atop the Beara-Sneem Groundwater Body. High rates of groundwater recharge are unlikely here, since the steep local topography results in substantial runoff to sea. Recharge is further limited by the inherent low storage capacity and transmissivity of the underlying bedrock. The area is vulnerable, however, to groundwater contamination due to the absence of substantial topsoil – which would otherwise have a buffering effect on pollutants contained in runoff. It is considered that the majority of groundwater flow will occur in the upper 3m of rocks, and flow at depths of greater than 30m is only expected to occur in isolated fractures.

No flooding events have been recorded in the study area.

3.3.9 Biodiversity

Special Areas of Consevation (SACs) and Special Protection Areas (SPAs) – collectively referred to as 'Natura 2000' sites – are areas of especial ecological importance, designated for protection under EU Council Directive 92/43/EEC ('the Habitats Directive') and EU Council Directive 79/409/EEC ('the Birds Directive'), respectively. These sites have been designated due to the presence of one or more habitats/species of conservation concern ('Qualifying Interests') listed in Annexes of the aforementioned Directives. It is the objective of each Natura 2000 site in Ireland to maintain or restore the favourable conservation condition of these Qualifying Interests. The study area is within and in the proximity of a number of such sites (Table 3.3). Additionally, one Natural Heritage Area (NHA; a site of national ecological importance, designated for legal protection under the Wildlife (Amendment) Act 2000), the Pulleen Harbour Bog NHA, is situated in the vicinity of the proposed development (Table 3.3).

The Beara Peninsula SPA takes in much of the coastline of the western end of the Beara Peninsula (including that at the site of the proposed mainland landing point), and the entirety of the coastline of Dursey Island. According to the NPWS site synopsis, the SPA is "one of the most important sites in the country for Chough [*Pyrrhocorax pyrrhocorax*; protected under Annex I of Directive 79/409/EEC], with a breeding population of international importance occurring". "Large flocks" occur on the island itself.

The site also supports a "nationally important" population of fulmar (*Fulmarus glacialis*). Although not a Qualifying Interest, the peregrine falcon (*Falco peregrinus*; protected under Annex I of Directive 79/409/EEC) is also present at the site.

Table 3.3 Designated SPAs, SACs and NHAs in the vicinity of the proposed development, and their Qualifying Interests (Source: NPWS Database of Site Synopses)

Site name and NPWS code	Proximity to proposed development	Qualifying Interest(s) and corresponding NPWS code(s)
Beara Peninsula SPA [004155]	Within (mainland and island)	Fulmar (*Fulmarus glacialis*) [A009]; Chough (*Pyrrhocorax pyrrhocorax*) [A346]
The Bull and The Cow Rocks SPA [004066]	7.7km west	Storm petrel (*Hydrobates pelagicus*) [A014]; Gannet (*Morus bassanus*) [A016]; Puffin (*Fratercula arctica*) [A204]
Deenish and Scarriff Islands SPA [004175]	13.8km north	Fulmar (*Fulmarus glacialis*) [A009]; Manx shearwater (*Puffinus puffinus*) [A013]; Storm petrel (*Hydrobates pelagicus*) [A014]; Lesser black-backed gull (*Larus fuscus*) [A183]; Arctic tern (*Sterna paradisaea*) [A194]
Iveragh Peninsula SPA [004154]	14km north	Fulmar (*Fulmarus glacialis*) [A009]; Peregrine (*Falco peregrinus*) [A103]; Kittiwake (*Rissa tridactyla*) [A188]; Guillemot (*Uria aalge*) [A199]; Chough (*Pyrrhocorax pyrrhocorax*) [A346]
Kenmare River SAC [002158]	Immediately adjacent (taking in surrounding ocean and coastline up to high water mark)	Large shallow inlets and bays [1160]; Reefs [1170]; Perennial vegetation of stony banks [1220]; Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]; Atlantic salt meadows (*Glauco-puccinellietalia maritimae*) [1330]; Mediterranean salt meadows (*Juncetalia maritimi*) [1410]; Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]; Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]; European dry heaths [4030]; *Juniperus communis* formations on heaths or calcareous grasslands [5130];

Site name and NPWS code	**Proximity to proposed development**	**Qualifying Interest(s) and corresponding NPWS code(s)**
		Calaminarian grasslands of the *Violetalia calaminariae* [6130]; Submerged or partially submerged sea caves [8330]; *Vertigo angustior* (Narrow-mouthed Whorl Snail) [1014]; *Rhinolophus hipposideros* (Lesser horseshoe bat) [1303]; *Lutra lutra* (Otter) [1355]; *Phoca vitulina* (Harbour Seal) [1365]
Pulleen Harbour Bog NHA [002416]	13km east	Peatlands [4]

The Kenmare River SAC is a site with a very large footprint, which takes in the entire bay where the Kenmare River meets the sea between the Beara Peninsula and the Iveragh Peninsula (County Kerry). It also extends for some distance into the open ocean beyond the bay in question, where it takes in the entirety of the coastline of Dursey Island and that at the proposed mainland landing point (up to the point of the high water mark). Many of the Qualifying Interests of the site are not of major relevance to the proposed development since they are not found in its immediate vicinity but are present elsewhere in the SAC. Qualifying Interests of the SAC which, according to NPWS maps of the site, are found in close proximity to the proposed development are as follows:

- Reefs [1170]
- Submerged or partially submerged sea caves [8330]
- Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]
- Otter (*Lutra lutra*) [1355]
- Harbour seal (*Phoca vitulina*) [1365]

In addition to the Qualifying Interests listed in Table 3.3, surveys of the site have revealed that a number of other protected species of flora and fauna have been identified in close proximity to the proposed development, including Betony (*Betonica officinalis*; protected under Floral (Protection) Order 2015), common pipistrelle (*Pipistrellus pipistrellus*; protected under Annex IV of Directive 92/43/EEC) and soprano pipistrelle (*Pipistrellus pygmaeus*; protected under Annex IV of Directive 92/43/EEC).

There are also a number of proposed NHAs (pNHAs) within and in the vicinity of the proposed development (Table 3.4). These are sites which have been proposed for protection under the Wildlife (Amendment) Act 2000 but have not yet been officially designated. pNHAs are afforded some limited protections (including the requirement for consideration of their ecological value in the formal planning process.

Table 3.4 Proposed NHAs within 15km of the proposed development

Site name and NPWS code:	Proximity to proposed development:
Dursey Island pNHA [000086]	Within (island)
Garinish Point pNHA [001986]	2km east
Firkeel Gap pNHA [001051]	2km east
Bull and Cow Rocks pNHA [000080]	8km west
Deenish and Scarriff Islands pNHA [001345]	14.1km north
Kilkinnikin pNHA [001985]	7.7km east

Of these, just one is within the immediate vicinity of the proposed development – the proposed Dursey Island NHA. The island has been proposed for designation as a NHA due to its important breeding populations of fulmar and chough.

Habitat mapping of the site of the proposed development indicates that exposed rocky shore, rocky sea cliffs, exposed siliceous rock, dry-humid acid grassland and dry siliceous heath are the predominant habitat types at the site. The habitat at the proposed passing bay locations along the approach road is largely heath and grassland. The grassland is a mixture of dry-humid acid grassland and improved agricultural grassland. The habitat on Dursey Island is largely semi-natural grassland and heath and contains rocky sea cliffs also.

A survey of invasive alien species (IAS) indicates that *Rhododendron ponticum*, *Gunnera tinctoria* and Japanese Knotweed (*Fallopia japonica*) are present at a number of sites on the approach road, R572, but not within the cable car site on the island or mainland. All three are classified as 'High Impact' IAS by Biodiversity Ireland. *Allium triquetrum* has also been identified along the approach road and is classified a 'Medium Impact' IAS by Biodiversity Ireland. A single plant of *Carpobrotus edulis* was identified growing in a private garden on Dursey Island and cascading onto the public road. This is classified as a 'High Impact' IAS by Biodiversity Island. Stems of *Allium triquetrum* were identified on the grass verge opposite this private garden on Dursey Island. Two stands, one small stand and one moderately sized stand, of *Fallopia japonica* were also identified along the Garinish Loop.

Of the sites listed in Table 3.3, just two are within or in the immediate vicinity of the site of the proposed development – The Beara Peninsula SPA and the Kenmare River SAC.

3.3.10 Noise and Vibration

According to the National Roads Authority (NRA) Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes, a sensitive receptor is a location such as "*residential housing, schools, hospitals, places of worship, sports centres and shopping areas, i.e. locations where members of the public are likely to be regularly present*" and as a result, may be affected by the presence of noise/air pollution in their surroundings. The nearest sensitive receptor to the proposed development is a residential property located approximately 300m east of the proposed development. The proposed development also includes the provision of 10 no. passing bays, 1 no. visibility splay, and a number of additional localised improvements along the 8km stretch of the R572 leading to the mainland landing point.

The nature of the study area is rural within a coastal area and, therefore, the existing noise levels within the proposed study area are relatively low.

3.3.11 Air Quality and Climate

The nearest air quality monitoring station to the site of the proposed development is the Valentia (Rural West) Station at Cahersiveen, County Kerry. According to EPA records, the current air quality in the Rural West AQIH Region is 'Good'.

High sensitivity receptors are regarded as residential properties where people are likely to spend the majority of their time. Commercial properties and places of work are regarded as medium sensitivity while low sensitivity receptors are places where people are present for short periods or do not expect a high level of amenity.

In terms of receptor sensitivity to dust soiling, there are no sensitive receptors within 20m of the proposed works and less than 10 sensitive receptors within 50m of the proposed works. Garinish Point pNHA, Bearish Peninsula SPA, Kenmare River SAC and Dursey Island pNHA are also considered to be sensitive receptors to air quality impacts.

It was determined that, in terms of potential environmental impacts, all options are rated equally.

3.4 Do-Nothing Scenario

In 2010, 2013 and 2016 Roughan & O'Donovan (ROD) were commissioned to undertake a 'Deterministic & Probabilistic Assessment' of the existing Dursey Island Cable Car, which involved a complete structural, mechanical and electrical health check of the infrastructure. The results of this inspection and assessment indicated that the cableway is in reasonable working condition. There are no immediate safety concerns evident from the inspection and assessment subject to the recommendations of Section 6 of that report.

However, the reports also noted that the current system is not and cannot be fully compliant with the requirements of the European Standards for "The Safety Requirements for Cableway Installations Designed to Carry Persons", S.I. No. 470 / 2003 and S.I. 766 / 2007. The cableway was constructed in 1969 and, therefore, the various components of the system are outdated to the extent that upgrading them to meet current standards is not feasible. Although exemptions for most of the non-compliances identified in the report have been granted by the Commission for Railway Regulation, many of these exemptions have been granted on the basis that the cableway will be replaced in 3-5 years.

As a result, the do-nothing scenario would result in the decommissioning of the cableway in the short to medium term, resulting in the need for a barge/ferry for residents and visitors to access the island as is the case with all other West Cork Islands. As the cableway is a unique and distinguishing characteristic of the Beara Peninsula and West Cork, and has been for the past 50 years, it was decided that the do-nothing scenario should not be further considered.

In addition, the car park at the site currently accommodates approximately 70 vehicles but is often oversubscribed. This can lead to cars being parked informally at the side of the road and drivers making awkward U-turn movements, which can add to congestion in the area. Furthermore, ticket sales records show that visitor numbers are increasing year on year. Consequently, it is clear that the existing parking facilities are unsustainable, and the situation will worsen if no action is taken to improve parking facilities and control visitor numbers.

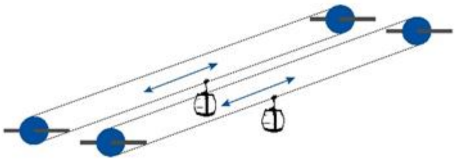
3.5 Alternatives Considered

Four no. Cableway Technology Options, three no. Cableway Alignment Options and three no. Architectural Design Options were developed for the purposes of the project. Subsequently, five Overall Design Options were developed by combining options from the respective option categories. This section provides a description of each option, according to option category. All options will allow sufficient lateral clearance, and sufficient overhead clearance over the Dursey Sound and the trafficked area on the mainland.

3.5.1 Cableway Technology Options

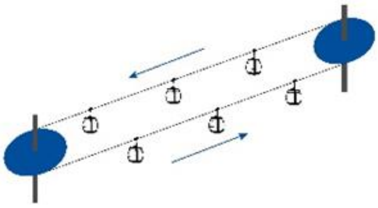
3.5.1.1 Technology Option 1 – Detachable Gondola

Option 1 constitutes the most basic solution available today. In this type of system, detachable cabins can accommodate 4 – 15 passengers and are installed on a single rope which carries and hauls. In comparison with other available technologies, this option is very economical for transport capacities of over 1,000 p/h, but the speed is lower and the cabins are less stable in strong winds. This type of system is most common in urban areas, ski resorts and tourist attractions because it is quick to build, very reliable and allows a return on investment (ROI), amortised over 5 or 15 years, ranging from €8 - €20 million, depending on the number of stations, the transport capacity and the distances travelled.



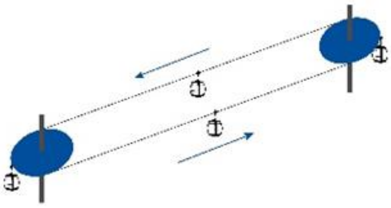
3.5.1.2 Technology Option 2 – Pulsed Ropeway

Pulsed ropeways are similar to those of mono-cable installations (such as that described in Option 1) but differ in that their carrier cabins are equipped with a fixed grip and are grouped together, instead of being equally distributed along the length of the rope. For this reason, the entire cableway must slow down or stop to allow passengers to board/disembark at stations. The resultant lack of flexibility and low transport capacity inherent with this type of ropeway has made them unsuitable for urban and ski resort environments and better suited to tourist sites. This type of system was very popular throughout the latter half of the 20th century. Although it is still used for some tourist site developments, the number of projects of this type is decreasing every year.



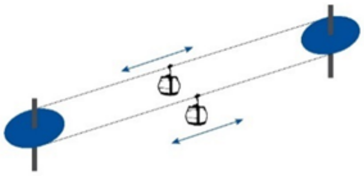
3.5.1.3 Technology Option 3 – Reversible Ropeway Synchronised

Unlike Options 1 and 2, this type of ropeway is reversible, meaning the rope itself can move backwards or forwards as required, rather than moving in one direction only. It carries two carrier cabins. Each cabin is fixed to a single hauling rope. In solutions of this type using just one rope, high tensions limit the choice of equipment.



3.5.1.4 Technology Option 4 – Reversible Ropeway Desynchronised

Like Option 3, this type of ropeway is reversible and has two cabins. It differs in that it has two separate and desynchronised ropeways, each of which conveys a single carrier cabin. Additionally, each ropeway has two ropes (as opposed to one) – one of which supports and carries the cabin, while the other hauls it. Each carrier is fixed to the loop of its own hauling rope. Solutions like this are widely used, allowing long spans and high tension. The advantage of this option over the previous three is that if one of the carrier cabins is stopped for repair/maintenance, the other can remain in operation. The transport capacity of this system depends highly on the length of the ropeway and waiting/boarding times.



3.5.1.5 Evaluation of Cableway Technology Options

Criteria used to evaluate the four no. cableway technology options are as follows:

1. Investment cost ratio

   This rating, on a scale of 0 – 3, considers 0 to be the most expensive solution and 3 to be the least expensive solution in terms of investment costs, i.e. costs associated with studies, equipment, assembly, and civil engineering.

2. Operating cost ratio

   This rating, on a scale of 0 – 3, considers 0 to be the most expensive solution and 3 to be the least expensive solution in terms of operating costs, i.e. costs associated with components required, complexity of solutions, maintenance costs, etc.

3. Wind resistance

   In a ropeway equipped with cabins, the wind resistance factor is defined by the inclination that an empty cabin, without passenger, can take. A cabin that weighs more and can carry less passengers is more capable of resisting wind. Therefore, we evaluated solutions that reconcile transport capacity (i.e. number of passengers) with the feasibility of installing cabins meeting the wind resistance criteria. The rating, on a scale of 0 – 3, considers 0 to be the solution requiring the most cabins (for a transport capacity of 300 p/h at 25 m/s), and 3 to be the solution requiring the least cabins (for a transport capacity of 300 p/h at 25 m/s).

4. Operational flexibility

   Operational flexibility refers to an option's ability to operate effectively in the face of temporal fluctuations in visitor numbers due to season, time of day and weather; and to continue to operate in the event of a mechanical failure. The rating, on a scale of 0 – 3, considers 0 to describe a 'not a very flexible' option, and 3 to describe the 'most flexible' option.

5. Quality of the experience

   The quality of the experience is difficult to define. However, discussions with Cork County Council have indicated that experience is a critical aspect to consider for the proposed development. In this case, travel time has been selected as a proxy to describe the quality of the visitor experience. Travel time is defined as the minimum time it takes to travel from the mainland to the island. This time must be close to the time it currently takes, which is six minutes. At a speed of about 1 m/s a cable car will cover a distance of 400m in approx. 5 minutes. This rating, on a scale of 0 – 5, considers 0 to describe a 'low quality' experience, and 5 to describe a 'high quality' experience (one which offers the possibility of travelling under 1 m/s, reducing travel time to 5 minutes.

6. Transport capacity range

   The transport capacity values were established, taking into account various factors, development opportunities and the potential for Dursey Island to attract visitors into the future. The values were set at 200 - 300 people per hour (p/h) from the mainland to the island and, equally, 200 - 300 p/h from the island to the mainland. This criterion assessed whether each option would be capable of delivering this transport capacity.

Table 3.5 presents the evaluation criteria scores for each technology option.

Table 3.5 Evaluation criteria scores and total scores according to cableway technology option

	1. Detachable Gondola	**2. Pulsed Ropeway**	**3. Reversible Ropeway Synchronised**	**4. Reversible Ropeway Desynchronised**
Investment cost ratio	0	1	3	2
Operating cost ratio	0	3	3	2
Wind resistance	0	1	3	3
Operational flexibility	2	1	0	3
Quality of experience	2	0	1	3
Transport capacity OK?	OK	OK	OK	OK
TOTAL	4	6	10	13

According to these criteria, it was decided that the most appropriate technological solution for the Dursey Island Cable Car is Technology Option 4 - a ropeway transport solution with a capacity of 200 to 300p/h in each direction with a de-synchronised reversible ropeway operation with two independent tracks.

Operation at half-capacity on one track will be possible to facilitate maintenance or to allow for a degraded operation mode in the event of a track failure. Operation in normal daily use at nominal capacity will be possible in winds of up to 25 m/s and in winds of up to 30 m/s using the degraded operation mode.

The standard operation mode will be capable of a journey from the mainland to the island in at least 5 minutes for the minimum transport capacity of 200 p/h. Standard operation mode will also allow for rapid evacuation from the island to the mainland of at least 300 p/h in winds blowing at a maximum speed of 25 m/s. In winds exceeding this value, transport capacity may be degraded while ensuring island evacuation in the shortest possible time.

Table 3.6 summarises the capacities attainable by the proposed cableway at different conceivable operating speeds for different times of the day, assuming a cabin capacity of 15 no. people.

Table 3.6 Capacities attainable with Cableway Technology Option 4 at various conceivable speeds (assuming cabin capacity of 15 no. people)

	Route and speed	**Capacity**
Day operating	Mainland to island at 1m/s Island to mainland at 6m/s	170 p/h each way
	Mainland to island at 1.5m/s Island to mainland at 6m/s	200 p/h each way
	Mainland to island at 2m/s Island to mainland at 6m/s	245 p/h each way
Afternoon operating	Mainland to island at 4m/s Island to mainland 4m/s	300 p/h each way

	Route and speed	Capacity
Extra operating	Mainland to island at 6m/s Island to mainland at 6m/s	330 p/h each way

3.5.2 Cableway Alignment Options

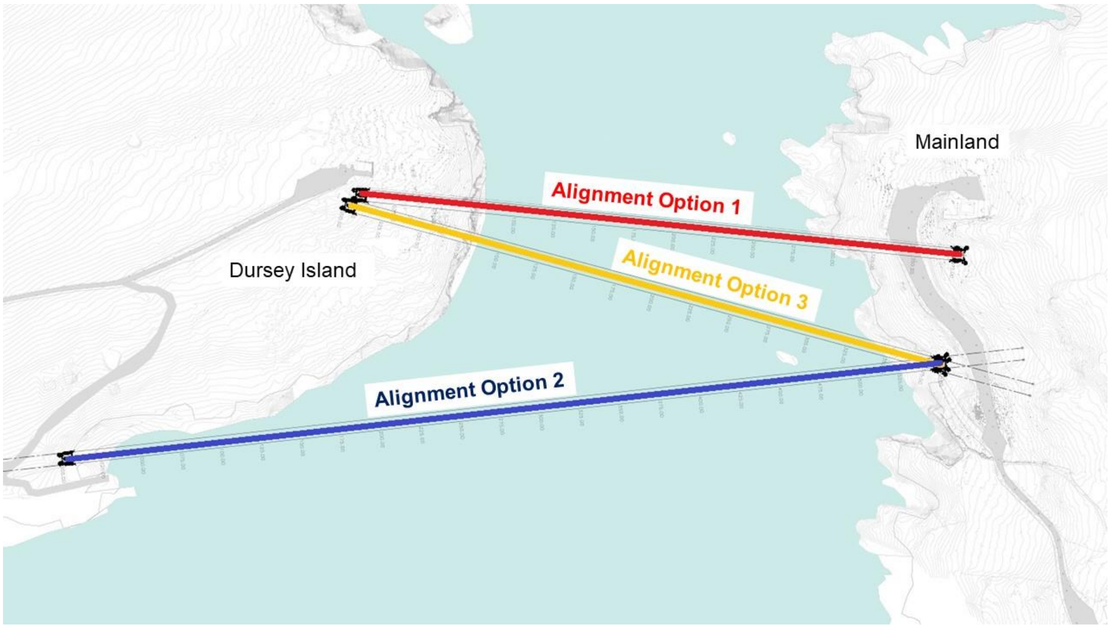


Plate 3.1 **Map illustrating locations of Cableway Alignment Options 1, 2 and 3**

Three cableway alignment options have been considered. These alignments are presented in Plate 3.1, in Figure 3.1 of Volume 3 of this EIAR and are described below.

3.5.2.1 Alignment Option 1 – Existing to Existing

The first potential alignment option would be situated approx. 25m south-east of the existing alignment (Plate 3.1). This proposed alignment constitutes the shortest route between the island and the mainland. Its ropeway main span (240m) and side spans (65m) would be similar to that of the existing ropeway. With this option, pylons of 30m weight would be required. The decision to offset the cableway 25m to the south-east would allow both the pylons and the stations to be erected at levels similar to those of the existing cableway. It would also allow the operation of the original cableway to continue throughout construction. Furthermore, it would provide sufficient clearance over the existing road and car park on the mainland.

3.5.2.2 Alignment Option 2 – Slipway to Slipway

With a main span length of 540m, the second potential alignment option (Plate 3.1) would have the longest crossing span of the three options presented. This alignment, which would stretch from the location of a slipway on the mainland (immediately south of the existing line station) to a slipway on the island (south-west of the existing line station), would create a crossing in a more 'open sea' environment. An alignment option of this length would require pylons of approx. 50% greater height on both island and mainland than those of Option 1. The ropes could be anchored at the proposed line stations or extended in side-spans to either side of the line station buildings. The latter option would facilitate the transfer of the cable forces to the ground without significantly increasing building foundations. A total building height of approximately 45m – 50m would be required on both mainland and island. This alignment represents the most visually striking option for the Dursey Sound crossing. On the other hand, a span of this length might require either (a) an upgrade in the cableway technology (ropes, cabins, speed) in order to facilitate the required capacity, or (b) accepting a significant decrease in visitor capacity.

3.5.2.3 Alignment Option 3 – Slipway to Existing

The third potential alignment option (Plate 3.1) is an approximately intermediate route between Alignment Option 1 and 2. On the mainland, the line station would be located at the location of the nearby slipway, while on the island it would be situated close to the existing line station building. The main span of the ropeway would measure approximately 320m – a distance which would necessitate minimal changes to the cableway installation. The height of the mainland station building would need to be 50% greater than that of Alignment Option 1 but would be of a similar height on the island.

Alignment option 1 – existing to existing was selected as the chosen alignment option as this is the shortest distance for crossing the Dursey Sound. The existing landing point was also determined to be the most suitable location for constructing the visitor centre and car park.

3.5.3 Architectural Design Options

This section outlines the proposed architectural layout for the proposed Dursey Island Cable Car and Visitor Centre. Firstly, it sets out the aspects of the architectural and structural design that are common to all three Architectural Design Options ('General Architectural Design and Layout', Section 3.5.3.1). Then it outlines the differences in approach of the three no. Architectural Design Options developed for the proposed project (Sections 3.5.3.2 (Option 1), 3.5.3.3 (Option 2), and 3.5.3.4 (Option 3).

The cableway stations have been tested at different locations on the site to assess the advantages and disadvantages of each location and to seek a solution that overcomes the varied challenges of the site, program and budget in the most satisfactory way. Critical considerations of the masterplan have been how to simultaneously achieve level access into the cableway stations in accordance with accessibility requirements set out in Part M of the building regulations; to achieve the necessary elevation of the cable cars above the water's surface so as not to impede watercraft navigating through Dursey Sound; to avoid impacting on the nearby Kenmare River Special Area of Conservation (SAC) by keeping back from the water's edge; to minimise visual / aesthetic impact on the naturally beautiful rocky, sloping landscape; to minimise impact on the heath, flora and nesting sites that surround the site; and to produce a solution that is within the allocated budget.

3.5.3.1 General Architectural Design and Layout

All three Architectural Design Options will seek to allow the original cableway service to continue to operate throughout construction. As outlined in the brief provided by Cork County Council, all Options will include the following structural components: mainland station, island station, pylons, mainland-side visitor interpretive centre and visitor car park. Ancillary works, including infrastructural upgrades and hard and soft landscaping will also be required. General specifications associated with these elements are outlined in this section. Because of the exposed, marine environment of the study area, all structures (associated with all Architectural Design Options) will need to be designed with due consideration of durability requirements.

Visitor Centre

It is a design goal of the proposed development to create a fluid, connected experience for the visitor moving from the visitor centre to the mainland-side line station. As such, the two programmes will be designed as one. At present, visitors to the existing cableway are spending extended periods of time queuing at the platform with no shelter or entertainment available, leading to frustration and negatively impacting the visitor experience. In order to avoid this situation and deliver a more positive visitor experience in future, the intended logical sequence of events for the visitor to the Dursey Island Cable Car and Visitor Centre is as follows:

(i) Visitor arrives at car park and has either already bought their ticket in advance online, or upon entering the building has the opportunity to immediately purchase a tracked ticket, thereby securing their place in a digital queue with an estimated departure time clearly communicated in advance.

(ii) Visitor is free, therefore, to spend the majority of their 'queuing time' exploring the visitor centre and not waiting at the line station. Exhibitions of interpretive information, views of the Dursey Sound, garden spaces, a gift shop and a café will keep visitors entertained during this time and the educational aspect will prime their overall experience of the destination.

(iii) Visitor is prompted by audiovisual cues to move to the line station when their boarding time is near. At this time they can move to the departure platform to board the cablecar and depart for the island.

It would be preferable if the visitor centre was kept open to some degree year-round and not sitting idle during the off-season. To encourage year-round use of the visitor centre facility, it would be worth exploring the possibility of combining the visitor centre with the local community centre, either by accommodating the community centre at the facility, or by establishing some kind of reciprocal relationship where local community groups can use the facilities for their own events during the off-season. The design of the building should reflect the intended mixed-use purpose and flexible nature of the space. The building's architecture should be simple and spacious, and composed of natural, hard-wearing materials. The visitor centre will be a heated and ventilated building (potentially using a combination of mechanical and natural ventilation).

Mainland-Side Line Station Building

The design and layout of the mainland-side line station building will be strongly informed by the cableway machinery contained within it, which is likely to come as a set-piece from a specialist supplier. Since the majority of visitors' queuing time should be spent in the connected visitor centre, the line station space will be designed to be aesthetically pleasing and provide shelter, but to discourage visitors from lingering too long. As a result, the building will have a relatively minimalist design. It is proposed to provide a rainscreen enclosure, level platforms, and office facilities for the operator, but little else beyond these essential elements. The structure will have to be situated at a sufficient elevation so as to provide adequate clearance over any trafficked area on land, and over the navigable Dursey Sound waters.

Island Station Building

The design and layout of the island station will similarly be largely influenced by the cableway machinery to be contained within it. It is anticipated that the majority of the development budget will be spent on the mainland-side facilities. Accordingly, the island station building will be a relatively simple structure. In contrast to the mainland side of the site, where visitors will spend most of their time in the visitor centre (and not the line station), the goal of the island station is to provide sufficient welfare facilities to support waiting passengers without the need for an additional structure. The station will include a rainscreen enclosure which will shelter both the landing platforms and a waiting area and toilet facilities; and a small playground. The only heated space will be the toilet block. The rest of the space will be open to the elements – but sheltered from the worst of the weather by the rainscreen.

Pylons

The primary functions of these structures are to support the cableway ropes and provide the necessary vertical clearance over the Dursey Sound and the trafficked area on the mainland, while allowing a suitable landing point level at the stations. Traditionally, pylons for cableways have been latticed space-frame structures, located in discrete locations on mountain sides or other non-visually intrusive locations. Because of the open and exposed nature of the landscape in the study area, it is not possible in this case to situate the pylons in non-visually intrusive positions. The design goal for the pylons is to erect structures which perform their functions while having a visual appearance which compliments the existing landscape. Foundations will be of durable reinforced concrete. The body of the pylons themselves will be coated in a high specification protective paint whose colour is aesthetically appropriate for the surrounding environment. Depending on the Alignment Option selected, the pylons will have an overall height above the foundation in the region of 28-30m and, assuming a circular cross-section, will have a varying diameter, tapering from base to cable saddle support.

Based on the ground conditions described in Section 3.3.7, two structural options have been considered: (1) a lattice tower with four legs, and (2) a monopole. Foundations for the stations are considered separately.

Lattice Tower

Shallow pad reinforced concrete foundations are proposed under each leg of the lattice tower. The exact foundation dimensions will depend on the final tower geometry and loading regime. The formation level of the foundation shall be set at a sufficient depth so as to avoid the layers of overburden and weathered rock. Further consideration of the foundation depth will be necessary in the event that rock socket friction is required to resist tensile loads.

Monopole

For the monopole option, a single shallow pile (or, alternatively, a pile group) could be employed to provide resistance against the vertical, horizontal and overturning forces imposed by the structure. The diameter and depth of the pile will be designed based on the findings of the ground investigation and the final loading regime. However, if a piled solution is used, it is anticipated that the piles will be relatively short given the presence of competent bedrock at shallow depths. Bored concrete piles are the most suitable pile type, given the local ground conditions. Subject to the final loading regime, it is likely that shallow pad foundation will be a viable alternative to piled foundations. The geological structure of the rock will have to be taken into consideration, particularly if the monopole will be situated in steeply sloping terrain, as the rock's major plane of weakness (bedding) seems to have the same orientation as Alignment Option 1.

Car Park

The capacity of the proposed Visitor Centre car park will be increased (from 70 spaces) to somewhere in the range of 100-180 spaces. The larger car park options will accommodate the parking demand for most of the year, but on the busiest in-season days there will be a likely shortfall in the range of 170-230 spaces. However, due to site constraints and landscape, it is not desirable or cost-effective to have a car park of scale exceeding 180 spaces. At the same time, consideration should be given to the possibility of providing an overflow car park in the vicinity of the proposed development. This could be situated in a suitably located field within walking distance of the Centre, and only made available as required. Alternatively, a satellite car park with a shuttle bus service linking the Centre with the Beara Peninsula Ring Road could be provided to the east of the proposed development. Steps will be taken to minimise the visual impact of the car park on the landscape.

A relatively large area of the proposed car park is likely to require cuttings and embankments to ensure consistent elevation levels. The cuttings may be able to be executed in the rock with no additional retaining measures required. The excavated rock is very likely to form an excellent fill material for the fill/embankment areas and for capping/pavement purposes. With careful planning it will be possible to balance the cut and fill volumes, achieving an environmentally acceptable solution

It is proposed that, whichever Design Option is pursued, the car park be developed in two phases:

Phase 1. Consolidation of the existing car park; to be carried out during the construction phase.

Phase 2. Construction of a larger car park; to be deferred until such time as growing visitor numbers necessitate it.

Lighting

The lighting of the proposed development will be understated and unobtrusive insofar as possible, in order to prevent/minimise light pollution to the surrounding environment, including protected environmental areas and the Kerry International Dark-Sky Reserve. The potential occurrence of the following phenomena will be taken into consideration in the lighting design: sky glow (direct upward waste light), light trespass (intrusive light and light into windows/windscreens), over-illumination, glare (source intensity).

Approach Road Works

In order to address existing congestion and facilitate anticipated volumes of traffic during the operation of the proposed development, it is proposed to carry out road improvement works on the 8km stretch of the R572 between Bealbarnish Gap and the mainland side of the cable car site. These works will involve the construction of 10 no. passing bays, 1 no. visibility splay, and completion of a number of additional localised improvements to increase forward visibility. Anticipated traffic volumes are detailed in Chapter 5 of Volume 2 of this EIAR – Traffic and Transport. Proposed road improvement works are detailed in Chapter 4 – Description of the Proposed Development. Figures 4.12 – 4.22 of Volume 3 of this EIAR present drawings of the proposed passing bays and visibility splay.

3.5.3.2 Architectural Design Option 1

The layout of Option 1 is presented in Figure 3.2 of Volume 3 of this EIAR. Option 1 station building adopted a similar tack to the existing station, in that it was positioned on the high ground immediately northeast of the carpark and immediately southeast of the existing station buildings at a height of +25m AOD. This raised position reduced the angle of inclination of the cablecar rising from the platform to the upper pylon height, enabling it to gain the appropriate elevation to clear the carpark and Dursey Sound at an acceptable height while keeping the pylon footing location back from the water's edge. This position was initially also thought to be advantageous as it would work with the natural topography, minimising excavation on what was considered to be a sensitive site and allowing re-surfacing and demarcation of the existing carpark to form the new, larger carpark. Finally this position was considered advantageous as, due to it being offset from the current cableway and power lines, it allowed the new cableway system to be constructed without interfering with the continuing operation of the existing system, minimising any period of disconnection of the island from the mainland.

The landing platform is located on high ground immediately south-east of the existing station, accessed by an external elevator from carpark level. A large terraced carparking platform is formed to raise the carpark capacity to 184 spaces; an expansive visitor centre is located in the undercroft space which is a byproduct of forming this carparking platform. At carpark level there is a ticket desk, a shop, and an office. The large lower level of the visitor centre is accessed by external landscaped ramps and also by elevator. The lower level includes a large café/restaurant served by a bar and kitchen, a large exhibition hall, a conference room, WCs, and circulation. There is also a projecting viewpoint which extends out from the lower level to the southwest over the cliffs. Advantages of this option considered to be synergetic combination of carpark structure and visitor centre structure design solutions.

Plate 3.2 **Option 1 architectural site plan**

Mainland-side Line Station Building

Like the existing building, the mainland-side line station of Option 1 will be positioned on the high ground immediately northeast of the existing car park and southeast of the existing platforms at a height of +25m AOD. This position reduced the angle of inclination of the cablecar rising from the platform to the upper pylon height enabling it to gain the appropriate elevation allowing sufficient clearance of both the trafficked area below and the Dursey Sound. Unlike the existing station however, the Option 1 mainland station will provide level disabled access (via a lift) in compliance with current building regulations under Part M. The architectural rainscreen which will oversail and shelter the stations, will be designed to complement the appearance of the other visitor centre buildings and pylons, so they share a common architectural language and so that all constituent elements of the masterplan read as a family of related forms.

Island Station Building

The island station building will be positioned on what is currently the rough carparking area to the southwest of the existing station. It will mirror the design of the mainland station, with a similar architectural rainscreen oversailing the platforms and machinery, and will have a toilet block as well as an operator's office.

Plate 3.3 **Option 1 architectural site plan of the island station**

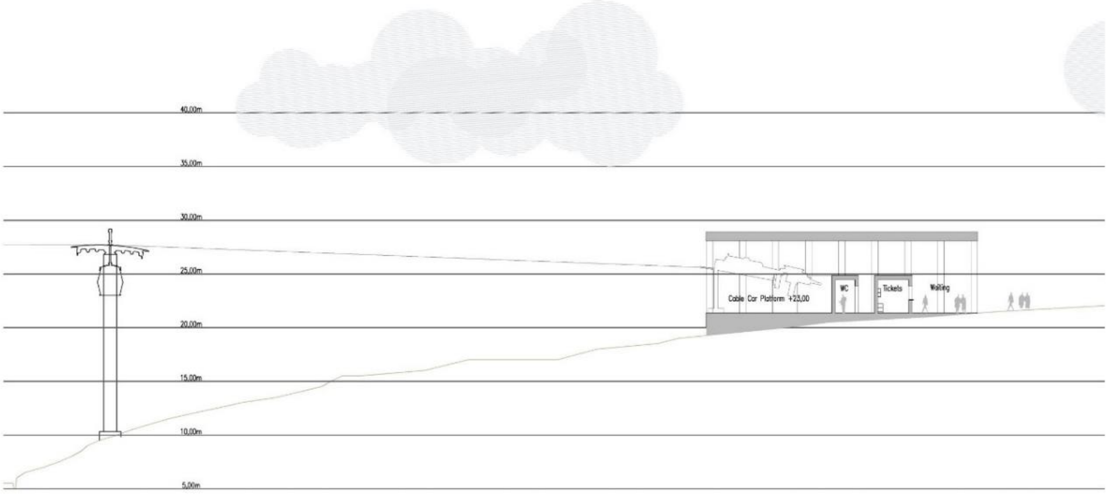


Plate 3.4 **Option 1 architectural section of the island station**

The key architectural precedent for the Option 1 Line Station Buildings is the Gaia Ropeway Cable Car in Portugal, by Menos é Mais Arquitectos.

Plate 3.5 Gaia Ropeway Cable Car in Portugal, by Menos é Mais Arquitectos

Visitor Centre – 'Concourse' Design

In Architectural Design Option 1, the guiding principles informing the general arrangement are to express the 'vector' of the cableway at ground level as a threshold/arrival space; and to seek to work with the natural site topography as much as possible by terracing both the carpark and the visitor centre itself down the sloping terrain, harnessing the sloping topography as a design driver.

Ticketing for the cableway will be provided in the visitor centre lobby, located at the head of the carpark at +16.0m AOD, and aligned with the cableway overhead. From here, visitors can access the line station platform above, or access the visitor centre located beneath the carpark via the lifts, or via landscaped pathways. At this point it would be expected that visitors will proceed down the pathway into the visitor centre.

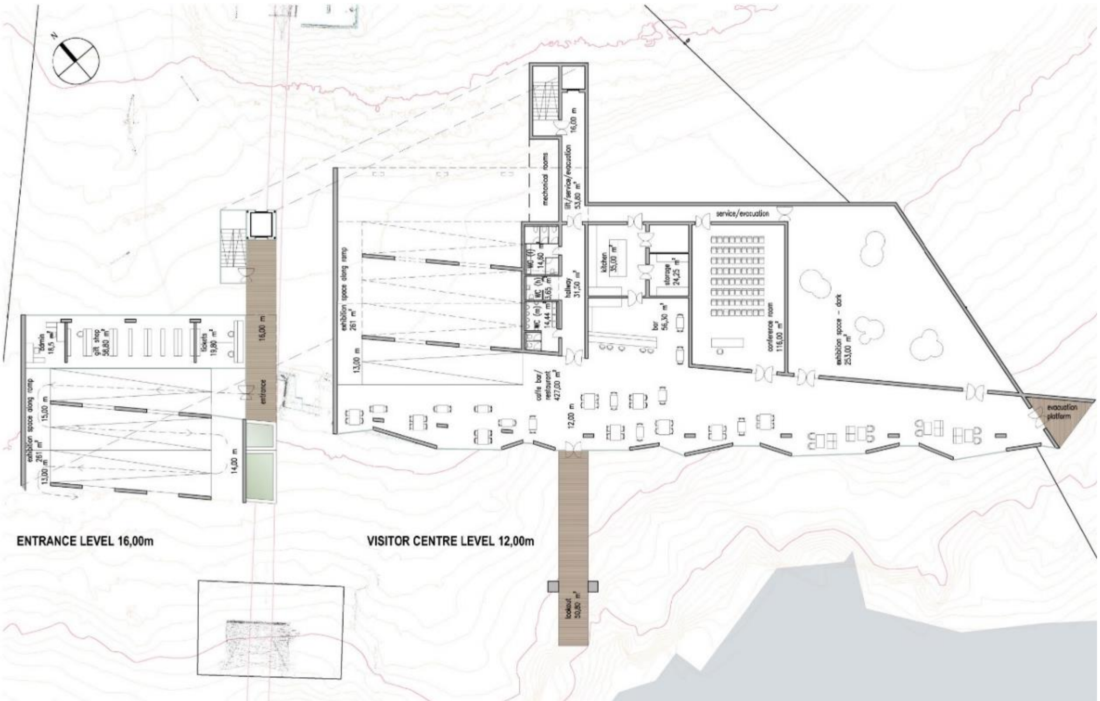


Plate 3.6 Option 1 architectural floor plans showing arrival and undercroft levels

The naturally lit exhibition space / concourse located beneath the carpark benefits from dramatic views of the Dursey Sound through a glazed southern elevation which cranks and folds to imitate the cliff face below. An external viewing platform, dark exhibition space, café, toilets, conference room and classroom spaces are accessed via this concourse. The external viewing platform reaches out and cantilevers beyond the foot of the main pylon allowing the visitor to experience the cableway from a different point of view. The building will be approx. 1,500m² in area.

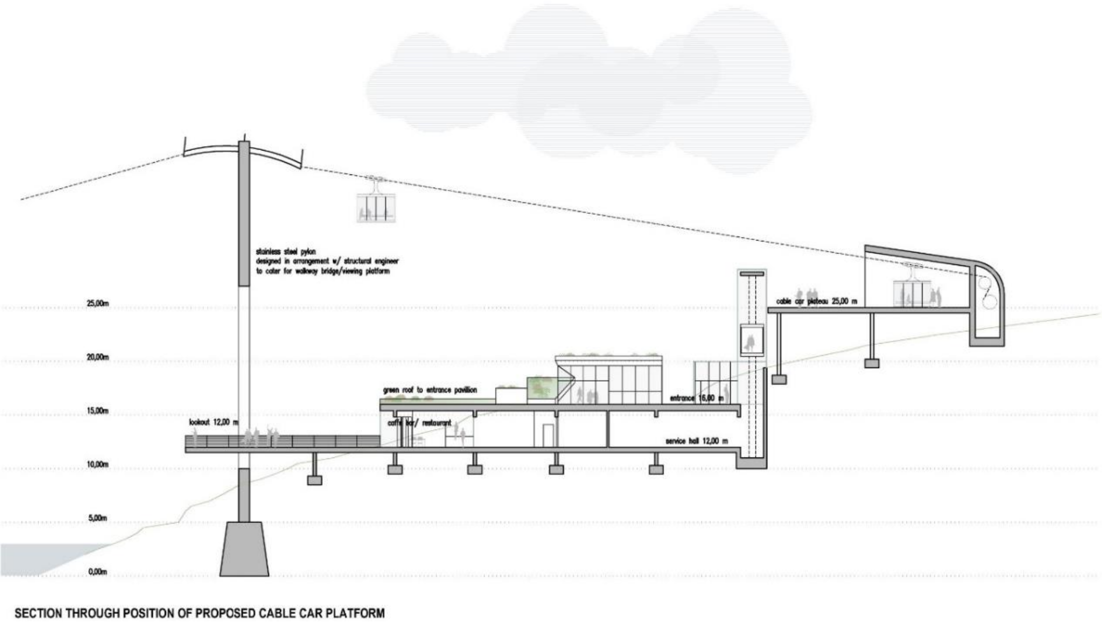


Plate 3.7 Option 1 architectural section demonstrating how the building would follow the natural topography of the site

The key architectural precedent for this option is the Vucedol Archaeological Museum, in Croatia, by Radionica Arhitekure.

Plate 3.8 **Vucedol Archaeological Museum, in Croatia, under construction, by Radionica Arhitekure.**

Mainland-side Pylon

The pylon will be the tallest structure in the proposed development, rising to +40m AOD. In Design Option 1, it will have a 'wishbone' mast construction at the foot. A viewing bridge will extend from the visitor centre external viewing platform to the platform and will cantilever beyond it, creating a dramatic viewing point overlooking the Dursey Sound.

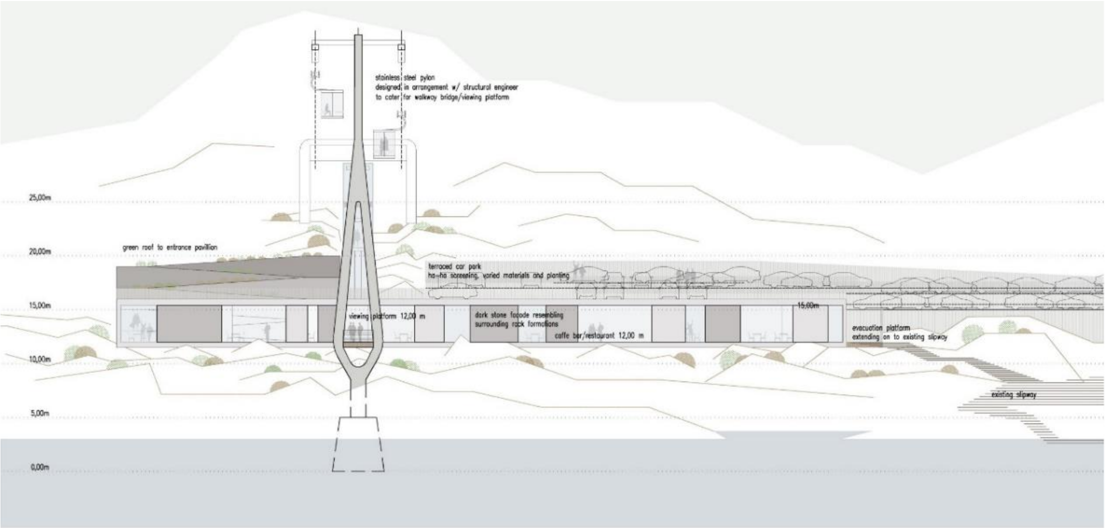


Plate 3.9 **Option 1 architectural elevation showing the 'wishbone' pylon structure with integrated viewing platform**

Car Park

The Option 1 proposal incorporates a terraced carpark to minimize rock break and maximize spaces. The site plan indicates that 184 cars will be accommodated on terraces rising from the direction of the sea, shaped to the existing contour lines. The extant carpark arrival point is at +17m AOD. In the Option 1 design, three terraces set at +16m AOD, +17m AOD and +18m AOD branch from this arrival point and are connected by the slope of the parking surface. Negative seaward visual impact will be mitigated against through the use of a series of berms and screen walls in a variety of stone materials. The construction of the car park described can be phased, with the final higher terrace at +18m AOD only being built subject to future requirements.

Landscaping

Hard landscaping to the west of the visitor centre will resemble the surrounding natural environment.

Structural Considerations

The heavy loading associated with the green roof element of this option has implications for the space at 12m below. As a result, it is envisaged that columns on a 5m nominal structural grid will be required to reinforce the exhibition space below. The conference room will be a column-free zone with the roof comprising reinforced concrete (RC) slab with downstand RC beams. Much of the walls will be load-bearing reinforced concrete with various treatment to the façade external leaf making up the cavity wall construction. Reinforced concrete walls will provide lateral stability to the building.

3.5.3.3 Architectural Design Option 1a

A version of Option 1 with a reduced visitor centre footprint, conceived in particular to minimise excavation into the landform at undercroft level and preference conformity to the natural topography instead as a way of reducing the projected cost. This resulted in a scheme with landing platforms (still) located on high ground immediately south-east of the existing station, accessed by an external elevator from carpark level. A reduced carpark platform providing 90 spaces. A ticket office and a food hut with external seating area located at carpark level, with a second external elevator and three staircases leading to a reduced undercroft level, long and shallow, containing a shop, exhibition spaces, and WCs. Advantages of this option considered to be synergetic combination of carpark structure and visitor centre structure design solutions and acceptable build cost.

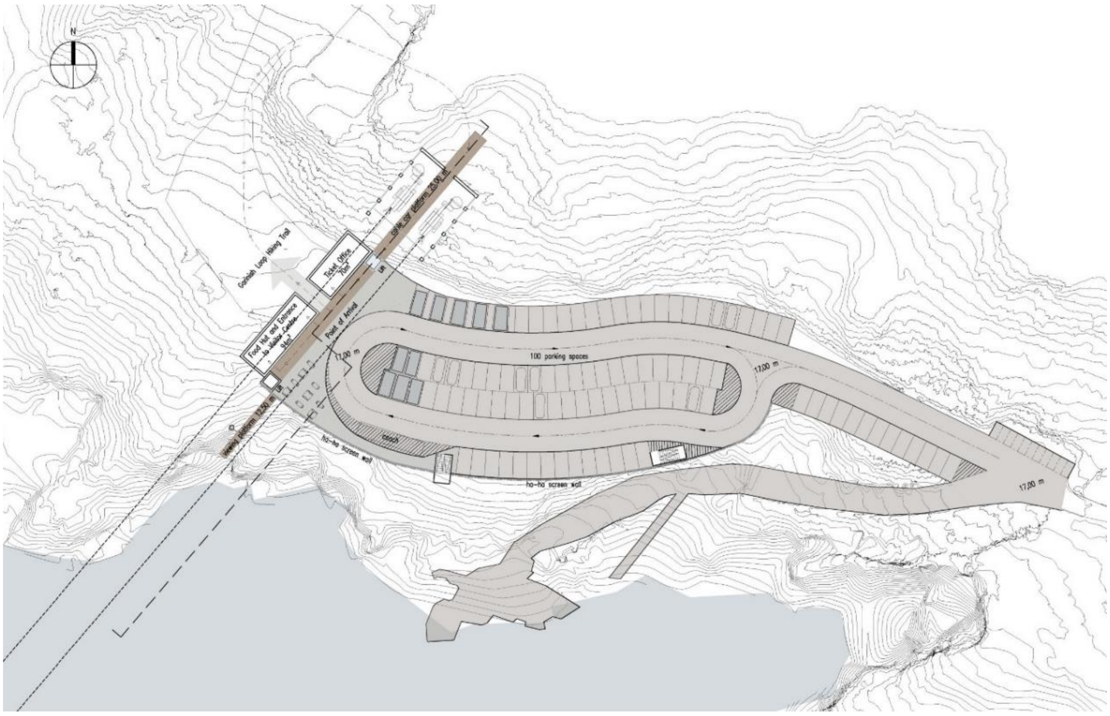


Plate 3.10 Option 1a architectural site plan

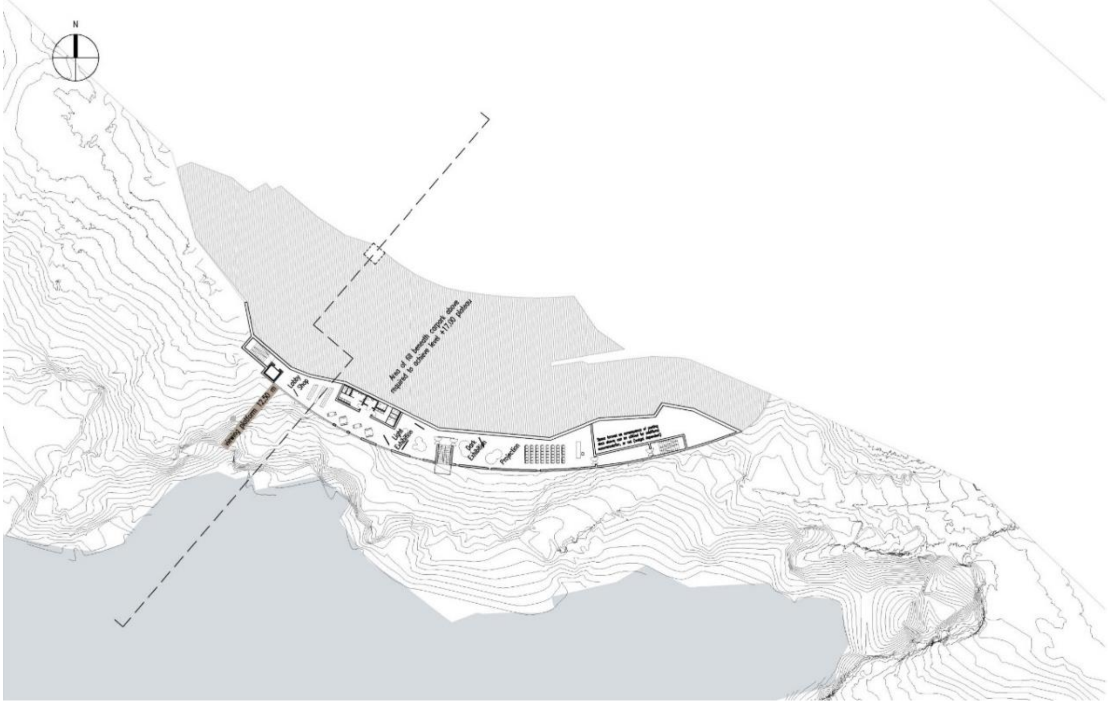


Plate 3.11 Option 1a architectural undercroft plan

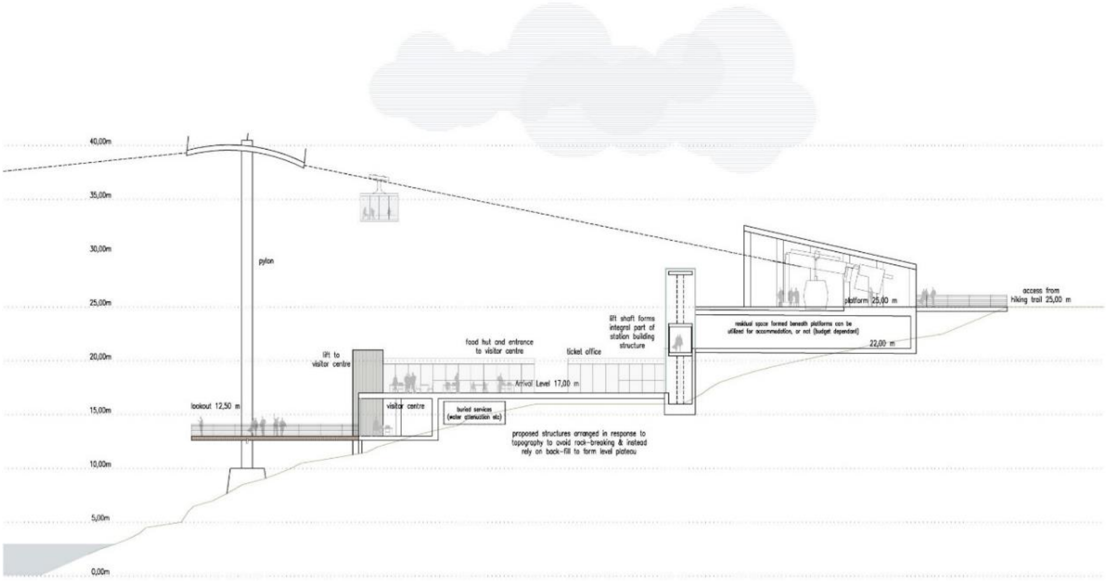


Plate 3.12 **Option 1a architectural section showing the building staggering to follow the landform**

3.5.3.4 Architectural Design Option 2

The layout of Options 2A and 2B is presented in Figure 3.3 of Volume 3 of this EIAR. Option 2 proposed a relatively tall multi-storey 'tower' building located at the existing mainland slipway that would house the cableway machinery and landing platforms at the top, be accessed from the carpark level at mid-height, and also provide level access via a lift down to the existing slipway at its base. The cableway station would be located at the top of the 6-7 storey tower building, located at the water's edge alongside the existing marine slipway, which incorporates all of the visitor centre / support functions in a single building across multiple levels. The visitor centre facilities would be provided on the intermediate floors between entry level and platform level linked internally to form an 'architectural promenade' winding up through the building, providing intermittent interpretative exhibition spaces complimented by cantilevering balconies framing views across the Dursey Sound in different directions, guiding the visitor from the carpark level through the various internal exhibition spaces, café and viewing points en route to the departure point. The tower is served by an internal elevator which rises to the platforms, and also descends to the marine slipway, providing part-M compliant disabled access to all functional parts of the site. A new boat house would be located at the slipway level conceived to allow for a future rehabilitation and reuse of the slipway for some tourism function such as boat tours or charters. Therefore, this option would function as a vertical multimodal interchange between land, sea and air-based transport modes. The car park is expanded to 177 spaces on a single level and relies upon formed land to the south of the existing carpark achieving the necessary width to form a loop. The main advantages of this option are considered to be the minimal built footprint; the neatness of the Part-M accessibility solution; and the exciting architectural expression of the tower. This option was also considered to offer up a neat solution as it combined the various programmes into one single building and avoided the need for a separate pylon structure, minimising clutter on site, while also generating a building form reminiscent of the defensive tower house structures found elsewhere along the Irish coastline.

Two potential Island station locations were assessed as part of Option 2, effectively splitting Option 2 into two sub-options '2A' and '2B';

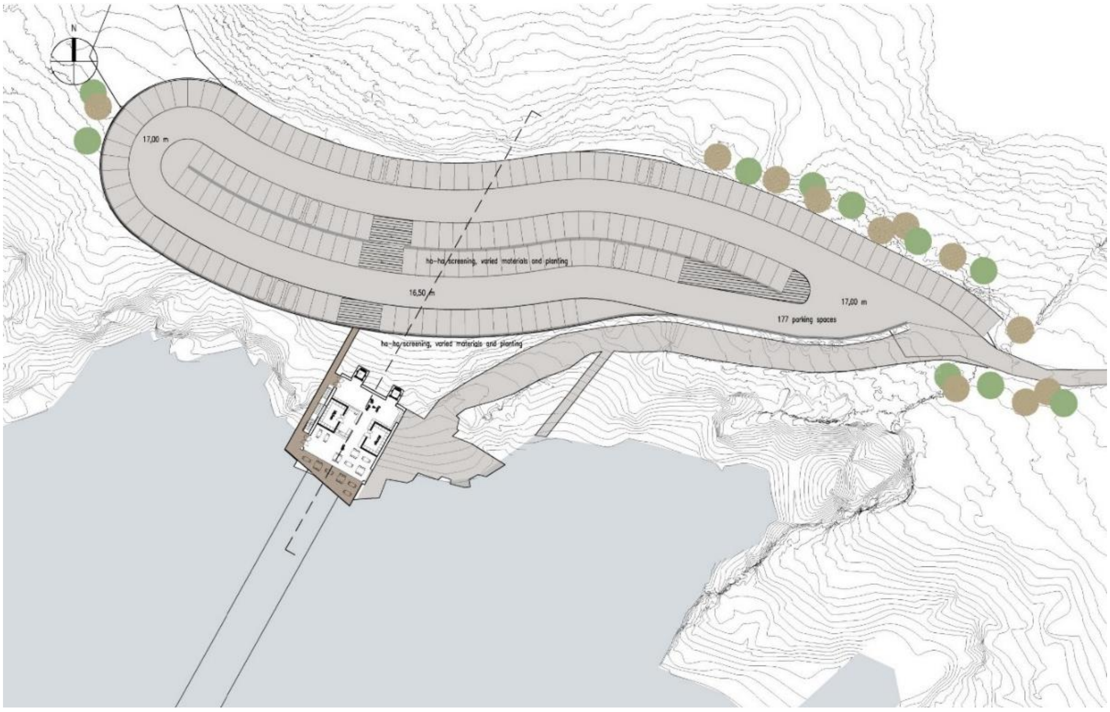


Plate 3.13 **Option 2 architectural site plan, showing the tower location between the car park and the slipway**

The following text should be read in conjunction with drawing DCCVC-ROD-STR-SW_AE-DR-CB-10006 titled 'Option 2A and 2B – Mainland Site Layout Plan'.

Mainland Station Building

Architectural Design Option 2 has no stand-alone mainland-side line station building as the line station element of the proposal is integrated within the visitor centre design.

Island Station Building "2A"

The island station building 2A is proposed to mirror the mainland 'tower' design solution on the island-side slipway i.e. to create a vertical multimodal interchange building allowing Part M-compliant access to the slipway, to the island itself, and to the cablecar platforms. Upon development of this concept on the island slipway site, it was found that this approach was not as suited to the island slipway site topography which is less steep with a longer and more gradual slope between the slipway and the road. It was also considered that due to the slipway being located significantly further from the mainland than the existing landing point, to locate the station at the island slipway would significantly lengthen the cableway span, with resultant implications on clearance over Dursey Sound and on the expense of the cableway system. The clearance over the sound is dictated by the sag in the ropes which in turn is related to the span of the ropes. Therefore, the elongated span length for Option 2A would mean the island station building for Option 2A would have to be taller than desirable or than required by the programme to be contained within it.

Island Station Building "2B"

Option 2B proposed to incorporate an island station location similar to that for Option 1 which represented the shortest span across Dursey Sound from the mainland slipway site. The mainland station building would be rotated in plan by 21 degrees to accommodate the alternative cableway alignment. The proposed island station for Option 2B is almost identical to that proposed for Options 1 and 3 but with the station rotated in plan by 9 degrees to accommodate the alternative cableway alignment. This location has the added benefit of making use of the existing carpark and roadway currently serving the existing mainland station.

Visitor Centre – 'Vertical Interchange' Design

As described above, the Visitor Centre of Architectural Design Option 2 is conceived as a winding architectural promenade within a tower structure that effectively forms a vertical transport interchange between the land (access via car/bike/coach/walking), the sea (access by boat via the slipway), and the sky (access via cable car). In this design, the ground floor structure is positioned at +4m AOD on a brownfield site next to the existing mainland-side slipway, south of the existing cableway landing point. The visitor centre would be able to link the slipway, cableway and approach road via lifts enabling level access from the visitor car park to all the points of use. Central lift cores will provide access to the facilities and amenities spread across various levels of the visitor centre tower block. The third floor of the tower would be accessible via the ground level car park via a light bridge.

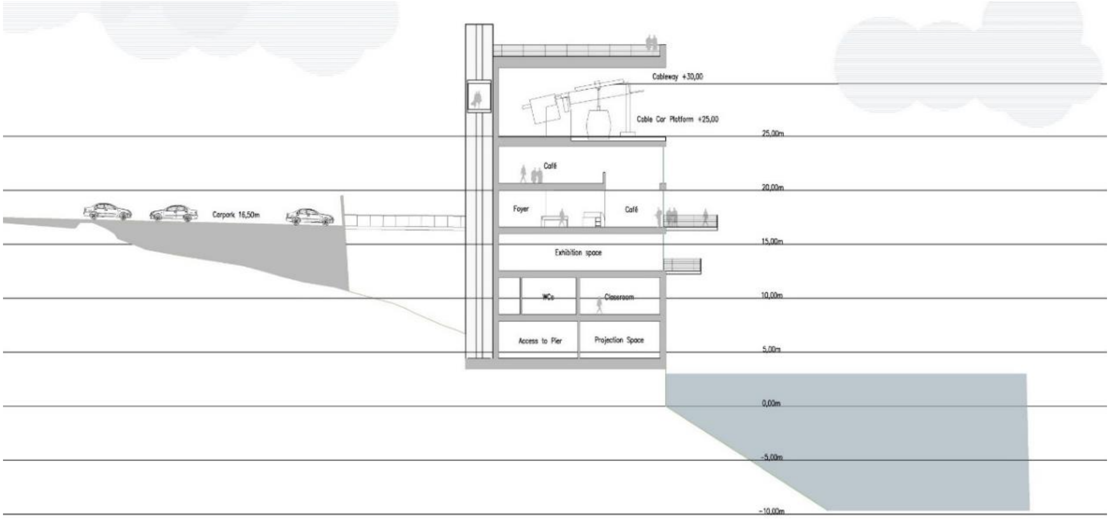


Plate 3.14 **Option 2 architectural section showing how the tower addresses the sloping site topography**

There are numerous advantages to this approach. The fact that this Design Option is situated on an existing brownfield site means that it would potentially have a lesser environmental impact than some other options, particularly since a rare, protected floral species (Betony) has been identified growing on the site. Additionally, because the visitor centre building itself will form a tower, it can support the cableway directly and eliminate the need for one of the pylons. There will be an opportunity for a viewing platform on the roof of the tower block from where there will be magnificent panoramic views of the surrounding landscape. In this way even those who opt not to ride on the cable car will be able to experience similar vistas. Furthermore, building regulations-compliant disabled access to the slipway and waterfront will enable visitors to experience this aspect of the site as well, and will keep the door open for future redevelopment of the slipway for some marine/tourism use yet unforeseen. The dramatically designed tower rising out of the ocean in this remote environment will certainly meet the call in the project brief for an 'iconic' landmark, while at the same time having a form which serves its function well, and forming a modern continuation of the long history of coastal tower structures such as forts, tower houses and lighthouses in Ireland.

The key architectural precedent for this option is the Knut Hamsun Centre in Norway by Steven Holl.

Plate 3.15 **A cut-away model of the Knut Hamsun Centre in Norway by Steven Holl Architects demonstrating the internal 'architectural promenade' winding up through the building.**

Plate 3.16 **Photograph of the Knut Hamsun Centre in its coastal context in Norway by Steven Holl Architects**

Car Park

The Option 2 proposal incorporates a broadly flat carpark set at the entry level of +17m AOD which minimises the need for rock breaking by curving to follow the existing topographical contours. The site plan indicates over 177 cars could be accommodated on the extant car park area and supplemented with formed land to the south. By virtue of the relatively small footprint of the proposed Option 2 visitor centre, this car park solution could make better use of the limited available areas of relatively flat ground. Negative seaward visual impact will be mitigated against through the use of berms and screen walls, extending from the retaining structure used to form the parking plateau, and treated in a variety of stone materials. This would conceal the carpark from view when seen from Dursey Island, thereby helping to preserve the natural and unspoilt feel of the area.

Structural Considerations

The various floors of the multi-storey building will comprise reinforced concrete (RC) slabs with downstand RC beams with external balconies at levels 2 and 3, cantilevering up to +5m AOD. The cantilevered external space will need careful consideration to avoid thermal bridging at the interface with the internal 'warm' space. The cantilevered RC beams supporting the thermally bridged RC floor slab will greatly assist in addressing this issue. Lateral stability will be achieved using RC walls to the perimeter of the building. In addition, it is proposed that the substantial forces associated with the cableway will be resisted by a back-span or tie-back cable and not resisted by the building structure itself. In this design option, the mainland buildings are located near to the existing slipway. There are significant additional durability requirements associated with a building located in a marine splash zone. In addition, there are inherent risks associated with construction close to the sea edge. However, the use of prefabricated forms of construction (concrete and steelwork) can somewhat mitigate these construction risks.

3.5.3.5 Architectural Design Option 3

The layout of Option 3 is presented in Figure 3.4 of Volume 3 of this EIAR. Landing platform is located on high ground immediately south-east of the existing station following advice from cablecar specialist engineer, accessed by an external elevator from carpark level. A relatively small and compact visitor centre to perform as a 'multifunctional space' with ticket desk, store, WCs, a small shop stand area, and a projection/exhibition area, arranged in a wide and shallow single storey building to maximise views to sea and help to screen the carpark from view when seen from the island. 109-space carpark arranged in a single level built on the existing carpark plateau and also making use of formed land to the south of the existing carpark achieving the necessary width to form a loop. Projecting viewing platform extending from the visitor centre out into open air to the southwest. Main advantages of this option are considered to be the minimal built footprint, possibility of extending building in future stages as visitor numbers grow, screening of carpark/lessen visual impact of carpark.

Plate 3.17 Option 3 architectural site plan

Mainland-side Line Station Building

Option 3 adopts a similar architectural design tack to that of Option 1 for the mainland-side line station building, but one that is likely to be of a lower specification and include more 'off-the-shelf' components, due to a reduced budget which was assumed as part of this option development.

Island Station Building

The island station building will be almost identical to that of Option 1 described in the previous section.

Visitor Centre

The proposed structure is a smaller scale building than what was proposed in Options 1 and 2, which was part of exploring the implications of a reduced budget. This proposal sought to position a small pavilion building between the carpark and the water's edge so that the volume of the building itself acted as a screen to conceal the carpark from view when seen from the Island. The internal space provided is minimal in this option and so the emphasis would have been put on external spaces, such as picnic areas, viewpoints, and pathways around the site. These external areas would be complimented with external visitor interpretive materials in the form of sculptures, information boards and similar.

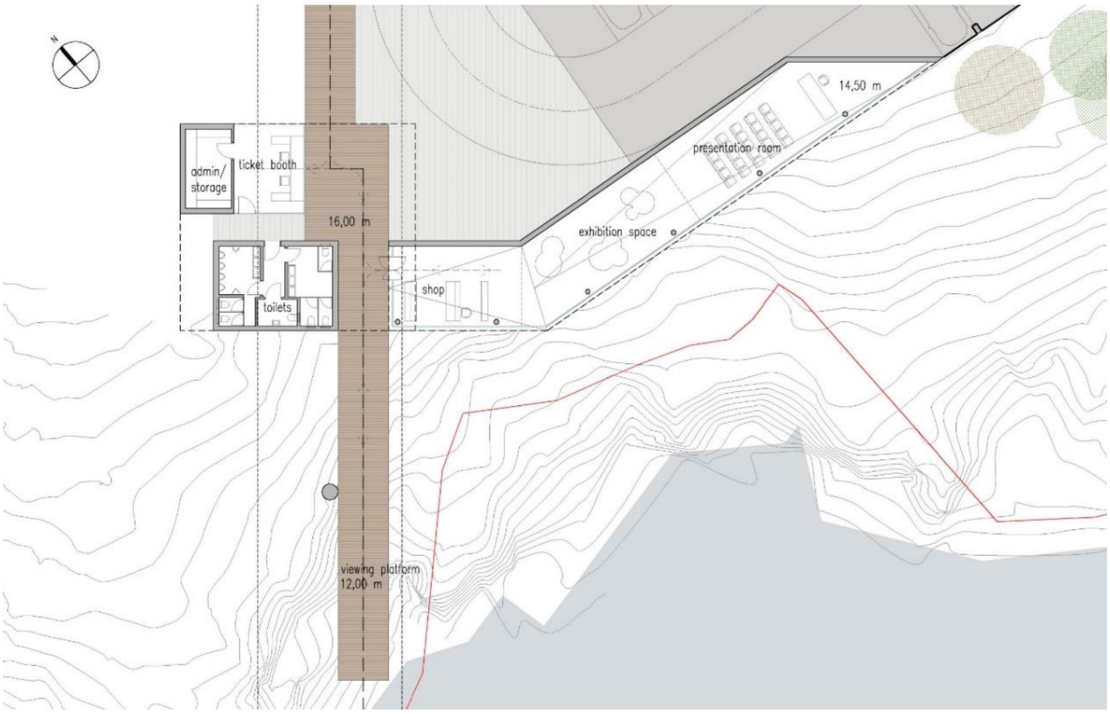


Plate 3.18 **Option 3 architectural floor plan**

The key architectural precedent for this option is the Trollstigen Visitor Centre, Norway by Reiulf Ramstad Arkitekter.

Plate 3.19 **Trollstigen Visitor Centre by Reiulf Ramstad Arkitekter**

Plate 3.20 Trollstigen Visitor Centre by Reiulf Ramstad Arkitekter

Structural Considerations

This heading pertains to structural considerations specific to Options 3 and 3A. The superstructure will most likely be RC piers and unbraced structural steelwork. There is a significant amount of glazing to the south facing façade of the visitor centre with the building lateral stability provide by the rear RC concrete wall and RC roof slab supported off the RC columns. Lateral stability for the entrance/ticket booth to be provided by RC walls to the toilet block and admin/storage room. The glazed facades will require access for maintenance. This difficulty can be addressed on the sea facing sides by the provision of a suitable safe access strip provided externally to relevant perimeters.

Car Park

The Option 3 proposal is conceived as a scaled-down version of Option 2, incorporating a broadly flat carpark that includes 100 spaces for cars and a bus bay. Negative seaward visual impact will be mitigated against through the use of 'ha-ha' screen walls which are intended to be expressed as a continuation of the visitor centre elevation.

3.5.3.6 Architectural Design Option 3a

Following the publication of the Options Report in December 2018, further design development took place as feedback from Cork County Council was taken on board by the architects and the designs were refined, leading to the development of option 3a.

Following review of Option 1a, it was felt that the undercroft-type solution posed to many constraints on visitor movement and access due to the level change, and so it was decided to take another look at Option 3, which was similar in layout but for the visitor centre being located at carpark level rather than undercroft level. This option can thus be understood as an amalgamation of Option 3 and Option 1a. The landing platform remains located immediately south-east of the existing station. However, the ground is excavated to lower the platforms level so that they can be accessed by ramp and the need for a mechanical lift is eliminated. A visitor centre is positioned in a wide and shallow linear building between the carpark and the water's edge to maximise views to sea and help to screen the carpark from view when seen from the island. The floor area is enlarged to 440m^2. The carpark is conceived as a two-phase development, which can start by optimising the existing carpark plateau only and avoid excessive landforming, with a future 2nd phase possible by terracing the carpark into the rising land to the northeast. A key concept of Option 1a is the embracing of the existing 'Garinish loop walking trail' which crosses the site, by providing a boardwalk across the waterfront of the building to ensure continuity of the trail. This boardwalk would double as a spill-out area for the visitor centre.

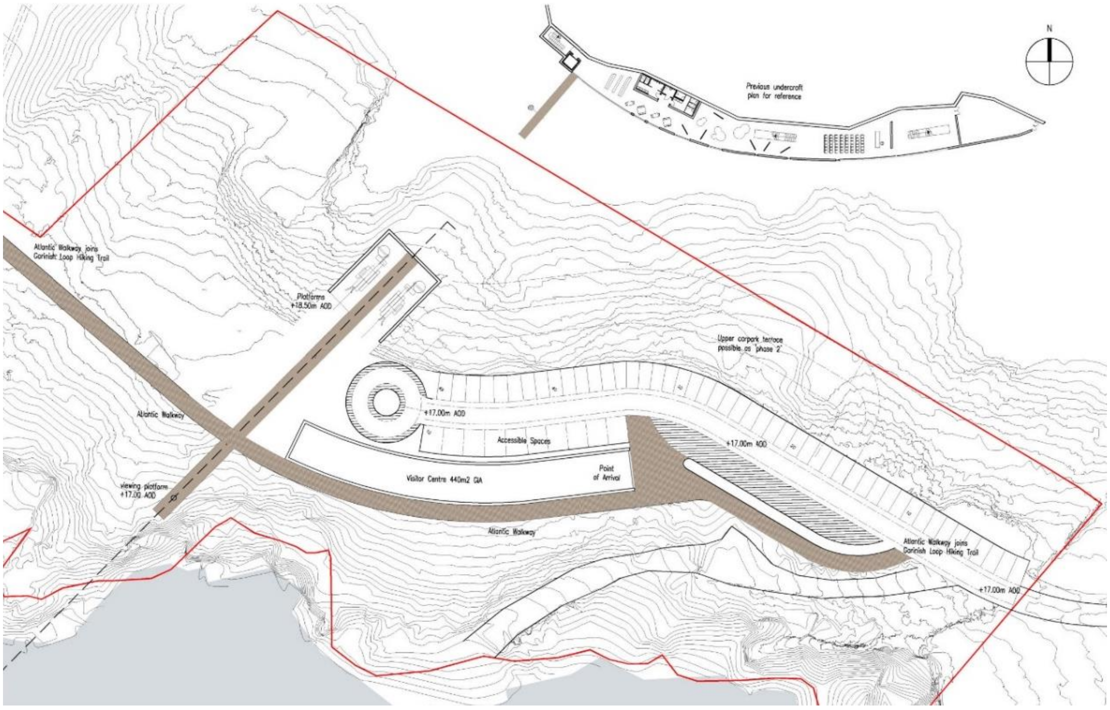


Plate 3.21 **Option 3a architectural site plan showing 'phase 1' carpark**

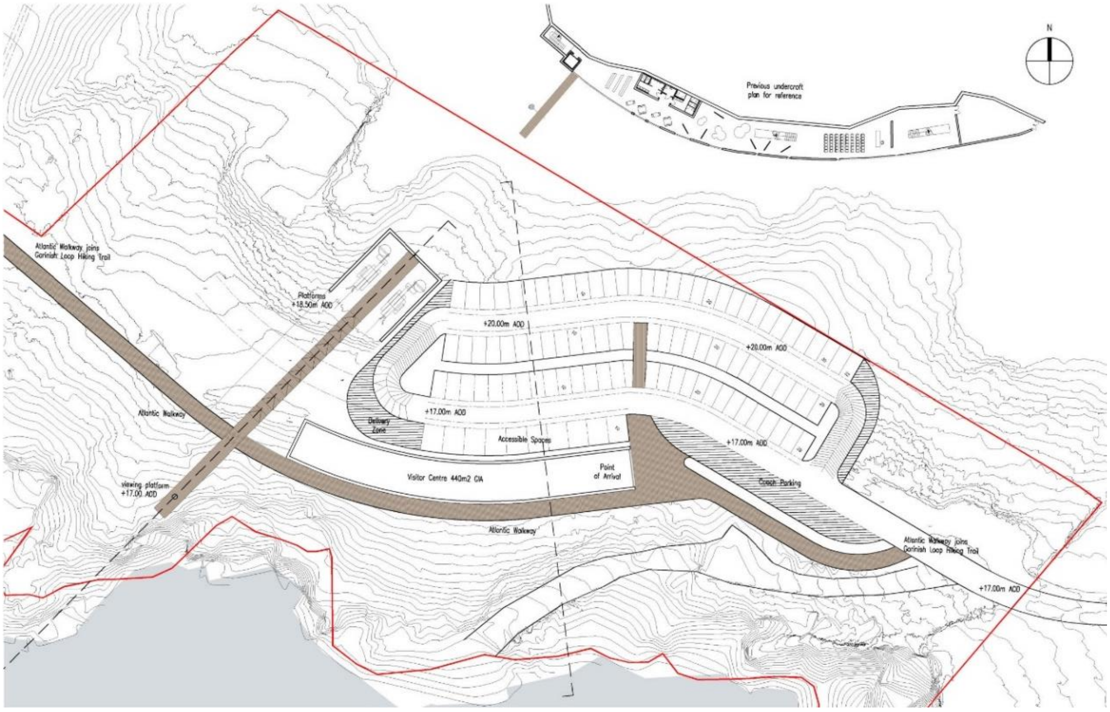


Plate 3.22 **Option 3a architectural site plan showing 'phase 2' carpark**

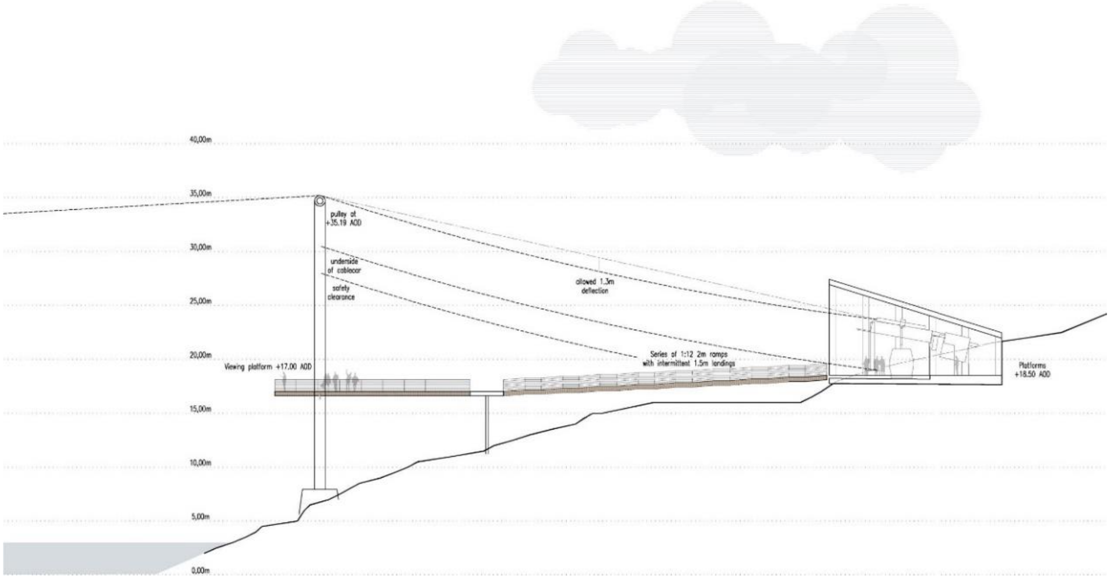


Plate 3.23 **Option 3a architectural section showing ramped access to station platforms**

3.5.3.7 *Architectural Design Option 3b*

Following review of Option 3a, it was felt that there was too much of a disconnect between the mainland station and the Visitor Centre, and so that the visitor centre building ought to be extended to the west to control the 'axis' between the boardwalk and the gangway leading to the cablecar platforms. There was also the view expressed that vehicle access to the rear of the cablecar station would be necessary for deliveries / servicing, and that plant spaces should be located to the rear of the cablecar station also. As a result, Option 3b builds on Option 3a and proposes a new block of accommodation on this axis point, and a new service yard to the rear of the cablecar platforms accessed from the upper terrace of the carpark. The proposal now is three distinct elements; the cablecar station/service yard; the long and slim interpretative exhibition/visitor centre building; and the café/shop building in between. All three buildings are interconnected with ramped access, eliminating the need for mechanical elevators. The only staircase is located in the exhibition building and leads to basement WCs. The building bisects the site and the area west of the visitor centre is intended to be 're-naturalised' to return to heath land and native flora, which could have some external interpretative materials (sculptures) and play equipment for visiting children.

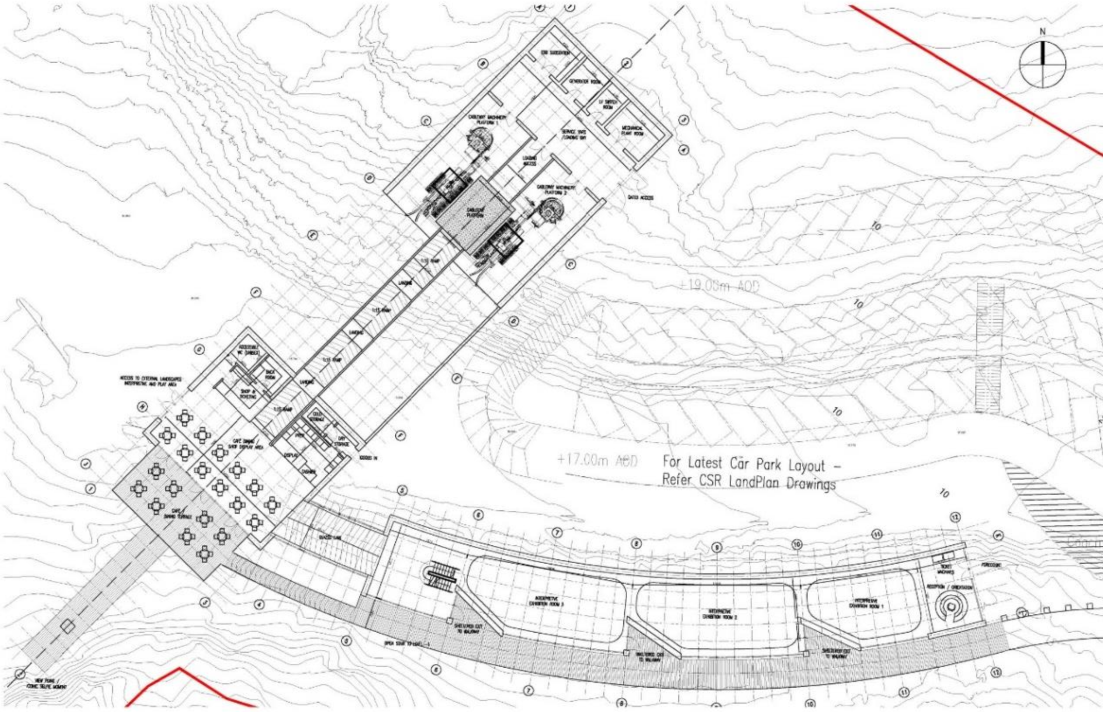


Plate 3.24 **Option 3b architectural ground floor plan**

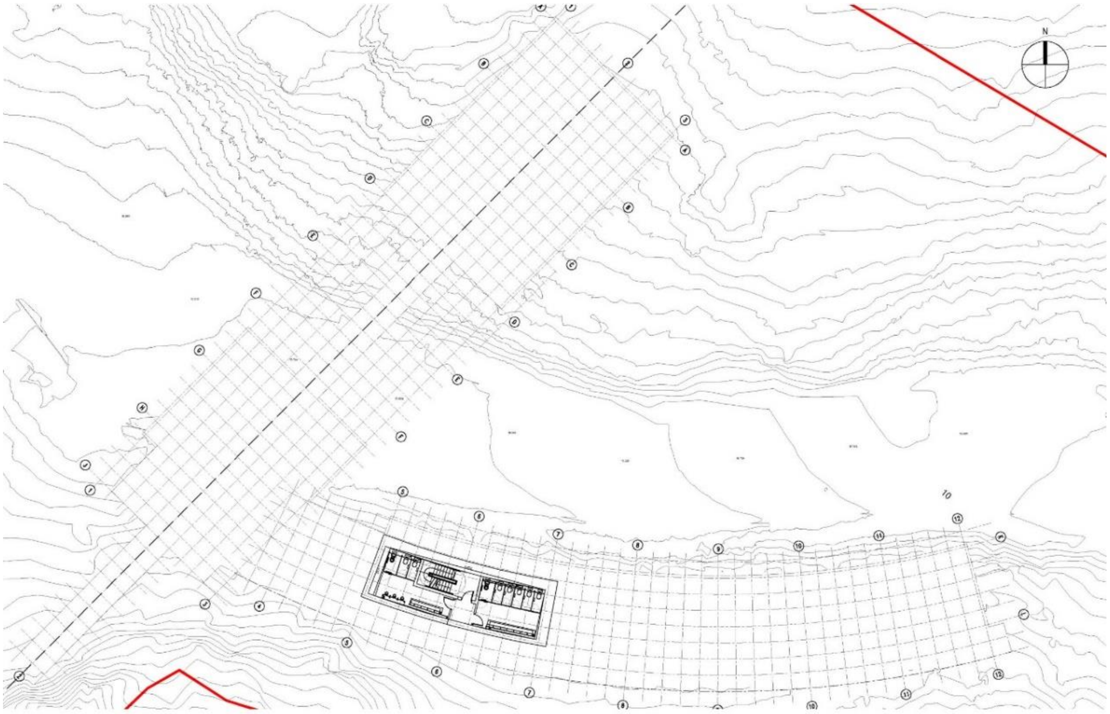


Plate 3.25 **Option 3b architectural basement plan**

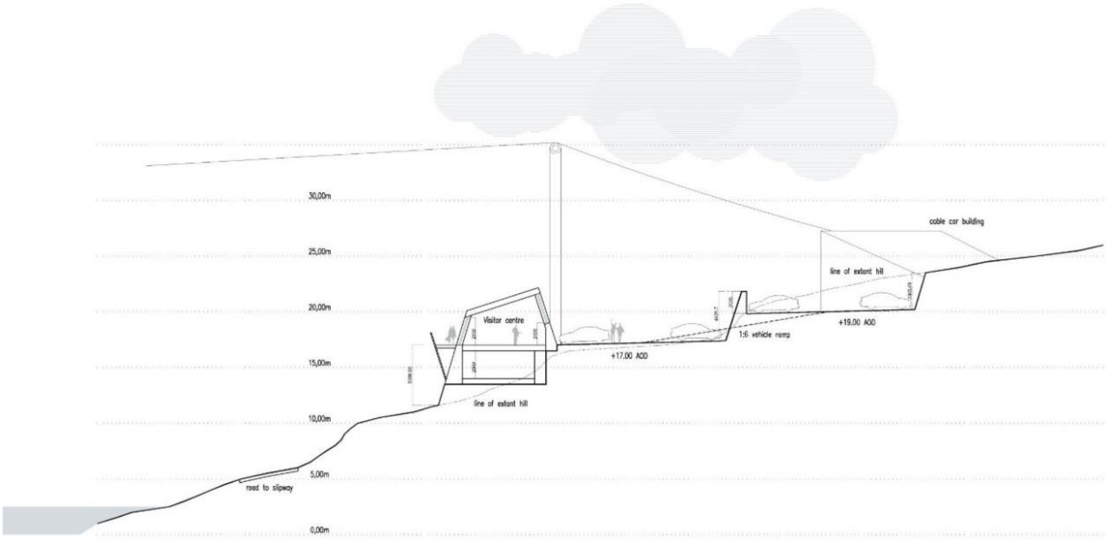


Plate 3.26 Option 3b architectural section showing the terracing of the carpark

3.5.3.8 *Architectural Design Option 3c*

Following review of Option 3b, it was felt that the café building at the axis between the interpretative exhibition building and the station building was too busy and represented a 'pinch point' in the overall visitor flow diagram. It was also considered that the overall building footprint had grown too large again, and that the interpretative exhibition building in particular was too large. At this time, it also came to light that the Cork County Council was required to provide a Right of Way to a third party across the site to the western extremity of site for farming-related activities including herding sheep and operating a tractor. This right of way was now in conflict with the ramped access link between the café/shop building and the cablecar platforms building which previously bisected the site. In light of this new information STW formed the view that the cablecar platforms location was no longer viable and needed to be relocated to be level to the arrival/carpark level, and forward of the Right of Way route to prevent crossing. This view gained client support and resulted in a reworked version of Option 3b where the café/shop building was deleted and replaced with the cablecar platform building; and the exhibition building was reworked to host the café and shop functions alongside the exhibition materials in the same footprint. This allowed the Right of Way to continue past behind the new buildings unimpeded, reduced the level changes within the building, reduced the building floor area, and simplified the visitor movement / flow within the buildings.

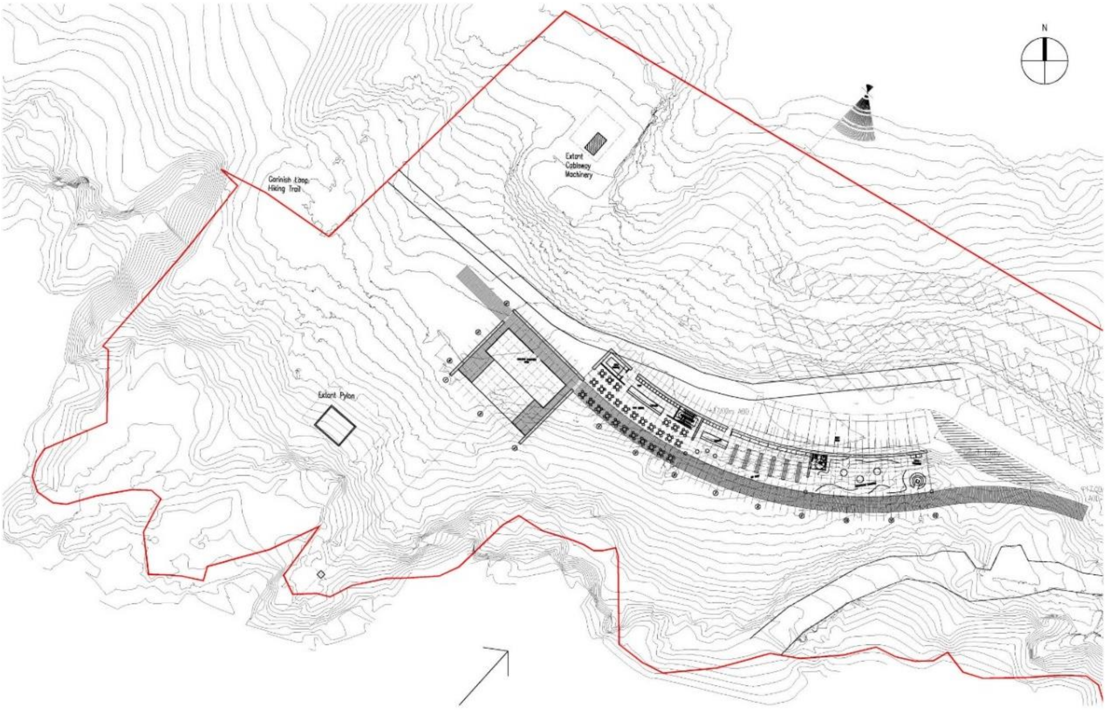


Plate 3.27 **Option 3c architectural site plan showing the line station platforms moved forward towards the water**

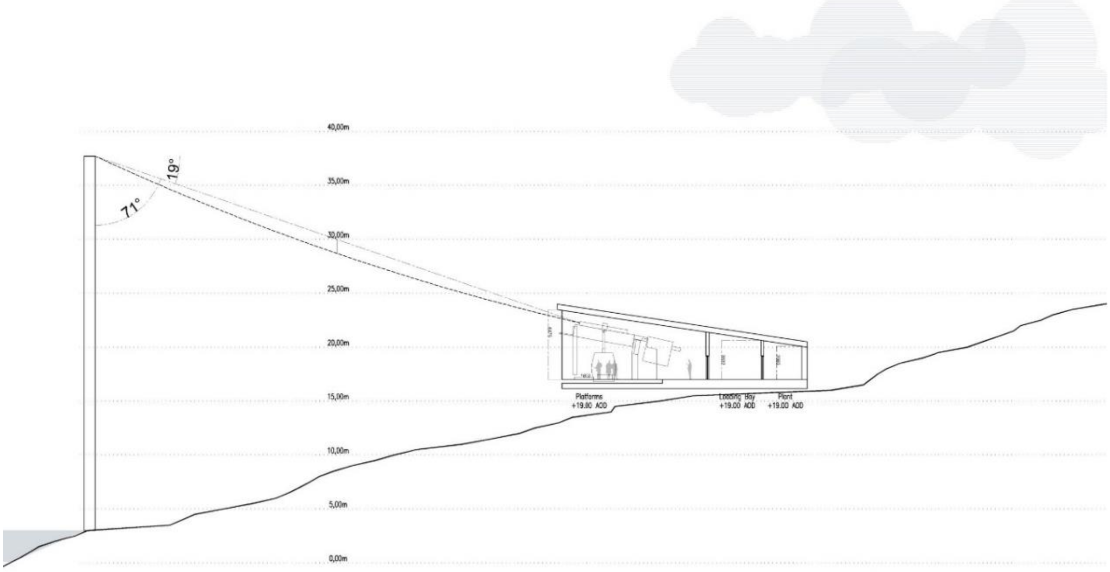


Plate 3.28 **Option 3c architectural section diagram showing the line station platforms at the forward and slightly lower position**

3.5.3.9 *Architectural Design Option 3d*

Following review of Option 3c, ROD expressed concern that the new cablecar platforms location would result in the location of the cableway pylon being too close to the water's edge. ROD suggested that the station move laterally to the northwest end of the site, where the landform would allow for the pylon to be located an adequate distance ahead of the cablecar platforms to achieve the necessary car uplift, while remaining an acceptable distance back from the water's edge. STW agreed to run with this compromise location. The distance between the agreed platform location and the established interpretative exhibition building location was now such that a single linear building was no longer logical, and so the design was amended to become separated out into individual pavilion buildings between the two. This approach was signed off in March 2019 and formed the basis of the final proposed design.

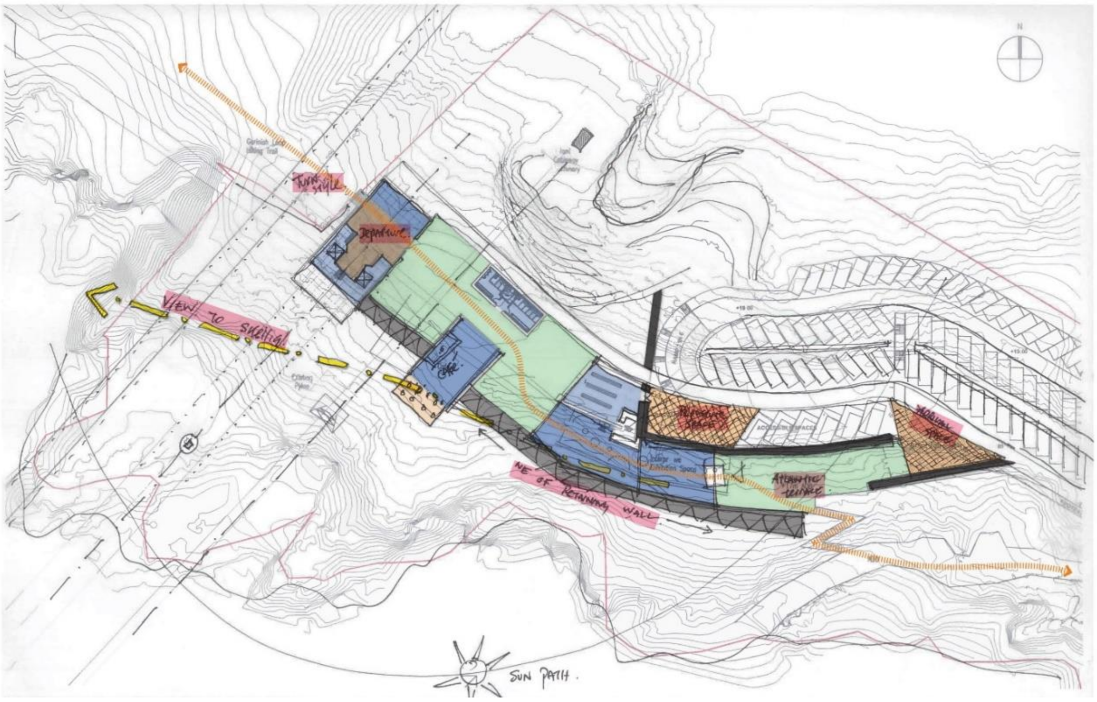


Plate 3.29 **Option 3d architectural site plan hand drawing**

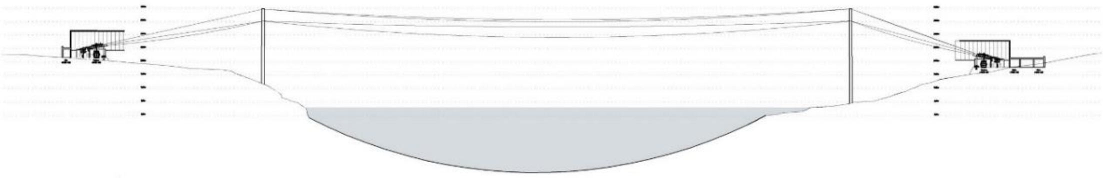


Plate 3.30 **Option 3d architectural section across the Dursey Sound**

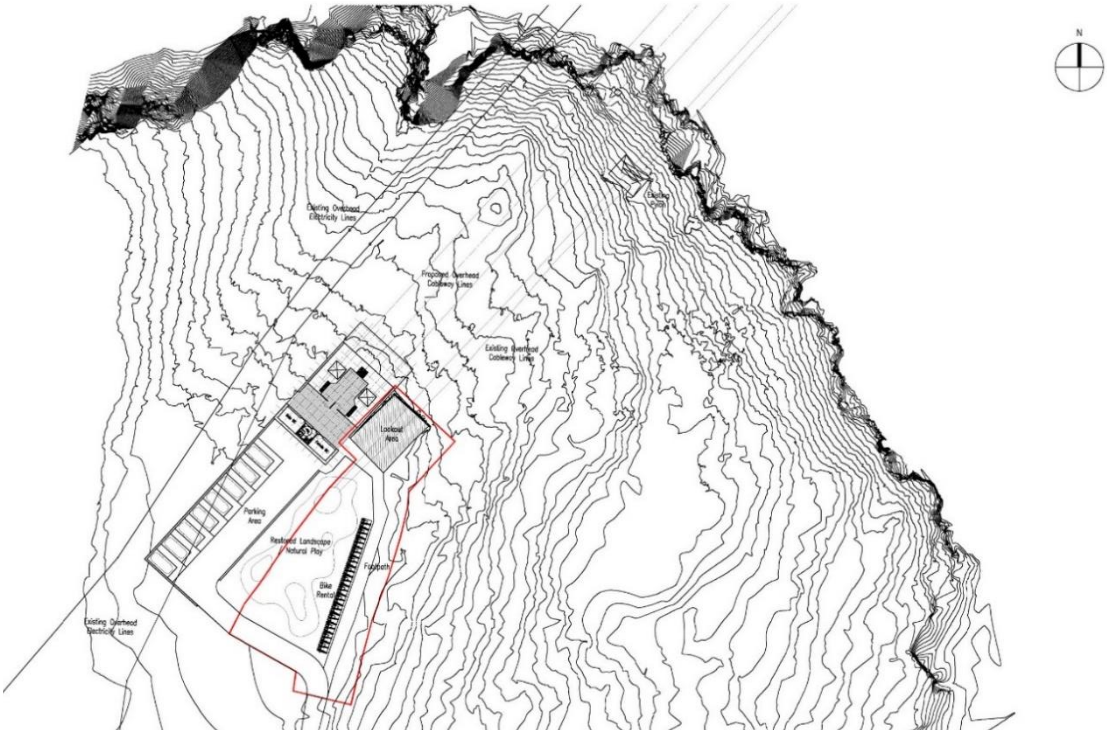


Plate 3.31 **Option 3d – Architectural island-side site plan**

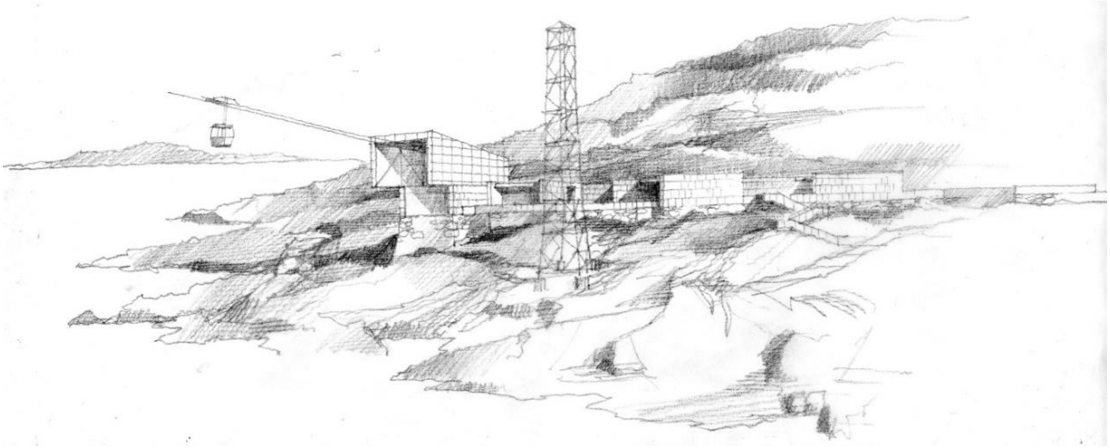


Plate 3.32 **Option 3d – Artists' impression of the proposal**

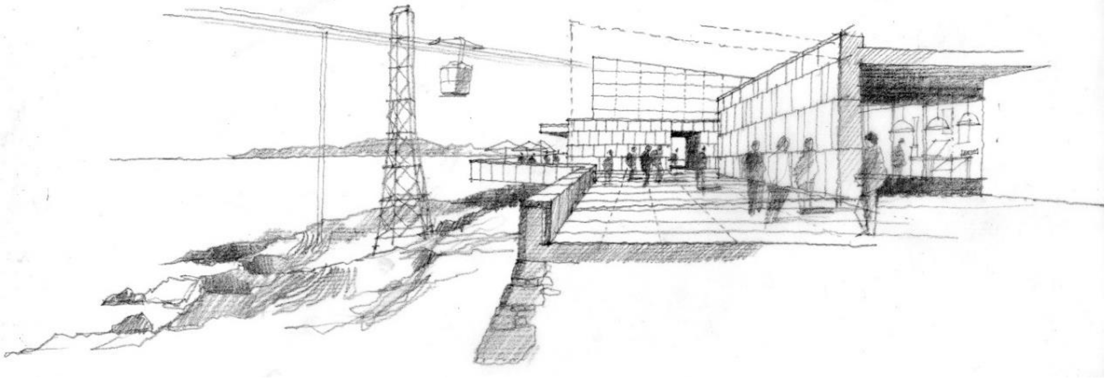


Plate 3.33 **Option 3d – Artists' impression of the proposal**

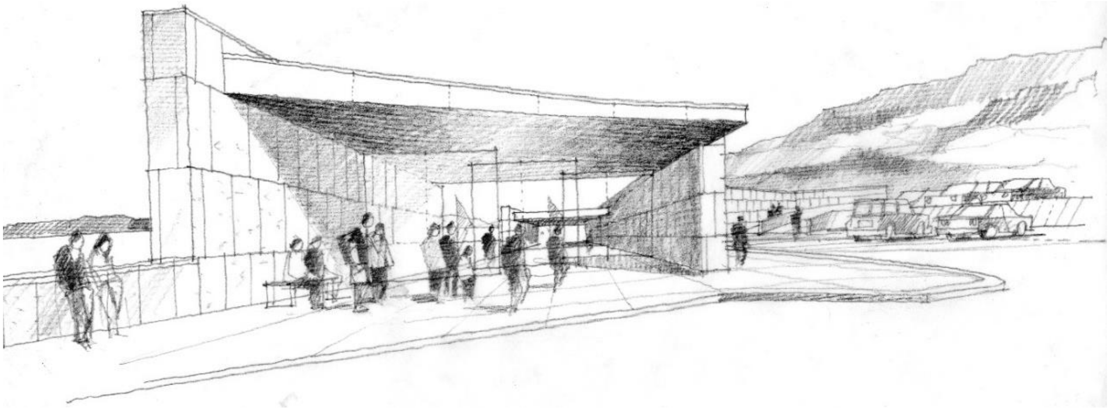


Plate 3.34 Option 3d – Artists' impression of the proposal

3.5.4 Overall Design Options

At Options Stage, five no. Overall Design Options were developed by combining options from the three option categories – Options 1, 2a, 2b, 3 and 3a. As is shown, based on the evaluation of the Cableway Technology Options, which concluded that Option 4, 'Reversible ropeway desynchronised' was the most suitable option for the proposed development, all five Overall Design Options use this Technology Option. What varies between the five options are (1) the alignment of the cableway, and (2) the architectural design and layout of the development. Following the issuance of the Options Report, Option 3a was refined to develop three further options – firstly, 3b; followed by 3c; and finally, 3d. All eight no. options are presented in Table 3.7.

Table 3.7 Overview of Overall Design Options, outlining the options from each option category that were selected for each

	Option 1	Option 2a	Option 2b	Option 3	Option 3a	Option 3b	Option 3c	Option 3d
Cableway Technology Option	4	4	4	4	4	4	4	4
Cableway Alignment Option	1	2	3	1	1	1	1	1
Architectural Design Option	1	2	2	3	3a	3b	3c	3d

3.6 Environmental Appraisal of Overall Design Options

In order to determine the most suitable option to advance, the Overall Design Options developed at Options Stage were appraised in a multi-criteria analysis (MCA) Since Options 3b, c and d were developed subsequent to the issuance of the Options Report, these options were not included in the MCA, which was completed at Options Stage. However, since 3b, c and d are derogations/variations on 3a, it is considered that they would have scored very similarly to Option 3a in all criteria of the MCA. The MCA evaluated the Options with respect to the following criteria:

- Environmental merit
- Aesthetic merit
- Technical merit

- Buildability and disruption impact during construction
- Durability and maintenance requirements
- Capital construction costs
- Economic viability
- Project risk

A summary of the environmental appraisal of each option is presented in this section. In order to assess the environmental merit of each option, the risk posed by each option to 9 no. environmental criteria was estimated. These environmental criteria are as follows:

(i) Biodiversity
(ii) Soils and Geology
(iii) Hydrogeology
(iv) Hydrology
(v) Landscape and Visual Amenity
(vi) Noise and Vibration
(vii) Air Quality and Climate
(viii) Archaeology, Architecture and Cultural Heritage
(ix) Population, Human Health and Material Assets

3.6.1 General

3.6.1.1 Biodiversity

All options are situated within the Beara Peninsula SPA, although they pose various degrees of risk towards the Qualifying Interests of the area, as outlined for each option in turn, in the following sections.

3.6.1.2 Soils and Geology

Since there are no records of any landslide events in the study area, it is considered that the risk of such an event occurring is low for all options.

3.6.1.3 Hydrogeology

While the hydrogeological risk posed varies somewhat from option-to-option (as described in the following sections) it is considered that the risk posed by all options in this respect is low, provided mitigation measures and best practice guidelines are adhered to.

3.6.1.4 Hydrology

There is no risk of flooding associated with any of the proposed options.

3.6.1.5 Population, Human Health and Material Assets

It is considered that all options will have positive effects on the local community by creating new jobs and stimulating the local economy. The degree to which these benefits are felt, however, varies from option-to-option, as described in the following sections.

3.6.2 Option 1

3.6.2.1 Biodiversity

This option will result in the largest area of habitat loss due to the scale of the footprint of proposed development. While this Option covers much of the area of existing hard surface, it will also extend into the grassland/heath mosaic to the north of the existing car park and this would necessitate the translocation of grassland habitat supporting the protected plant species, betony (*Betonica officinalis*). Loss of such habitat may have adverse effects on populations of chough (*Pyrrhocorax pyrrhocorax*) and fulmar (*Fulmarus glacialis*). It is envisaged that the grassland habitat could be salvaged and subsequently reinstated in the landscaping of the proposed development. This would require translocation by licenced National Parks and Wildlife Service personnel. This Option would not entail any works *within* the Kenmare River SAC, although suitable preventative and mitigating measures would have to be employed during the construction phase to address the possibility of run-off of polluted water from the construction site into the adjacent SAC.

For these reasons, Option 1 has been ranked as the 2nd most preferred option in terms of biodiversity.

3.6.2.2 Soils and Geology

Because this option has the footprint with the greatest area, it will necessitate the greatest amount of earthworks (excavation, rock-breaking, and movement of soil and rock), and will also require the greatest volume of imported materials.

For these reasons, Option 1 has been ranked as the least preferred option in terms of soils and geology.

3.6.2.3 Hydrogeology

As described in the previous section, this option entails the most substantial earthworks of all five. It is also considered to pose the greatest risk in terms of groundwater pollution. However, this risk is small and, provided mitigation measures and best practice guidelines are adhered to, it is unlikely that the hydrogeological regime of the study area will be negatively affected.

For these reasons, Option 1 has been ranked as the least preferred option in terms of hydrogeology.

3.6.2.4 Hydrology

In the design and layout of this option, similarly to the existing cableway, both landing points are located at a distance from the Kenmare River SAC (i.e. the sea) and this reduces the risk of pollution relative to other options. However, this large-scale option is likely to attract the highest number of visitors and will, therefore, place the greatest demand on the on-site wastewater treatment system, thereby increasing the risk of effluent entering the adjacent SAC.

For these reasons, Option 1 has been ranked as the intermediate preferred option in terms of hydrology.

3.6.2.5 Landscape and Visual Amenity

In this option, although the design of the proposed development is to a much higher specification than that of the existing site, the layout of the proposed development is similar to that of the existing site, with the exception of the car park, which will be much larger than its extant equivalent, and the visitor centre, which will be at a similar level to that of the existing car park. The large car park has the potential to negatively affect views from elevated locations in close proximity to the site (i.e. the approach road, the cableway, and the Beara-Breifne Way walking trail to the east of the site). The structures of the proposed development will have localised adverse effect on the landscape character. The enlarged car park, for instance, has the potential to encroach upon rock outcrops to the north of the site.

Potential negative landscape effects would include some effects on the fabric of the landscape due to the construction of the building, car park and associated works, but the land is generally level and the effects are expected to be minor. The introduction of visitor facilities integrated with the station building, on a remote and isolated island, are likely to have a localised effect on the isolated and tranquil character of the island. This may be perceived by some as negative, and others as positive. However, the wider landscape character of Dursey Island is not expected to be affected. The visitor centre green roof, the 'ha-ha' wall surrounding the carpark, the use of high quality construction materials, and soft landscaping will mitigate to some degree against adverse visual impacts.

In fact, it is considered that, overall, Option 1 would have neutral to positive effects on landscape and visual amenity, since the design in question constitutes a substantial improvement from the appearance of the existing cableway site.

3.6.2.6 Noise and Vibration

Due to the scale of the proposal, Option 1 is expected to be associated with the highest levels of noise and vibration during the construction phase. Due to its size and capacity, this option is also likely to result in the highest visitor numbers and, as a result, the greatest noise levels during the operational phase.

For these reasons, Option 1 has been ranked as the least preferred option in terms of noise and vibration.

3.6.2.7 Air Quality and Climate

Due to the scale of the proposal, Option 1 is expected to be associated with the greatest emissions of air pollutants and greenhouse gases during the construction phase. Due to its size and capacity, this option is also likely to result in the highest visitor numbers and, as a result, the greatest vehicular emissions of all five options.

For these reasons, Option 1 has been ranked as the least preferred option in terms of air quality and climate.

3.6.2.8 Archaeology, Architecture and Cultural Heritage

While Option 1 has the largest footprint of all five options, it is not situated in close proximity to any recorded sites of archaeological or architectural interest. Therefore, Option 1 is not of archaeological or architectural heritage concern and is considered the intermediate preferred option in this respect.

3.6.2.9 Population, Human Health and Material Assets

Because of its scale, Option 1 is likely to give rise to the most noise pollution, air pollution and traffic congestion (during both construction and operation) and these factors have the potential to cause some nuisance locally. In this sense, Option 1 is the least preferred option.

However, during the operational phase, Option 1 (because of its scale) is considered to be the most beneficial option in terms of regional economic and infrastructural development. By increasing tourist numbers at the site, the proposed development will boost local economic growth, create jobs, and improve local water, telecommunications and transport infrastructure. In this respect, Option 1 is the preferred option during operation due to the magnitude of benefits.

As the benefits associated with the operation of the proposed development outweigh any nuisance during the construction/operation phase, Option 1 has been ranked as the 1st preference in terms of population and human health.

3.6.3 Option 2a/2b

3.6.3.1 Biodiversity

Option 2a will result in the development footprint extending into the Kenmare River SAC on both the mainland and island sites. The following protected habitats and species, which are Qualifying Interests of the SAC, are present at both locations, and may be negatively affected by the proposed development:

- Reefs [1170]
- Submerged or partially submerged sea caves [8330]
- Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]
- Otter (*Lutra lutra*) [1355]
- Harbour seal (*Phoca vitulina*) [1365]

Option 2b, which has the same architectural design and layout as Option 2a, but has a different cableway alignment, will fall within the Kenmare River SAC on the mainland side of the site only, but would also carry the risk of negatively effecting these Qualifying Interests.

Based on the findings of a preliminary betony survey, it would appear that the footprints of both Options 2a and 2b would avoid locations where the protected plant species is present, thereby eliminating the need for translocation.

The footprint of the proposed car park for this option is predominantly confined to the existing car park and adjacent disturbed ground. While some amount of heathland habitat will be lost to the construction of the new car park, the loss will be less than that accrued under Option 1.

In terms of biodiversity, Option 2a has been ranked as the 4th preference, while Option 2b has been ranked 3rd.

3.6.3.2 Soils and Geology

As Options 2a and 2b incorporate the provision of towers, there are substantial less earthworks associated with these options compared to Option 1.

For this reason, Options 2a, 2b, 3 and 3a have been ranked jointly as the preferred options in terms of soils and geology.

3.6.3.3 Hydrogeology

As Options 2a and 2b incorporate the provision of towers, there are substantially less earthworks associated with these options compared to Option 1.

For this reason, Options 2a, 2b, 3 and 3a have been ranked jointly as the preferred options in terms of hydrogeology.

3.6.3.4 Hydrology

Because of its close proximity to the Kenmare River SAC (i.e. the sea) at both the island and mainland side of the site, Option 2a poses the greatest risk of aquatic pollution in the SAC during construction and operation. Additionally, of all options, 2a will bring the greatest number of visitors within very close proximity to the SAC, increasing the risk of littering in the protected area.

Option 2b poses somewhat less of a risk in this respect, since it is immediately adjacent to the SAC on the mainland side only. This risk, however, is still greater than that associated with Options 1 or 3/3a.

Accordingly, in terms of hydrology, Option 2a has been ranked as the least preferred option, while 2b has been ranked as the second least preferred option.

3.6.3.5 Landscape and Visual Amenity

Like Option 1, Options 2a and 2b will have visual impacts on views, particularly those from elevated sites overlooking the development (i.e. approach road, cableway and Beara-Breifne Way walking trail to east). The height of the tower associated with these options, however, is likely to result in visual impacts accruing over a greater area, since the development will be visible from further afield. The car park of Options 2a/2b will be better integrated into the natural contours of the landscape than those of Options 1 or 3 (although it is larger than that of Option 3). Nevertheless, the car park is still likely to be visually prominent. The use of landscaping, high quality material and the 'ha-ha' wall surrounding the car park will mitigate to some degree against adverse visual impacts.

3.6.3.6 Noise and Vibration

Due to the intermediate scale of the proposals, Options 2a and 2b are expected to be associated with slightly increased noise and vibration during construction and operation relative to Options 3/3a and are, therefore, considered to be intermediate preferred options in terms of noise and vibration.

3.6.3.7 Air Quality and Climate

Due to the intermediate scale of the proposals, Options 2a and 2b are expected to be associated with slightly increased air pollutant and greenhouse gas emissions during construction and operation relative to Options 3/3a and are, therefore, considered to be intermediate preferred options in terms of air quality and climate.

3.6.3.8 Archaeology, Architecture and Cultural Heritage

Because of the proximity of the proposed island station (adjacent to the existing slipway) to a cluster of archaeological sites immediately south of the existing island station (described in Section 3.3.1), Option 2a is considered the least preferred option of all five in terms of archaeology, architecture and cultural heritage.

Option 2b does not pose a known risk in this respect. Its landing point on the island (adjacent to the existing landing point) is of sufficient distance from recorded sites of archaeological, architectural and cultural heritage interest to pose any concern.

3.6.3.9 Population, Human Health and Material Assets

Options 2a, 2b and 3 are jointly ranked as the most preferred options in terms of disturbance during construction as they entail the least nuisance due to noise pollution, air pollution and traffic congestion. Because of their intermediate scale, Options 2a and 2b will bring intermediate benefits in terms of economic growth, job creation and infrastructural development.

3.6.4 Option 3/3a

3.6.4.1 Biodiversity

Option 3 and, to a lesser extent, 3a have the smallest footprints of development of all options, with no elements extending directly into the Kenmare River SAC. The cableway alignment associated with this option will result in cableway infrastructure extending into the grassland habitats where betony is known to occur, necessitating the translocation of plants under licence. The associated car parks, which are the smallest of all options, will bring about the least loss of area of acid grassland and dry heath habitat. As a result, these options are likely to have the least adverse effects on the conservation status of chough and fulmar, Qualifying Interests of the Beara Peninsula SPA.

For these reasons, Options 3 and 3a have been ranked jointly as 1st preference in terms of biodiversity.

3.6.4.2 Soils and Geology

By virtue of their intermediate to small footprints and the relatively minimal earthworks associated with them, Options 3, 3a, 2a and 2b have been jointly ranked as the most preferred options in terms of soils and geology.

3.6.4.3 Hydrogeology

By virtue of their intermediate to small footprints and the relatively minimal earthworks associated with them, Options 3, 3a, 2a and 2b have been ranked jointly as the most preferred options in terms of hydrogeology.

3.6.4.4 Hydrology

Unlike Options 2a/2b, much of the proposed development set out in Options 3/3a is set at a distance from the seafront. Additionally, the footprints of development associated with these options – and therefore, the scale of construction works – are substantially lesser than those of Options 1, 2a or 2b. As such, there is a reduced risk of run-off of pollutants to sea and subsequent adverse effects in the Kenmare River SAC.

For this reason, Options 3 and 3a have been ranked jointly as the most preferred options in terms of hydrology.

3.6.4.5 Landscape and Visual Amenity

As with Options 1, 2a and 2b, visual effects of Options 3 and 3a will mostly accrue to views from elevated areas overlooking the site (i.e. approach road, cableway, and Beara-Breifne Way walking trail to east). The proposed developments of Options 3 and 3a will occupy a similar area to that of the existing site. The buildings and structures will be of much higher specifications and greater aesthetic merit than those of the existing cableway. Pylons, for instance, will be more compact and less visually imposing. The structures associated with Options 3 and 3a will be substantially smaller, less imposing than those of Options 1, 2a/b. Option 3a has the smallest car park of all five options. It will also be better aligned with the contours of the landscape than that of Option 3, although neither car park will be as well integrated into the landscape as that of Options 2a/b.

3.6.4.6 Noise and Vibration

Due to their relatively small scale, Options 3 and 3a are expected to be associated with the shortest and least intrusive construction phases. Increases in noise pollution, air pollution and traffic associated with these options are likely to be the least of all options, thereby resulting in the least nuisance to local residents. Of the two options, it is considered that Option 3 will result in the least adverse effects of this nature.

For this reason, Option 3 and 3a have been ranked jointly as the most preferred option in terms of noise and vibration.

3.6.4.7 Air Quality and Climate

Because of their relatively small scale, Options 3 and 3a are expected to be associated with the shortest construction phases and the lowest numbers of site visitors during operation. It follows that they are likely to give rise to the least emissions of air pollutants and greenhouse gases of all options.

For this reason, Options 3/3a have been ranked as the most preferred options in terms of air quality and climate.

3.6.4.8 Archaeology, Architecture and Cultural Heritage

Because of their relatively small footprints and their distance from recorded archaeological sites, Options 3/3a have been ranked jointly as the most preferred options in terms of archaeology, architecture and cultural heritage.

3.6.4.9 Population, Human Health and Material Assets

It is considered that, due to their relatively small scale, Options 3/3a will result in the least benefits in terms of regional economic growth and job creation. However, Options 3 and 3a are likely to give rise to similarly low construction phase nuisance (due to noise pollution, air pollution and traffic) as Options 2a and 2b.

3.6.5 Options 3b/3c/3d

While, as discussed above, it is considered that Options 3b, c and d would have scored equally or very similarly to Option 3a in terms of the criteria applied in the MCA, 3d was considered to be the most preferred option by CCC, since it had the added benefits of (i) allowing vehicular access to the rear of the Cable Car, (ii) allowing the mainland pylon to be situated back from the high water mark, and (iii) facilitating maintenance of an existing right of way. Thus, the design option being put forward for the proposed development is Option 3d.

3.6.6 Summary and Conclusions

Table 3.8 Environmental impacts scoring system used in MCA of options

Environmental Impact Score	Description of Option
9 – 10	Preferred in 5+ environmental criteria
7 – 8	Preferred in 1 – 4 environmental criteria
5 – 6	Least preferred in 5+ environmental criteria
3 – 4	Least preferred in 7+ environmental criteria
0 – 2	Least preferred in all 9 criteria

Environmental impact scores were assigned to each option, according to the scoring system outlined in Table 3.8. Table 3.9 shows the results for all assessment criteria of the MCA of options. It shows that, in terms of environmental merit, the Overall Design Options were ranked as follows (where 1st is the option with the greatest environmental merit, and so on):

1st Option 3

2nd Option 3a and Option 2b
3rd Option 1
4th Option 2a

In spite of Option 3 being ranked as the option with the greatest environmental merit, the MCA found Option 3a to be preferable in terms of aesthetic and technical merit. It was also considered that Option 3a had greater economic viability. Option 2b, which ranked equally with 3a in terms of environmental merit, lost out to 3a in terms of buildability, durability, capital construction costs and overall project risk. Option 1 (which emerged as the second-best option overall) ranked low in terms of capital construction costs. It was considered that Option 2a was prohibitively expensive. It also ranked low in terms of buildability, durability, economic viability and overall project risk. For these reasons, Option 2a was ultimately ranked as the least preferred option overall in the MCA. Thus, Option 3a was ranked as the most preferred option overall in the MCA and has been selected as the option to advance for the proposed development.

Table 3.9 Results of Multi-criteria Analysis of options including all assessment criteria

Assessment Criteria	**Weighting**	**Scores**				
		Option 1	*Option 2a*	*Option 2b*	*Option 3*	*Option 3a*
Environmental merit	100%	7	6	8	9	8
Aesthetic merit	100%	8	9	8	7	8
Technical merit	100%	8	6	7	6	7
Buildability and disruption impact during construction	75%	8	4	5	9	9
Durability and maintenance requirements	100%	6	3	4	7	7
Capital construction costs	75%	4	0	3	7	6
Economic viability	100%	9	4	8	6	8
Project risk	100%	8	3	3	8	8
Assessment Score		58	35	46	59	61
Weighted Assessment Score		55	34	44	55	57
Rank		**2**	**5**	**4**	**2**	**1**

3.7 Design Development

Since the selection of Option 3A as the preferred option, the design has further evolved. The design has developed organically as well as variations arising from discussions with CCC's Project Steering Group, Failte Ireland and various scheme consultees. Feedback gathered via public consultation events has also shaped the final design. The most significant developments are summarised in the following sections.

3.7.1 Position of Mainland Station Building and New Cableway Alignment

A notable development in the mainland site layout stemmed from CCC's request to omit the two lifts from the proposed design. This request necessitated (1) relocation of the mainland station to lower ground closer to the sound i.e. to the middle of the existing carpark and (2) raising of the visitor centre so that it was level with the proposed carpark instead of the undercroft arrangement shown in Option 3A. Item (1) above had the knock-on affect of blocking access to the west end of the site. Consequently, it was decided to investigate an alternative alignment to the northwest of (but still parallel to) the existing cableway alignment. This new alignment was adopted following checks that sufficient clearance to the existing cableway and existing ESB overhead lines could be maintained (see Plate 3.35).

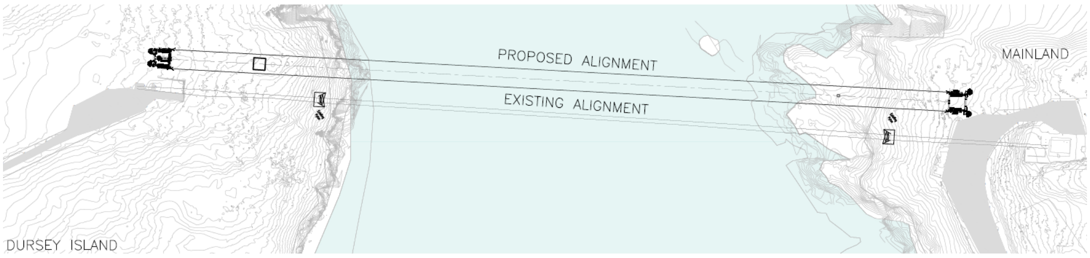


Plate 3.35 Map Illustrating Proposed Cableway Alignment

The new alignment necessitated the relocation of the mainland and island pylons and cableway stations.

3.7.2 Mainland Visitor Centre

A number of developments arose from meetings with Failte Ireland (FI) with regards to the design of the mainland site and in particular the layout of the visitor centre:

- Arrival – FI stressed the importance of having a central arrival point as a 'scene setter';
- FI asked that consideration be given to an 'Atlantic Terrace' in front of the café overlooking the Dursey Sound;
- Maximising the Atlantic views as a key part of the visitor experience/interpretation.
- FI asked that ROD give further consideration to avoiding congestion at the building entrance;

These comments lead to the addition of an arrival forecourt / terrace and a more open layout to avoid congestion.

Concerns expressed by CCC that the visitor centre was becoming too long and narrow were addressed by splitting the visitor centre into a number of smaller buildings i.e. separate exhibition space / gift shop, café and station building. This new segregated arrangement lent itself to the introduction of landscaped gardens to fill the interposing spaces.

Finally, liaison with CCC operations department resulted in additional storage space, extra office space and a service yard to the rear of the station building for deliveries.

3.7.3 Island Station Building

Following feedback from Failte Ireland it was agreed that the proposed building and associated facilities on the island would be reduced to essentials only, to minimize its environmental impact. Accordingly, the waiting area was reduced from a 40-seater waiting lounge with welcome desk, to a relatively small waiting area with no seating or welcome desk, and reduced welfare facilities. It was decided to retain the existing small residents' car park on the island.

As a result of the change in the cableway alignment discussed above, the island station building and parking facilities were moved to the northwest side of the existing cableway.

3.7.4 Carpark

In order to achieve the number of parking spaces stipulated by the CCC project Steering Group it was decided to further extend the car park into high ground bordering the northern edge of the existing carpark. In addition, in order to minimize the additional rock-cut associated with this extension, and to avoid a vast visually monotonous car park, it was decided to provide the parking over two levels, a lower tier at grade (circa 17m AOD) and an upper tier at (19m AOD) connected by ramps with a gradient of 1 in 6.

Chapter 4 Description of the Proposed Development

4.1 Introduction

This chapter provides a description of the various elements of the proposed Dursey Island Cable Car and Visitor Centre development. The primary elements of the design, the proposed construction, operation and demolition methodologies and the relevant environmental management plans are described in this chapter.

Surveys, assessments and information that form the basis of this Environmental Impact Assessment Report (EIAR) are based on the design of the project as described in this chapter, which has been developed to a stage that permits a fully informed Environmental Impact Assessment (EIA) to be carried out by the competent authority. While further detailing will be required to fully inform procurement and construction, no design changes will be permitted that have the potential to undermine the basis of assessment of the environmental impacts undertaken in this EIAR.

4.1.1 General Description

The location of the proposed development is directly adjacent to the existing cableway, which straddles the Dursey Sound, connecting the easternmost tip of Dursey Island with the townland of Ballaghboy, on the western end of the Beara Peninsula in west County Cork (Plates 4.1 and 4.2). The proposed cableway will run parallel to the existing alignment offset by approximately 14m to the north. The end-to-end length of the proposed cableway will be approximately 375m (roughly the same as that of the existing cableway).

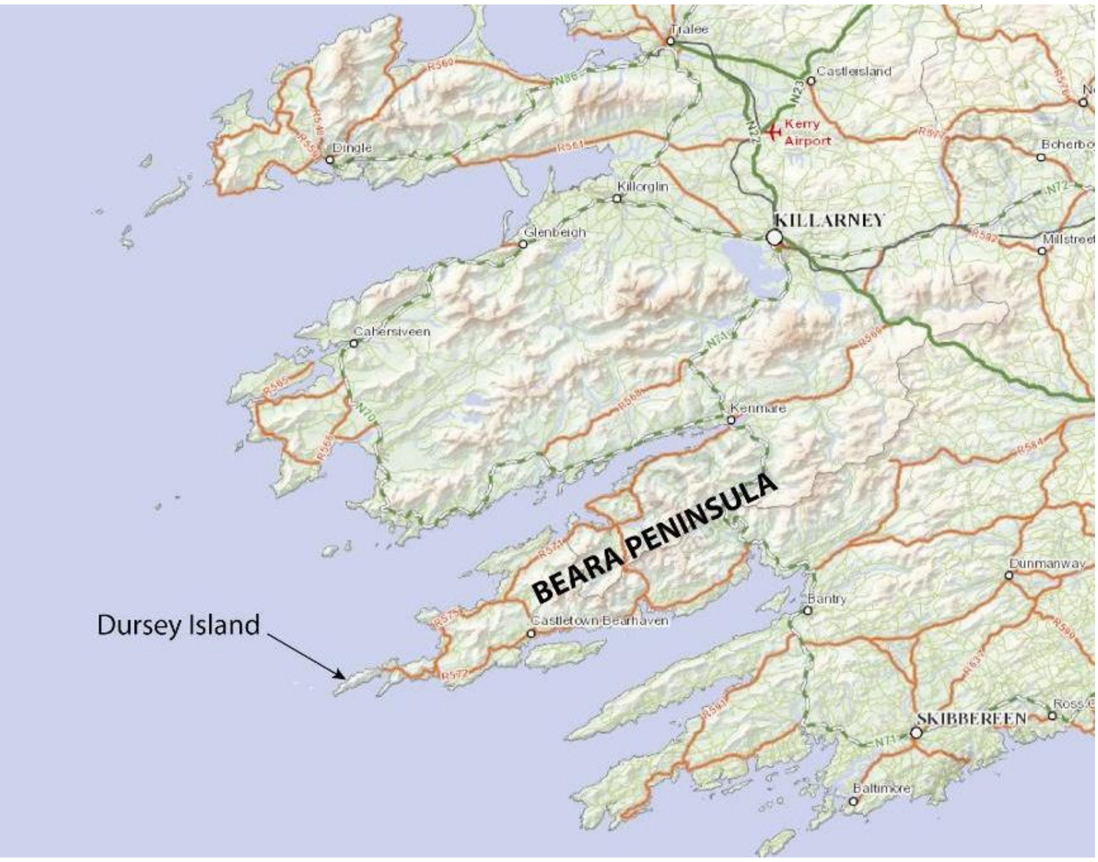


Plate 4.1 **Location of Dursey Island in relation to the Beara Peninsula**

The Dursey Island Cable Car was originally commissioned in 1969 and provides transportation across the Dursey Sound between the mainland at the Beara Peninsula (Lambs Head) and Dursey Island in County Cork. The cableway was originally built to serve the needs of the islanders, who could be cut off from the mainland for weeks in bad weather due to the hazardous tidal race that flows at high speed through the Dursey Sound. The cableway still serves a small number of islanders but is now predominantly used by tourists and farmers. The cable car was originally used to accommodate both passengers and livestock, but it was decided to cease the transportation of livestock in January 2012. As an alternative, Cork County Council (CCC) now provides a barge for the transportation of livestock to-and-from the island, as required.

British Ropeway Engineering Co. Ltd. provided the original carrier cabin, which was subsequently replaced in 1981 and again in 2004, making the current carrier cabin the third incarnation. Due to corrosion of the steelwork, the pylons were dismantled, and two new galvanised steel structures were erected in their place in 1977. Apart from these major replacements, minor upgrades, and the replacement of serviceable components such as ropes and fixings, many of the original components remain.

The proposed project will involve the decommissioning of the existing Dursey Island cableway, demolition of associated structures (with exceptions discussed below), and the construction of a new cableway and associated structures, including a Visitor Centre and café on the mainland, as set out in the project brief developed by CCC. CCC owns and operates the cableway. Some elements of the existing infrastructure (the mainland pylon, the carrier cabin and a section of the hauling machinery on the mainland) will be retained on-site as relics of the historic cableway, in order to promote their industrial architecture and cultural heritage value.

Plate 4.2 **Location of the Existing Dursey Island Cable Car**

It is also proposed to upgrade supporting infrastructure and utilities within the study area and its surroundings to facilitate the provision of improved welfare facilities and to accommodate the anticipated increase in visitor numbers associated with the proposed development. It has been projected that the proposed development will facilitate an anticipated annual maximum of 100,000 visitors to the mainland side of the site by 2030 (with a maximum of 80,000 visitors making the cable car journey to Dursey Island).

The majority of the proposed works will be carried out on lands currently owned by CCC, with the exception of some certain elements of the island-side works and improvement works to the R572 regional road which will necessitate the acquisition of private land by compulsory purchase order (CPO) in the areas in question. The proposed development also requires a Foreshore Licence, and an application for such will be made to the Department of Housing, Planning and Local Government's Marine Planning and Foreshore Unit prior to the submission of the planning application for the proposed development to An Bord Pleanála.

In Ireland, the Authority in charge of cableways safety is the Commission for Railway Regulation (CRR), formerly known as Railway Safety Commission. Among the Commission role and responsibilities, it is highlighted that they are in charge of "*reviewing applications for authorisation to place in service heavy and ligh*t *rail structural sub-systems and vehicles, heritage railways, and cableway*". CRR has been working, and continues to work, with CCC in relation to the existing Dursey Island Cable Car.

The multidisciplinary Project Design Team led by Roughan & O'Donovan Consulting Engineers (ROD) also includes the following external consultants (Table 4.1):

Table 4.1 Organisations within the Project Team

Consultant Organisation:	Services Provided:
Scott Tallon Walker Architects (STW)	Architecture & Master Planning
POMA	Mechanical & Electrical Engineering (Cableway)
JV Tierney	Mechanical & Electrical Engineering (Buildings)
Cunnane Stratton Reynolds (CSR)	Landscape Architecture
JANVS – VIDAR	Cultural & Heritage Design (Interpretive Design)
Tourism Development International (TDI)	Tourism Development Design
EirEco	Ecology
Maurice Johnson & Partners	Fire Consultant
i3PT	Assigned Certifier

4.1.2 Development Overview

The proposed development will include the construction/completion of the following elements at the site of the existing Dursey Island Cable Car and on the R572:

- Erection of a two-car desynchronised reversible ropeway cableway ('cableway' hereafter)[1] with a capacity of 200-300 passengers per hour in each direction;
- Erection of two supporting line structures ('pylons' hereafter) - one on the mainland and one on the island;

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[1] The term 'Cable Car' refers to the carrier cabin which conveys passengers to and from the island via the cableway.

- Construction of a mainland-side drive station ('mainland station' hereafter) including all necessary operating machinery, facilities for operating staff, and a platform for embarking/disembarking;
- Construction of an island-side return station ('island station' hereafter) including all necessary operating machinery, platform for embarking/disembarking, a sheltered waiting area and welfare facilities;
- Construction of a mainland-side interpretive exhibition centre with a gift shop ('Visitor Centre' hereafter);
- Construction of a mainland-side café with seating for 40 indoors, an additional 44 seats on an outdoor terrace/balcony overlooking the Dursey Sound, and welfare facilities;
- Construction of a mainland-side visitor car park with approx. 100 no. parking spaces and 1 no. bus bay;
- Retention of the existing residents' car park on Dursey Island;
- Upgrades of associated utilities infrastructure (including mainland water supply and telecommunications connectivity and mainland and island wastewater treatment systems);
- Completion of road improvement works (construction of 10 no. passing bays, 1 no. visibility splay at Bealbarnish gap (hereafter referred to as '11 no. passing bays') and completion of a number of local improvements to improve visibility) on an 8km stretch of the mainland-side approach road R572 (between the R572-R575 junction at Bealbarnish Gap and the mainland side of the cable car site);
- Demolition/removal of some elements of the existing cableway infrastructure (ropeway, island-side pylon), mainland-side visitor car park and island and mainland station buildings;
- Erection of interpretive/informative signage at strategic locations;
- Erection of 4 no. Variable Message Signs (VMS) at four locations along the approach roads to the site:
    1. Bealbarnish Gap;
    2. R572 at Castletownbere;
    3. R575 at Eyeries Cross; and
    4. N71 at Glengarriff;
- Retention of the cable car, mainland pylon and a section of the mainland-side hauling machinery of the existing cableway in order to facilitate ongoing appreciation of their industrial architectural and cultural heritage value;
- Soft and hard landscaping; and
- All other ancillary works.

4.1.3 Need for the Proposed Development

For an in-depth discussion of the need for the proposed development, please refer to Chapter 2 of Volume 2 of this EIAR – Need for the Proposed Development.

The proposed development is considered necessary for the following principal reasons:

- The capacity and turnover of the existing Dursey Island Cable Car cannot meet current or future demand for its use, and there is significant untapped tourism potential at the site. Replacement of the cableway with a state-of-the-art equivalent would allow a greater number of annual visitors to the site, and to

Dursey Island. As a result, greater revenue would be generated by the attraction. Additionally, indirect economic benefits would likely also accrue to other businesses in the Beara, west Cork and west Kerry regions, and other attractions on the Wild Atlantic Way (WAW). By delivering growth in the local and regional tourism sectors, the proposed development would contribute to achievement of objectives set out in a number of national, regional and local policy documents, including the '*Action Plan for Rural Development 2017'*, '*People, Place and Policy Growing Tourism to 2025*', the '*Draft Southern Regional, Spatial and Economic Strategy 2019 – 2031*', the '*Cork County Development Plan 2014 – 2020*', the '*Kerry County Development Plan 2015 – 2021*', the '*Cork Tourism Strategy 2016: Growing Tourism in Cork – A Collective Strategy*', the '*West Cork Municipal District Local Area Plan 2017*' and the '*West Cork Islands Integrated Development Strategy 2010*'.

- The existing infrastructure is substantially corroded and non-compliant with European Standards for '*The Safety Requirements for Cableway Installations Designed to Carry Persons*', S.I. No. 470/2003 or S.I. 766/2007. While there are no immediate safety concerns for those using the existing cableway, the infrastructure in its current form will need to be replaced in the short- to medium-term in order to maintain safe and convenient access to the island for island residents/farmers and visitors.
- At present, the Dursey Island Cable Car provides visitors with a suboptimal visitor experience. During the peak months of July and August, waiting times to board the carrier cabin of 2 hours and upwards are commonplace on the island and mainland. In terms of comfort and shelter, facilities are inadequate, with visitors sometimes having to queue outdoors during inclement weather. Furthermore, there are no welfare facilities (i.e. toilets) for visitors on the island. Visitors have also complained about a lack of information on Dursey Island regarding walking trails, history and natural heritage. The proposed development would offer a substantially enhanced visitor proposition without queues, with comfort and shelter, with interpretive information on cultural and natural heritage and activities on the island, and with adequate welfare facilities.
- As is stated in the '*West Cork Islands Integrated Development Strategy 2010'*, Dursey Island is threatened with permanent depopulation in the short-term and it is an explicit objective of the strategy to "*retain and enhance population levels on the [West Cork] islands*". At present, there are just two permanent residents living on the island and abandonment of homes and farmland is in evidence. As such, any development which makes permanent residence on the island more feasible is desirable. By improving ease-of-access to-and-from the island (i.e. shorter, more comfortable and safer journeys), the proposed development may contribute to the prevention of depopulation on the island. By increasing the number of annual visitors to the island, it will also create new opportunities for local businesses, which might also increase the viability of life on the island. Similarly, the proposed development may also increase the viability of farming on the island, which in turn would contribute to the maintenance of a sufficient area of suitable foraging habitat for red-billed chough (*Pyrrhocorax pyrrhocorax*) (for further details, please refer to Chapter 7 of Volume 2 of this EIAR – Biodiversity).

4.1.4 Relationship with Other Projects

The proposed development is not directly related to any existing or planned projects. However, Fáilte Ireland is a funding partner of the proposed development, which will be consistent with, and tie in with, existing developments associated with the WAW. Other tourism projects which are not in direct proximity to the proposed development but which may be subjected to increased visitor numbers due to the proposed development include Mizen Head Signal Station and Visitor Centre, Co. Cork; Bray Head Tower, Valencia Island, Co. Kerry; the Cliffs of Moher Visitor Centre, Co. Clare; the Allihies Copper Mine Museum, Co. Cork; the Skellig Experience Visitor Centre, Co. Kerry; and the Blasket Centre, Co. Kerry. An assessment has been carried out as part of Chapter 17 of Volume 2 of this EIAR - Interrelationships, Major Accidents and Cumulative Effects – in order to identify any potential effects due to the combination of the proposed development with developments within 15km of the site of the proposed development. Consultation with An Bord Pleanála, CCC Planning Department, Kerry County Council Planning Department and other relevant planning resources have been carried out to identify any likely cumulative effects

4.2 General Site Layout

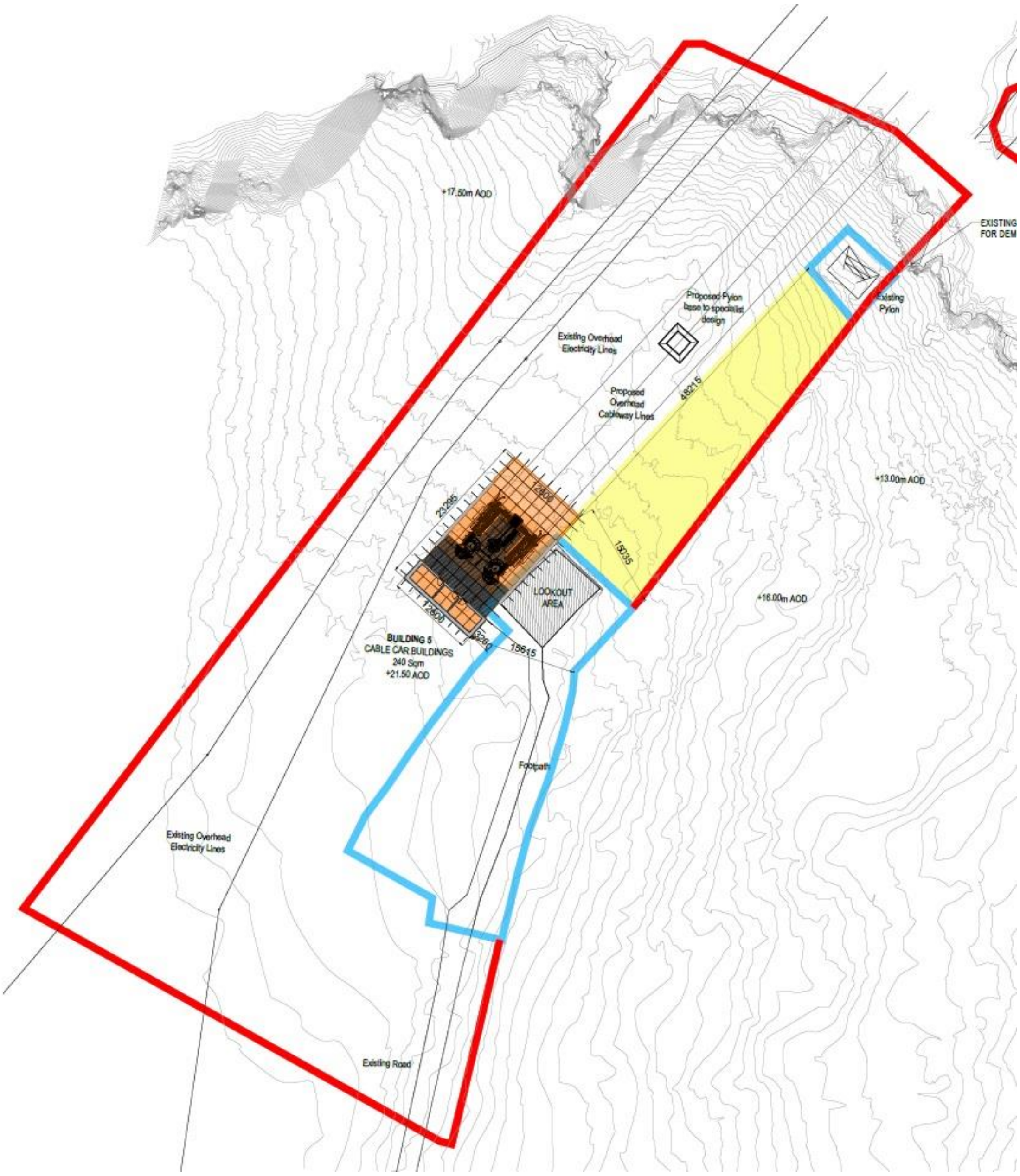


Plate 4.3 Proposed layout of island side of site

Figures 4.2 – 4.11 of Volume 3 of this EIAR present the proposed layout and design of the proposed development (island and mainland), excluding road improvement works and cableway. Proposed road improvement works are presented in Figures 4.12 – 4.22 of Volume 3 of this EIAR. Figure 4.23 – 4.26 of Volume 3 of this EIAR present the layout and design of the proposed cableway infrastructure. In this Chapter, Plates 4.3 and 4.4 present the proposed island- and mainland-side site layout, respectively (excluding road improvement works and cableway).

The site of the proposed development includes that of the existing Dursey Island Cable Car, on the Beara Peninsula and Dursey Island, and also takes in an 8km stretch of the principal approach road to the site, the R572 regional road, between the cable car site and the R572-575 junction at Bealbarnish Gap.

The proposed cableway will run along a parallel alignment to that of the existing cableway but offset 14 m to the north-west, and stopping 40 m short of the existing station on the mainland side.

On the mainland site, an approx. 100-space split-level car park will be constructed with the lower tier at approximately +17 m AOD (on the footprint of the existing car park), and an upper tier at +19 m AOD, extending into undeveloped grassland to the north-east of the existing carpark. The car park will be accessed through the existing entrance (via the R572) at the east end of the site.

As part of the proposed development, improvement works will be carried out on an 8km stretch of the R572, between its junction with the R575 (at Bealbarnish Gap) and the existing cable car site. These works will involve the construction of 11 no. passing bays and completion of a number of local improvements to improve forward visibility. The locations of these improvements will be spaced at appropriate intervals so as to reduce the distances between two-way sections and passing bays, and in order to allow opposing drivers to see each other in sufficient time to give way at one-way sections.

The proposed Visitor Centre will also be situated at approximately +17.6 m AOD, with the café at approximately +17.8 m AOD and mainland station at approximately +18m AOD. The mainland pylon will be located approximately 40 m south-west of the mainland station at an elevation of approximately +6 m AOD and overall height of 33.5 m. The existing cableway landing platform on the mainland will be converted into a lookout area.

On the island, the proposed station building will be constructed alongside the existing platform. The existing residents' car park (approx. 10 spaces) will be retained. The existing station platform will be converted into a lookout area.

The island station will be constructed at its existing grade (approximately +21.5 m AOD) and the pylon will be located 35 m north-east of the station building, at an elevation of +18 m AOD, necessitating a 21.7 m high pylon on the island.

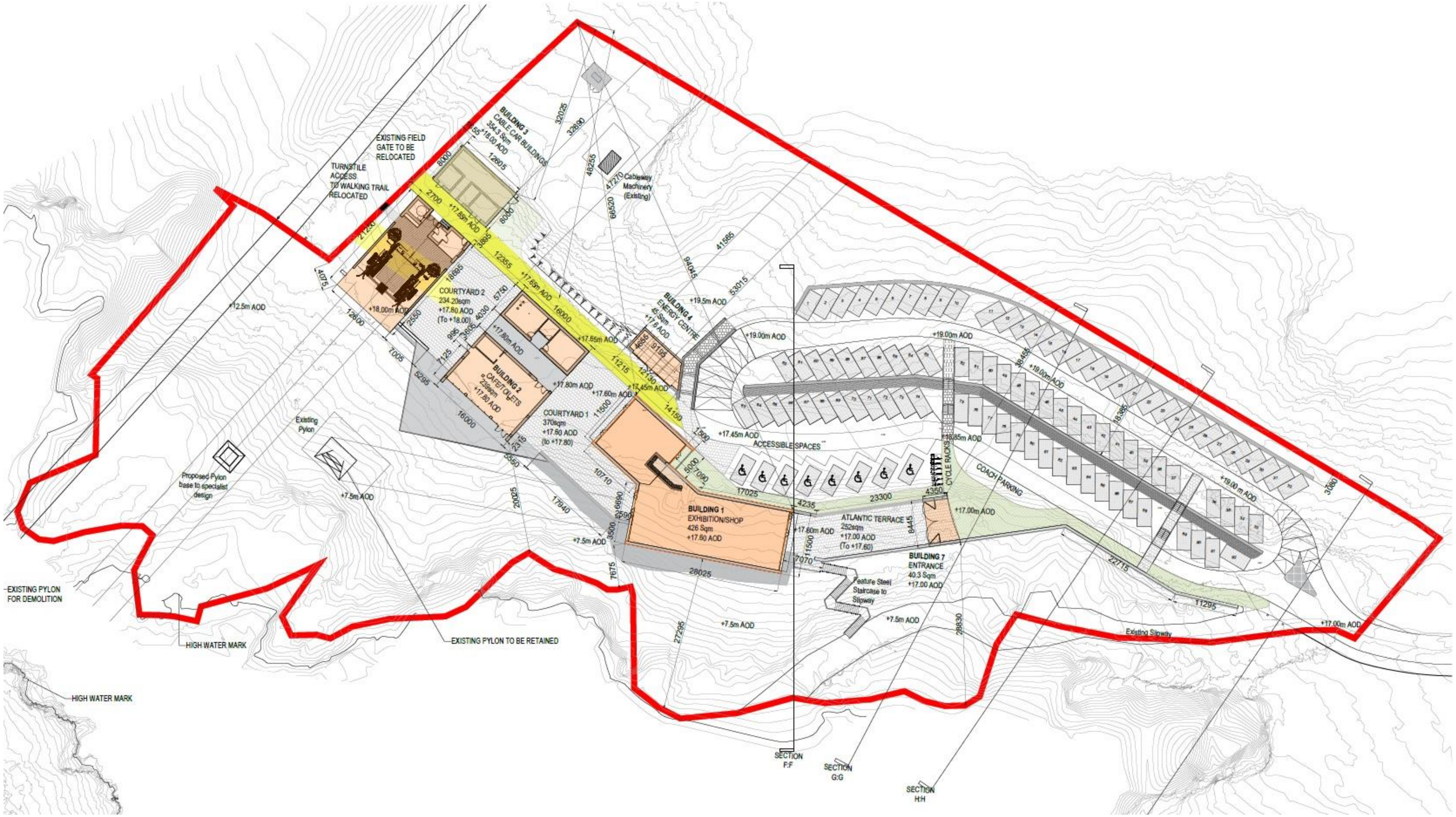


Plate 4.4 **Proposed layout of mainland side of site (not including R572 works)**

4.3 Architectural Design

4.3.1 Architectural Value of the Proposed Development and Its Setting

To speak about the architectural value of the proposal it is necessary to ask "*what is value?*" or "*how do we measure value?*" Value is the thing that visitors to the proposed Dursey Island Cable Car and Visitor Centre development will gain from the experience so, in a sense, value is easy to describe but hard to measure. What should really be asked is "*how do we show that what we are delivering is of value?*"

There are three value measures implicit in this; measuring improvement, measuring whether the proposed development is delivering upon commitments, and – the true measure of value – "*is the proposed development of value to visitors and stakeholders?*"

- *Will the proposed development constitute an improvement?*

  The proposal seeks to replace what is a rudimentary and under-performing facility and provide vastly expanded facilities for visitors that will elevate the experience of visiting Dursey Island to a new level of quality and renown. The quality of the buildings will be elevated from what are currently basic agricultural shed-type constructions to a set of modern architectural standard buildings, improving the durability and utility of the facility (in terms of weathering, energy performance, practicality of arrangement and internal quality of light) and beauty of the facility (as a result of the use of fine materials and finishes, designed, constructed and assembled well). The expanded facility will provide a broader range and higher quality of experiences to the visitor than what is currently offered, making for a better overall visitor experience. Thus, we consider the proposal to represent a vast improvement from the existing scenario.

- *Will the proposed development deliver on commitments?*

  The proposal is compliant with all regulatory standards applicable to it, both in the design and arrangement of the buildings themselves and also in the treatment of the surrounding landscape, and environment more broadly. The proposed development meets all the demands set out in the initial project brief by the client. Therefore, we consider the project to be fully meeting its commitments.

- *Will the proposed development be of value to visitors?*

  Understanding what matters to visitors and then knowing if we are able to provide this is tricky because of the time lag between the design phase and the realisation of the built-end development. However, we have studied the available data on the existing and expected target market, including Fáilte Ireland guidance on the development of WAW sites and the '*How to Develop & Promote Heritage Attractions for Visitors - a Tourism Toolkit for Ireland's Built Heritage*'. We have also consulted with Fáilte Ireland directly on a number of occasions, in order to gain their approval of the proposal. Fáilte Ireland have indicated that the proposal is very positive in this regard. Therefore, we consider the proposal to be of value to the anticipated end users of the facility.

In summary, we consider that the proposal scores highly against these three value measures and, therefore, can conclude that the proposal is of high architectural value.

4.3.2 Visitor Flow Through the Proposed Development

The design of the proposed development aims to create a fluid, connected experience for the visitor moving through the Visitor Centre, café and areas of landscaping ('Courtyards') to the mainland station, and onwards to Dursey Island via the cableway.

In contrast with the existing scenario, wherein visitors purchase tickets at the existing mainland station building, and often spend protracted periods of time queuing to board the cable car, the intended visitor experience at the proposed development is that visitors will purchase tickets for a specified time slot online prior to their visit (or failing that, at the site, if tickets are available) and will spend the time that they would otherwise have spent queuing enjoying the Visitor Centre, gift shop, café and associated outdoor areas. This section sets out the stepwise flow of movement that is envisioned for the typical visitor to the proposed development.

The following 10 bullet points should be read in conjunction with Plates 4.5-4.10. The movement sequence through the visitor centre is presented in Plates 4.11 and 4.12.

1. Visitors purchase tickets for the cableway online, on the website for the proposed development. Failing this, there will be opportunities to purchase tickets at the site itself.
2. Visitors will arrive by road to the car park and find a demarcated space. The car park will be surfaced using a combination of blacktop paving and 'grasscrete', as detailed in Section 4.5.6. The use of grasscrete will allow native grasses from the surrounding environment to colonise the carpark, softening it and giving the appearance of the car park being 'embedded' into the landscape.

Plate 4.5 **Example of a grass-crete style surface paving product**

3. Visitors will alight from their vehicle and make their way on foot along demarcated paths towards the arrival forecourt. There will be a canopy partially covering the forecourt and this area will be useful for groups disembarking from the coach at the coach bus bay to gather in shelter before entering the site. Hard paving, some seating, a waste bin and signage will feature in this area. There will be an automated ticket machine for the cableway here also, providing a second opportunity to purchase tickets.

Plate 4.6 Artists impression of the entrance canopy

4. Progressing from the arrival forecourt towards the Visitor Centre, the visitor next comes to the 'Atlantic Terrace'. This is the first informal interpretive space. It will use the Key View down over the mainland-side slipway to tell the visitor about the 'olden days' when islanders used to cross the treacherous Dursey Sound by *currach* (the vision for the 'Key Views' is detailed in Section 4.4.1). This will set the scene for why the cableway was built in the first place. There will be a staircase descending the cliff face here, enabling visitors to go for a closer look at the slipway.

Plate 4.7 Precedent for the external staircase – Svandalsfossen falls by Haga & Grov AS Civil Architects

5. Next in sequence is the Visitor Centre. Visitors will enter the space, which will be the internal, heated, more formally laid out portion of the interpretive experience. Here the obsolete cable car will be the *pièce de résistance*, with complimentary and supporting information on displays around this. The

presentation materials will be visually attractive and engaging. Section 4.7.4 describes the contents of the interpretive exhibition in greater detail. There will be a staff point at the end of the exhibition space where visitors may interact with a staff member, if necessary. This is the third potential point of ticket purchase for the cableway. From here, it is possible for visitors to segue into the gift shop, but the primary direction of movement is to be towards the second Key View, to the pylon retained from the defunct cableway. The view of the pylon is intended to work hand-in-hand with the cable car in the room.

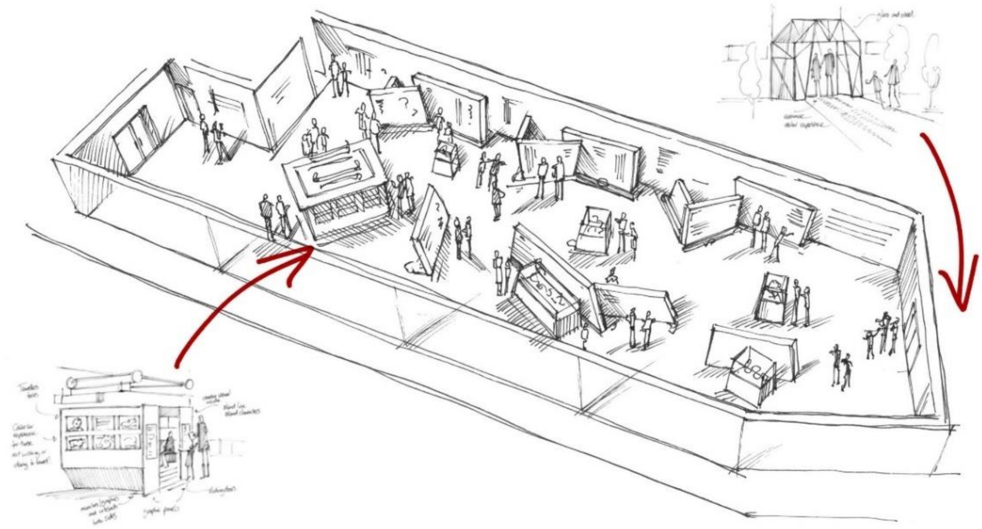


Plate 4.8 **Artists impression of the interior of the interpretive exhibition space**

6. Emerging at the far side of the Visitor Centre, visitors pass through the outdoor 'Courtyard 1', which is intended to host further interpretive materials – sculptures relating to local flora and fauna, along with tower viewers along the water's edge. They will then progress through the gap between the café and toilet block, the enclosure formed between the two of which will frame another Key View to the new mainland station, which is intended to be eye-catching and form a 'book-end' to the masterplan.

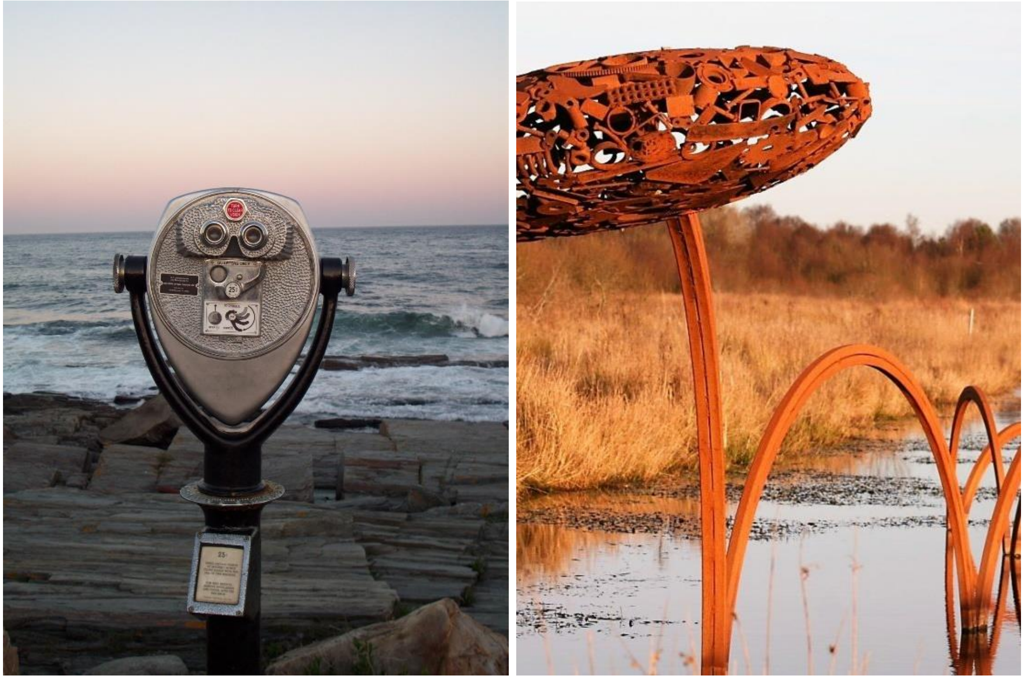


Plate 4.9 **Examples of tower viewers and interpretive sculptures / 'land art' to be found in Courtyard 1**

7. Visitors enter the café and grab a coffee or a bite to eat. The building is cantilevered off the retaining structure below, extending out beyond the mainland station and allowing visitors to catch a glimpse of the Key View to the distant Skellig Islands to the north-west. It is envisioned that further tables and chairs may spread out into 'Courtyard 2', as required. The space between the café and toilet block will have a canopy oversailing it to keep the rain off, but will otherwise be external.

Plate 4.10 **Precedent for the café interior – interior design by Ai3**

8. In between the café and the mainland station, 'Courtyard 2' will be the last interpretive exhibition space and will follow the theme of 'future' – '*what is next for Dursey Island and the Irish island communities more generally?*'; a bit about the new cableway, and so on. In this area, a track may be sign-posted up to visit the 'Historic Cableway Machinery'. From this high point, visitors can appreciate another Key View over the whole site and beyond to Dursey Island.

9. Visitors depart on the cable car and arrive on Dursey Island. The island station is near identical to the mainland station. Here, there are welfare facilities and a sheltered waiting area.
10. After engaging on recreational activities on the island (e.g. a walk, birdwatching, rock fishing, whale/dolphin watching), visitors return to the mainland via the island station. The arrangement of buildings aims to channel returning visitors through the café and gift shop as they leave. The exit through the gift shop enables people to bypass the Visitor Centre, which they have already seen on the way in; this avoids crossflow of incoming and outgoing visitors.
11. Visitors exit the gift shop into the carpark, where they locate their car and depart for their next destination.

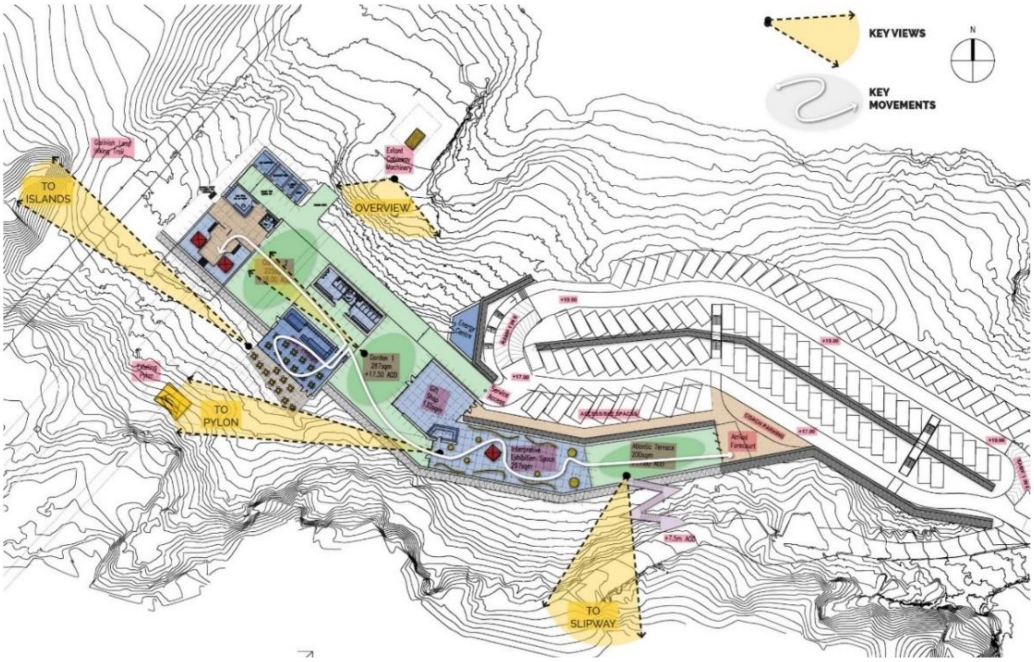


Plate 4.11 **The arrival movement sequence through the masterplan**

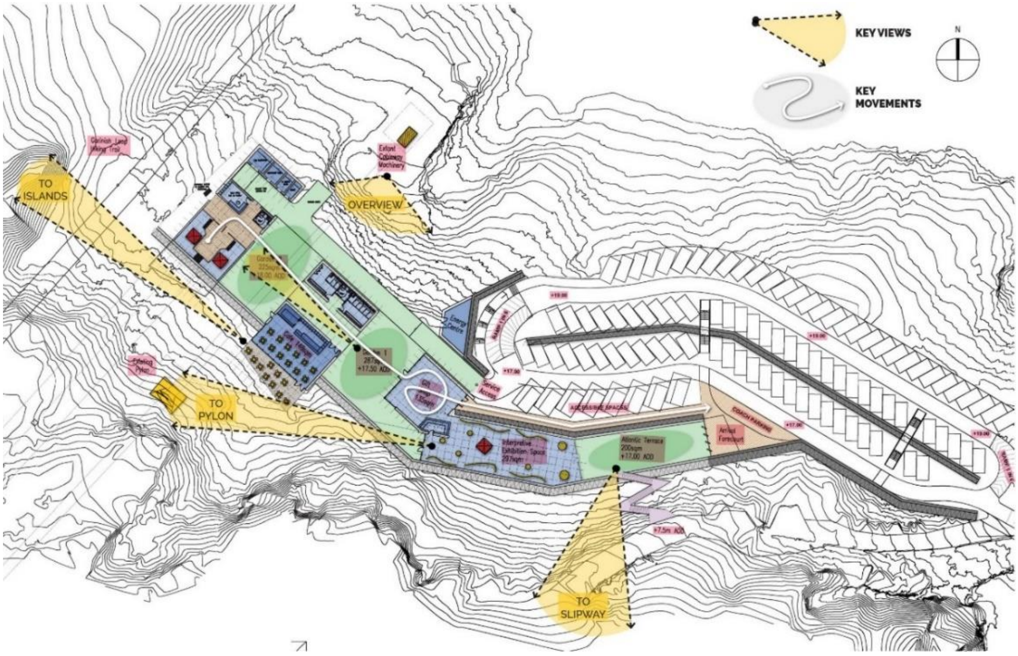


Plate 4.12 **The departure movement sequence through the masterplan**

4.3.3 The Architectural Merit of the Proposed Landing Point Locations

The proposed mainland cable car landing/departure platform is at approximately the same level AOD as the lower tier of the car park. The merit of this location is threefold:

1. With the mainland platform at this location, the proposed development achieves building regulations-compliant level access across the site and into the platform.
2. Because of the small scale of the site, its rocky, steeply inclined topography, the proximity of the site to the Kenmare River Special Area of Conservation (whose upper boundary is at the high water mark), and the requirement for the cableway to allow sufficient clearance for boats travelling through the Dursey Sound, there is very limited space on site for the positioning of the mainland station and pylon. With the mainland platform at this location, the associated pylon can be situated so that its footprint is outside of the Kenmare River Special Area of Conservation and so that sufficient clearance for marine vessels is accommodated beneath the proposed cableway.
3. Another benefit of situating the proposed landing platform at this location is that it is offset from both the existing cableway infrastructure and the existing electricity power lines, allowing the new cableway to be constructed with minimal disruption to either.

The merit of the proposed island-side departure point is that it is offset from both the existing cableway infrastructure and the existing electricity power lines, allowing the new cableway to be constructed with minimal disruption to either. The proximity of the departure point to the existing carpark and road is also of merit as it minimises the additional roadway construction required.

4.4 Interpretive Design

All successful visitor experiences have a 'Big Idea' - the strong message that pushes the interpretive proposition and resonates with the visitors. The effective 'Big Idea' for the Dursey Island interpretive proposition has underpinned the design of the visitor experience and will:

- Create an emotional connection with the public;
- Be distinct and re-imagine how the visitor thinks, acts or feels;
- Have resonance and meaning – it will have value as a topic for discussion;
- Pierce through any cultural and ethical borders to connect with all people;
- Be universal and be capable of being communicated across many media platforms; and
- Develop and contextualize the unique experience of travelling over the open sea by cableway on a transport system that is an integral part of day-to-day life for the islanders (rather than a created and artificial visitor experience).

4.4.1 Overview of Interpretive Design Proposition

The west coast of Ireland is a landscape of wild waves and deadly currents, dramatic coastline, and small farms precariously clutching to green slopes of land that disappear into the sea. This coastline has inspired writers and artists for millennia. There is perhaps nowhere better for a visitor to experience life at the edge of Ireland, than on Dursey Island. The opportunity that this project provides is unique. It will allow us to reveal the histories and mysteries of a remote piece of Ireland, a unique heritage that can only be unlocked by making a 'perilous' yet thrilling journey across the sea by cableway.

The visitor experience must be a journey of discovery that starts at home, perhaps even before setting foot on Irish soil. From an immersive interpretive experience in an iconic Visitor Centre to a journey across the Atlantic suspended from a wire to an invigorating walk in the uplands of Dursey Island to a comforting post-hike coffee in the visitor café – the visitor experience of the proposed development should be unforgettable.

There are three areas in which we have an opportunity to provide 'touch points' for the visitor if we are to create a visitor experience that will be one of the most exciting and engaging in Ireland:

1. The **Virtual & Online Environment**, including the website for the proposed development.
2. The **Outdoor Environment** of the Beara Peninsula and Dursey Island.
3. The iconic new **Visitor Centre** and cableway.

At a review of the options for interpretive proposition and of how to weight the relative emphasis of each of these areas, it was agreed that the major emphasis should be on the outdoor environment, particularly of Dursey Island itself but also that of the Beara Peninsula. The emphasis on the outdoor environment will be significantly greater than that for the Visitor Centre. There will also be a significant emphasis on virtual and online interpretation, both in advance of a visit and during a visit. The relative 'sizes' of the aspirations of interpretation emphasis are illustrated in Plate 4.13.

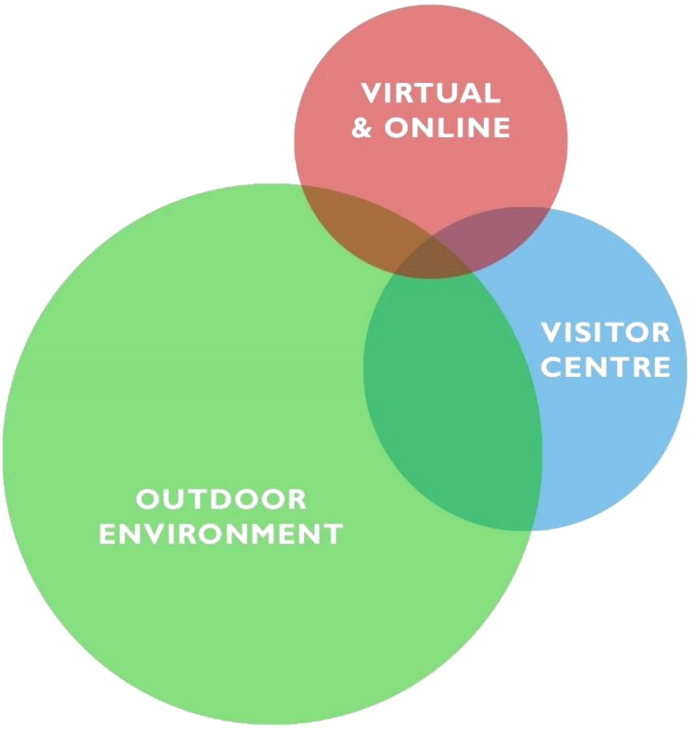


Plate 4.13 **Relative emphasis to be placed on the three areas of the Dursey Island Cable Car and Visitor Centre proposition**

Dursey Island and its cableway has several strengths that can only help to make a success of any development of the visitor proposition for the site. These strengths are as follows:

- The cableway exists in the folk memory of the Irish. Almost everyone has heard of and has a fondness for the story of '*the cable car that crosses the sea, taking cattle to an island*'.
- The Dursey Island Cable Car has been operating for over fifty years and is an attraction for tourists, both domestic and overseas.
- The site is in a beautiful location which is itself an attraction for tourists.
- The site is a 'Signature Discovery Point' on the WAW, Ireland's most successful tourism experience brand.
- The brand pyramid of Dursey Island is perfectly aligned with that of the WAW (Plate 4.14).
- The existing proposition at the site already appeals to six of Fáilte Ireland's tourist segments, so the proposed development has the potential to generate major (rather than niche) appeal.
- The owners of the site, CCC, are acutely aware of the importance of the site, both as a tourist attraction and a piece of essential local transport infrastructure, and are actively pursuing ways of ensuring a sustainable future for the facility.

Plate 4.14 'Brand pyramid' for the WAW and the Dursey Island Cable Car and Visitor Centre proposition

The following have been identified as the seven 'must do' elements of the Dursey Island visitor proposition:

1. *The Iconic Arrival Statement*

   First impressions count – and last. The iconic architecture of the new Visitor Centre and mainland station will include a 'touch point' to what has gone before: the mainland-side pylon and cable car of the existing cableway, which will be retained as relics of the original infrastructure and interpretive media. The vision for the Iconic Arrival Statement is detailed in Section 4.4.3.

2. *The Visitor Centre*

   The interpretation exhibition space that is the Visitor Centre 'sets the scene' for the visitor's cableway journey. It is where the seed is sown for the excitement, danger and thrill of the journey. Different topics of interpretation shall be presented which relate to all features of a visit to Dursey Island. This approach will allow the visitor to 'cherry pick' interpretive material that interests them and, hopefully, incidentally also come into contact with other topics. The vision for the Visitor Centre space is presented in greater detail in Section 4.4.4.

3. *The Café and Gift Shop*

   A truly welcoming experience should await every visitor, whether they intend to take the cable car journey or simply use the facilities of the Visitor Centre before commencing (or ending) a walk or other outdoor recreation. The café and gift shop will not be conventional; they will be a reason to visit in their own right. People love to eat and to shop; the site should provide an eating and shopping experience as much as a cableway experience.

4. *The Key Views*

   The architectural design has facilitated four 'Key Views', each of which affords opportunity for interpretation. They are as follows:

   i. The view to the mainland-side slipway and Dursey Island beyond from the 'Atlantic Terrace' welcome area, immediately before entrance into the Visitor Centre.
   ii. The view from the western end of the Visitor Centre, past the defunct cable car to the retained mainland-side pylon and the landscape beyond.
   iii. The view from the café terrace out to the Skelligs (visible on a clear day).
   iv. The 'overview' of the site, from the hillside north of the Visitor Centre, looking south over the new development, the retained mainland-side pylon and beyond to Dursey Island.

5. *The Cable Car Journey*

   The journey itself is the highlight of the experience. This is why people come here. The duration of the journey, the views it provides, and the space within the cable car are all factors which have been considered.

6. *The Dursey Island Experience*

   As with the cable car journey, being on Dursey Island is a 'real' experience and, besides necessary signage, little intervention is proposed on the landscape here (i.e. no benches, playground or sculptures). The experience on the island should be one of relative isolation and authenticity.

4.4.2 Unique Characteristics of the Site

The visitors proposition of the proposed development offers a host of unique and exciting experiences, including the following:

- Crossing the Atlantic Ocean by cableway;
- Getting a unique view of Ireland's coast (Plate 4.15);
- Travelling on Ireland's only cableway;

- Spending time in the splendid isolation of the most westerly of Cork's inhabited islands;
- Observing rare species of birds, dolphins and whales;
- 'Folk memories' of livestock transport (Plate 4.16);
- Enjoying unique views of the Skellig Islands and Mizen Head;
- Discovering ancient island sites; and,
- An experience of 'isolation' in a place with no shops, pubs or cafés.

Plate 4.15 A unique view of Ireland's coast from the existing cableway

To emphasise these unique features of the site and 'bring the experience to life' for visitors, the Design Team have been mindful to provide the following as part of the visitor proposition for the proposed development:

- An authentic and exciting 'build-up' to the cable car journey;
- Opportunities to photograph the landscape and seascape from a unique perspective; and
- The chance to take 'the most unique selfie' in Ireland, with the visitors and cable car in the foreground, and the island and Atlantic Ocean in the background.

Plate 4.16 Historic transportation of livestock on the cableway

4.4.3 The Iconic Arrival Statement

People travel for a variety of reasons – to escape, explore, understand and participate – but at the core of the experience lies the destination, the place that provides something which the traveler can keep forever and share with others. Destinations should put in place strategies and programmes that will best tell their unique story and become an inviting host for visitors, no matter the purpose of their journey.

Every step of the journey for the visitor should achieve an emotional objective: it could inform, alert, help fashion an opinion or emotion, be a statement or a reflection of an emotion. The pylons of the existing Dursey Cable Car are of themselves, iconic and achieve many of these emotive objectives. The existing mainland-side pylon will be retained to provide an iconic arrival statement. In any event, from a heritage perspective, the towers and cabin(s) are industrial heritage artefacts that should be preserved, presented and interpreted for the present and future generations to appreciate.

Plate 4.17 The mainland-side pylon retained as an iconic arrival statement

4.4.4 The Visitor Centre Interpretive Exhibition

An 'attraction' is any object, person, place, or concept that draws people, either geographically or through remote electronic means, so that they might have an 'experience.' An attraction is an outstanding example of some resource, that includes all the elements in a particular class. The experience can be recreational, spiritual or otherwise.

Traditionally, attractions are categorized as either cultural or natural. 'Cultural attractions' refers to historical attractions as well. The Public Use Planning (PUP) effort of the *World Heritage Centre* uses another, more refined, categorization, consisting of four non-mutually exclusive categories:

1. Geophysical-landscape-aesthetic (e.g. Cliffs of Moher, Co. Clare);
2. Ecological-biological (e.g. Saltee Islands, Co. Wexford);
3. Cultural-historical (e.g. Spike Island, Co. Cork);
4. Recreational (e.g. Blessington Lakes, Wicklow Mountains and Glendalough Cycle Loop, County's Dublin and Wicklow).

Dursey Island is fortunate to be able to provide an experience under all of these categories and the Visitor Centre and other aspects of the proposed development will provide the 'springboard' from which the visitor can launch themselves into enjoyment of the wider site and all it has to offer. Consequently, the spatial arrangement of the various themes and the layering of the interpretive narrative within the Visitor Centre has been designed to facilitate effective 'take-up' by the visitor.

The Visitor Centre space shall be divided into three zones, each presenting three themes (Plates 4.18 – 4.20). The arrangement provides a chronological and thematic progression of the narrative: first presenting the natural place, then developing into how man has fought over this place and conquered it, and finally an exploration of how life has changed over time, bringing us back to the 21st century. Table 4.2 provides an overview of how themes will be presented.

Table 4.2 Proposed zones and themes of visitor centre interpretive exhibition

Zone I - Place	Zone II - People	Zone III – Purpose
1. Geography and Topography 2. Natural History 3. Myths and Legends	4. Invaders and Settlers 5. War and Peace 6. 21st Century Island Life	7. Fishing and Agriculture 8. Historic Island Life 9. Cableway: Then and Now

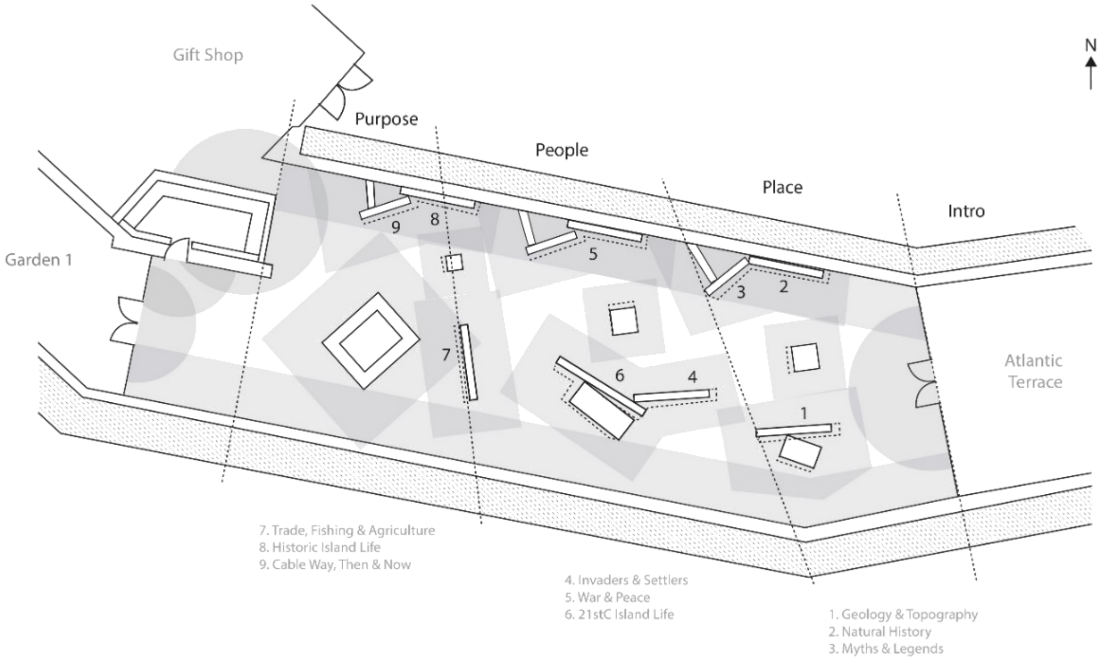


Plate 4.18 Proposed physical arrangement of the interpretive exhibition space, showing safe areas to facilitate ambulant and non-ambulant access to all displays

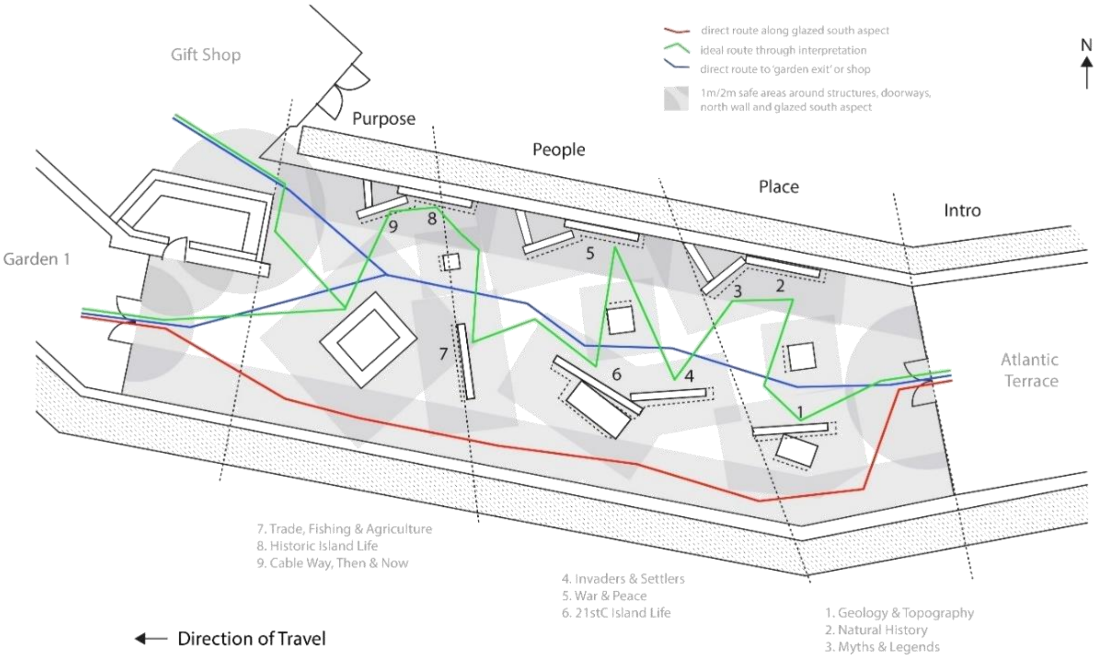


Plate 4.19 **Anticipated three routes that visitors may take through the proposed interpretive exhibition space (red = direct route along glazed west aspect; green = ideal route for taking in exhibition; blue = most direct route through space to gift shop and café)**

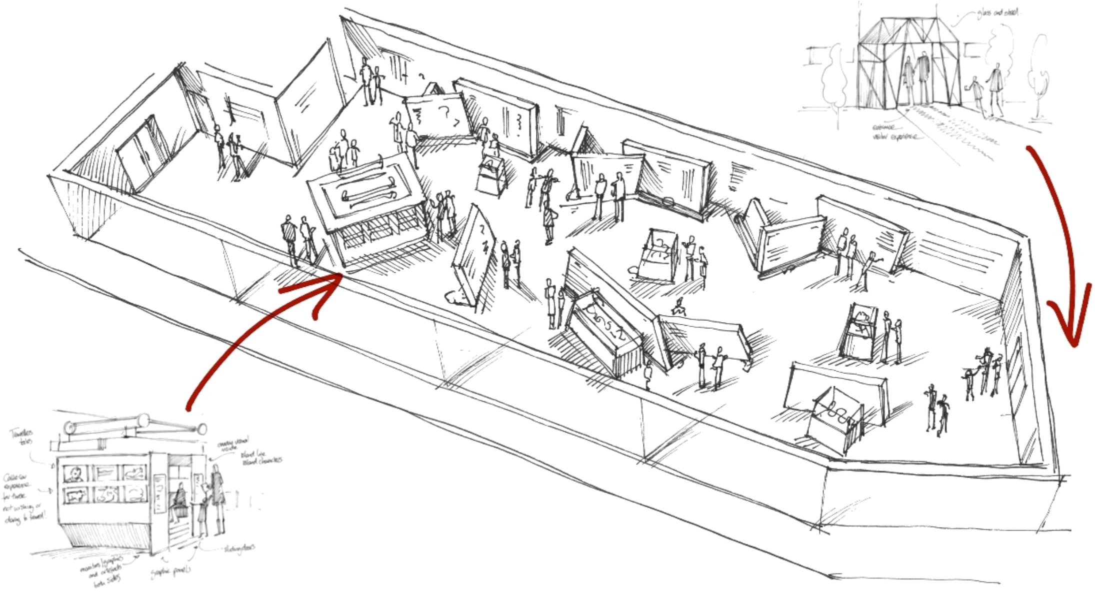


Plate 4.20 **Proposed arrangement of display units within the interpretive space of the visitor centre**

During the course of the design development, several precedent examples of interpretive exhibition spaces were researched. The most relevant to the proposed development, and the ones which have influenced the interpretive design of this proposition are the Grand Teton Discovery Centre, Wyoming; the Grand Canyon Visitor Centre, Arizona; and the Monmouth Battlefield State Park Visitor Centre, New Jersey (Plate 4.21).

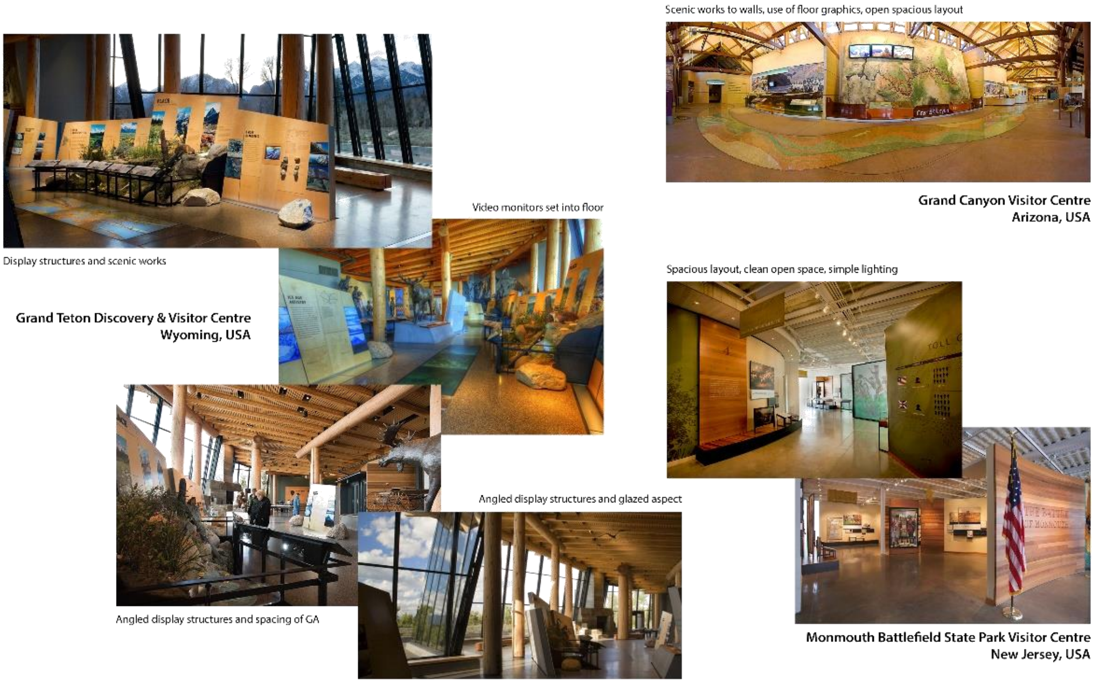


Plate 4.21 **Precedent examples of interpretive exhibition spaces**

Schematic representations of two proposed groups of interpretive display units (Plates 4.22 and 4.23) show that the proposed layout is intentionally spacious with clean, open spaces and simple lighting. The irregular angles and heights of the proposed display units are inspired by the rugged landscape of the west Cork coastline and cliffs. This approach provides for multiple surfaces on which various media can be displayed.

Each display zone will have a combination (as appropriate) of graphics, creative typography, scenic works, reconstructions, floor graphics and/or video monitors set into the floor, display screens set into vertical surfaces and artefact display cases (to be constructed with the same irregular style as the display units).

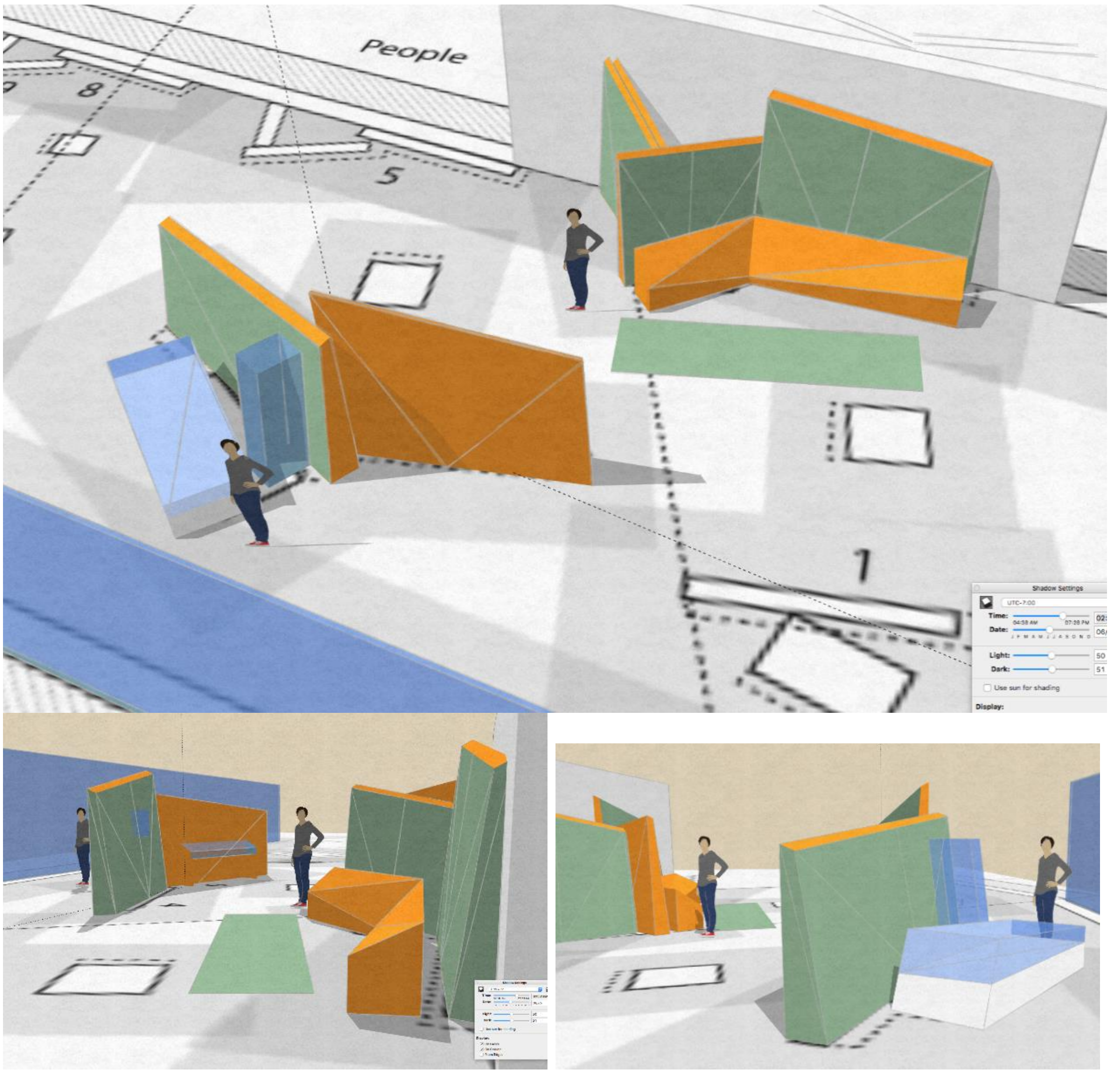


Plate 4.22 **Schematic representations of two groups of proposed interpretive display units**

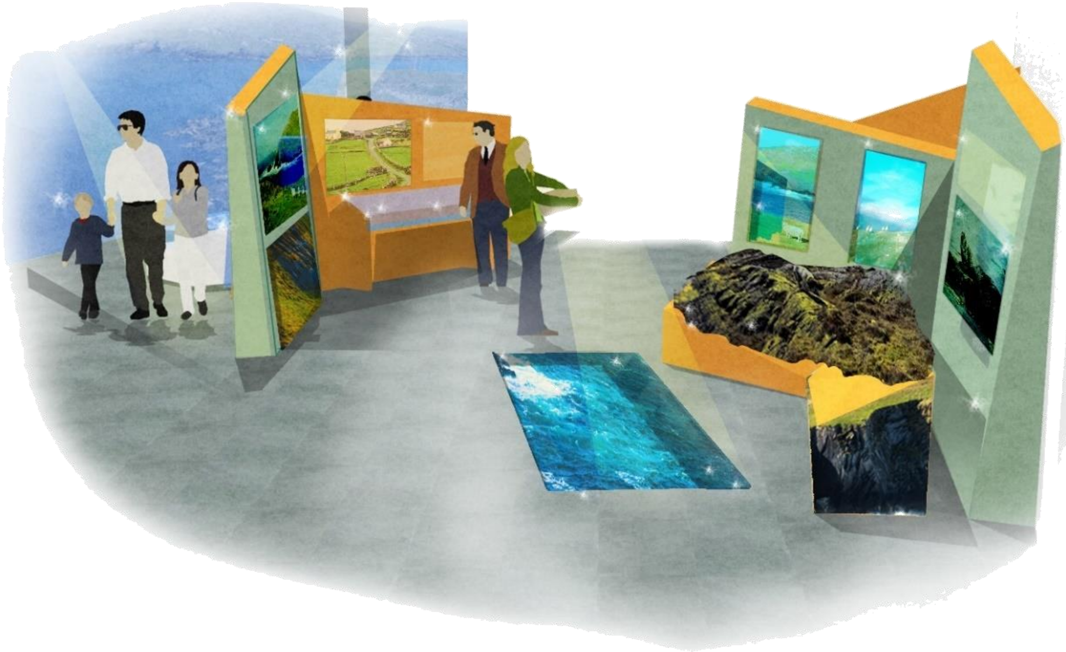
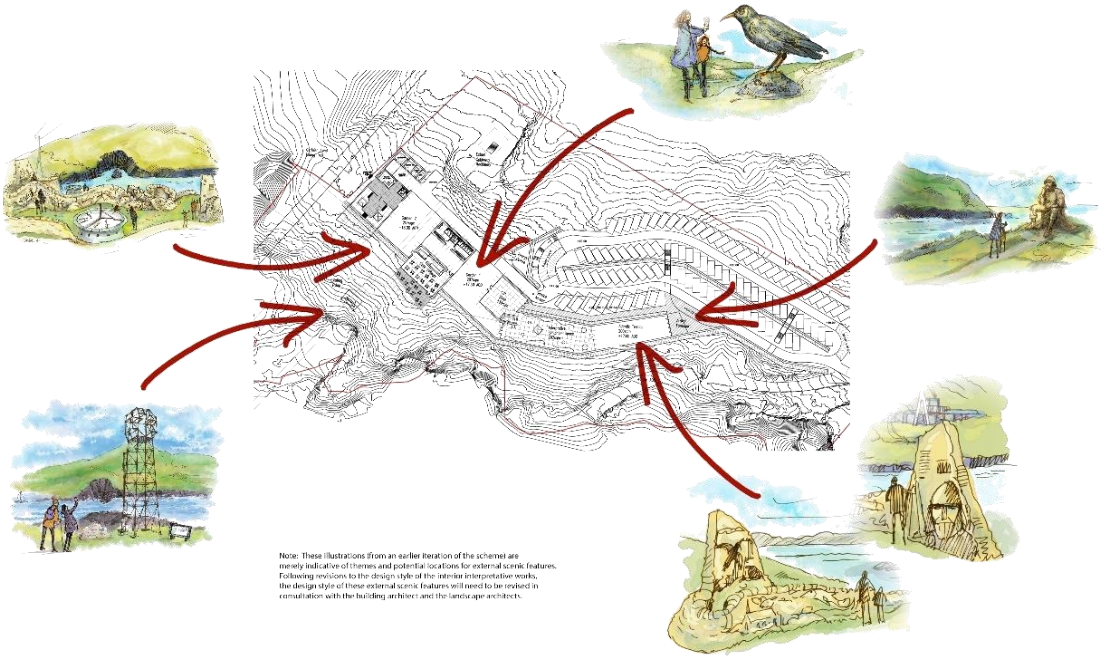


Plate 4.23 **Artist's impressions of the concept for two of the groupings of interpretive displays; units 2&3, 4&6**

4.4.5 Interpretive Signage and Landscape Art

Landscapes were for generations seen as *palimpsests* (something reused or altered but still bearing visible traces of its earlier form or use) holding a wealth of information and clues to their histories by those who were able to recognize and decode significant features and relate these to a larger system of landscape features. Vidal de La Blache (1845-1918), the French geographer, saw landscapes as visual indicators of holistic relationships between humans and natural environments, each stamped with a particular *genre de vie*. For the proposed development, it is proposed to employ a mix of the functional (signage, furniture) and purely interpretive (informative and explanatory) installations all with a style inspired by the natural and social history of the island. Plate 4.24 highlights examples from pre-existing developments which have inspired and/or are in line with the proposed signage and landscape art. Plate 4.25 shows examples of landscape art that can be considered for use as part of the proposed development. As stated previously, it is proposed to place the majority of outdoor interpretive materials (i.e. sculptures, benches, signage, etc.) on the mainland side of the site of the proposed development, in order to maintain the authentic and unspoilt nature of the visitor experience on Dursey Island.

Plate 4.24 **Examples of signage and landscape art from existing developments**



Note: These illustrations (from an earlier iteration of the scheme) are merely indicative of themes and potential locations for external scenic features. Following revisions to the design style of the interior interpretative works, the design style of these external scenic features will need to be revised in consultation with the building architect and the landscape architects.

Plate 4.25 **Examples of possible landscape art to be used in the proposed development**

4.4.6 Connections with Other Tourist Sites

Although occupying a relatively remote location, Dursey Island is close to a high density of tourism 'hot spots' in the south-west of Ireland. There is opportunity for collaboration between Dursey Island and the 'Big Six' attractions of the region: The Ring of Kerry scenic driving & cycling route; Skellig Michael ancient island monastery;

Glengarriff & Garnish Island tropical gardens; Bantry House & Gardens; Mizen Head - most southerly point; and Baltimore harbour town.

The interpretive proposition has been designed to enable a practical and contextual relationship with these and other sites and experiences in the area. Connections - both physical and virtual - with these sites and destinations add strength to the overall interpretive experience of the area for all visitors

4.5 Design of Structural Elements

4.5.1 Cableway Design

The principal technical components of the cableway infrastructure are: 2 no. passenger cable cars (Plate 4.26), the steel ropes (ropeways) which carry and convey them, the mainland and island pylons, driving machinery and landing platforms.

Plate 4.26 **Indicative design of carrier cabins**

The ropeway technology selected to be used in the proposed development is a paired, reversible, desynchronised jig-back system with two carrier cabins. Each cable car is carried on its own ropeway, which is comprised of two steel ropes – one of which supports the cabin, while the other hauls. Cable cars can move forwards or backwards at varying rates independently of each other. Each cable car will accommodate approximately 15 persons. Depending on the velocity of the cabins and the cabin layout, the cableway will be able to convey approximately 200 – 300 p/h in each direction. Operation in normal daily use at nominal capacity will be possible in winds of up to 25 m/s, and in winds of up to 30 m/s using a degraded operation mode.

The existing cable car travels at a max. speed of 0.9 m/s, conveying a max. of 6 persons to or from the island in 6.5 – 7 minutes (one direction). The speed of the proposed cable cars can be varied between 1 m/s to 6 m/s. Generally speaking, it is proposed that the outbound journey will be made at 1 m/s, conveying a max. of 15 persons to the island in approx. 5 – 6 minutes. The reason for slower operation on the outbound journey is to maintain the experiential qualities of the cableway journey. It is proposed that, on the return journey, in case of emergency or at times when there are only residents/farmers travelling on the cableway (i.e. using it for practical rather than recreational reasons), the cable cars will operate at a faster rate (up to and not exceeding 6 m/s), as appropriate.

The pylons will be of a functional tubular steel appearance with an approximate diameter of 1.2 m. Their role is to support the ropeway and to provide sufficient clearance for the passage of marine vessels between the bottom of the cable cars and the Dursey Sound below. Because of the open and exposed nature of the landscape at the site of the proposed development, it will not be possible to situate the pylons in a visually non-intrusive location. For this reason, the supporting pylons for the proposed development and the retained historic pylon will be painted in a colour which is aesthetically harmonious with the surrounding environment. Both pylons will sit on a shallow reinforced concrete pad foundation.

The cable car landing platforms will comprise a mechanical assembly similar to that shown in Plate 4.27, comprised of concrete supports (not shown), pad foundations (not shown), structural steel support frame, roller assemblies, work platforms and bull-wheels. In the mainland station, the landing platform will also contain a drive unit.

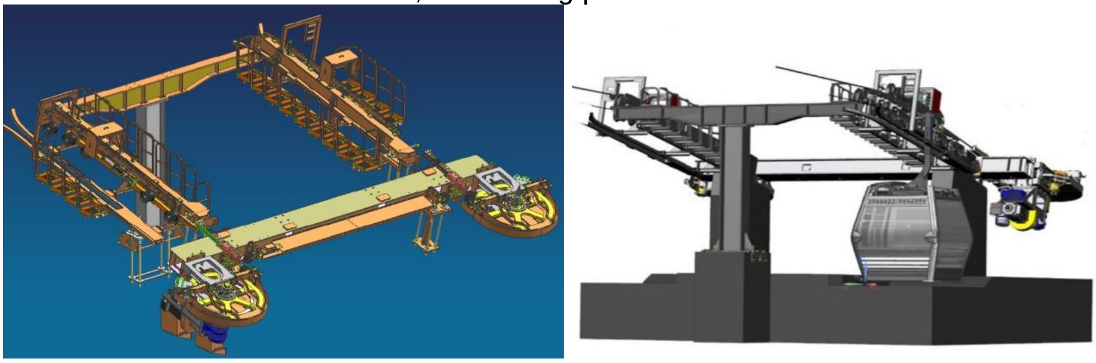


Plate 4.27 Typical mechanical assembly of cableway landing point

The proposed cableway infrastructure will have roughly the same alignment and span as that of the existing infrastructure but offset approx. 14 m to the north-east. This will allow the existing cableway to continue to operate (insofar as possible) while its replacement is being constructed.

4.5.2 Building Design – General

The design of the proposed buildings reflects the intended mixed-use purpose and flexible nature of the spaces. Because of the exposed, coastal nature of the site of the proposed development, all structural elements of the proposed development will be designed for durability, using appropriate hard-wearing materials. Durable concrete mixes will be used. Exposed steelwork will have appropriate corrosion protection.

4.5.3 Visitor Centre and Café Buildings

The design of the proposed mainland buildings (Visitor Centre and café (with toilet block)) is shown in Plate 4.28. The superstructure of these buildings will most likely be of reinforced concrete piers and unbraced structural steelwork. The architectural details and materiality will be common to all of the buildings to establish a common design language that makes them read as a set, while allowing room for each building to specialise to its specific function and siting. The proposed Visitor Centre's architecture is simple and spacious, and finished with natural, hard-wearing materials.

Plate 4.28 **Artists impression of the mainland proposal in context**

4.5.4 Mainland Station

Plate 4.29 **Artists impression of the mainland line station (with island line station in the distance) as seen from the north.**

Plate 4.30 **Artists impression of the proposed development, as viewed from a north-easterly point on Dursey Island**

Plate 4.31 **Artists impression of the proposed development, as viewed from the R572**

The mainland station will be situated immediately west of the existing station building, to the north-west of the proposed visitor car park and north of the proposed Visitor Centre and café buildings, at +18m AOD (Plates 4.28 – 4.31). The design and layout of the building is strongly informed by the cableway machinery to be contained within it. Since the majority of visitors' queuing time should be spent in the Visitor Centre, gift shop, café and associated outdoor areas, the mainland station space has been designed as a sheltered but uninsulated space to preserve the machinery but discourage visitors from lingering and obstructing embarkation/disembarkation at the platforms. As a result, the building has a relatively minimalist design. It features platforms (behind a turnstile) for embarking/disembarking the cable cars, a rainscreen or perforated metal enclosure to provide shelter from the elements, the cableway machinery and electrics, an office space for the cableway operator, and some support facilities for the operator, such as a storage area and a WC.

An existing public right of way will be maintained from the proposed car park to the lands on the western side of the development via a 3.9 m wide access track. This track will have unrestricted headroom and will pass between the station building and the storage space to the rear. Access to the lands on the western side of the development will be controlled via a new 4 m wide field gate, relocated to tie in with the aforementioned public right of way. This access track will also serve the purpose of providing access to the cable cars for maintenance personnel and island residents/farmers, the latter of whom will occasionally need to load/unload goods to/from the cable car(s).

The station's lock system foundations will have to resist relatively large lateral forces and overturning moments. As the station is a standalone structure, the cableway steelwork and machinery itself has no significant self-weight to counter those forces. The proposed foundation solution will be a combination of dead-weight pad foundations with rock anchors, if necessary. The building itself will be founded on a combination of shallow foundations (combination of pad, strip and slab).

4.5.5 Island Station

The proposed island station is a simple, minimalist, stand-alone structure which largely mirrors the mainland station building. It features platforms for the cable cars, a toilet block, and sheltered waiting area, with an oversailing rainscreen of metal construction with perforated metal panel cladding. As with the mainland station, the foundations of the island station will likely comprise a combination of dead-weight pad foundations with rock anchors, if necessary, and the structure will be founded on a combination of shallow foundations (combination of pad, strip and slab).

4.5.6 Car Park Design

The existing mainland-side visitor car park (Plate 4.32) is informal, with no delineated spaces, and accommodates a maximum of 70 cars. The proposed expanded visitor car park will feature approx. 100 no. parking spaces and a bus bay. In order to assimilate the structure with the undulating landform, it will be a two-tiered car park, with the lower tier at approx. +17.0 m AOD and an adjacent upper tier at approx. +19.0 m AOD. It has been established that the proposed approx. 100 spaces will be sufficient to accommodate the projected visitor numbers (refer to Chapter 5 of Volume 2 of this EIAR – Traffic).

It was decided at design stage that the landscape at the site is not amenable to a very large car park. While the provision of a car park at the site is necessary, steps will be taken in design to minimise associated adverse visual impacts and harmonise the structure with the surrounding environment. Stone-clad screening walls (a continuation of the walls from the Visitor Centre), grasscrete surfacing and the split-level design will be employed to mitigate against associated adverse visual impacts and harmonise the area with the surrounding landscape, as presented in Plate 4.33.

Plate 4.32 **Existing informal visitor car park**

Plate 4.33 **Proposed stone-clad screening walls surrounding the visitor car park**

The footprint of the proposed car park will take in much of the existing car park and also extend into undeveloped heathland to the north of the existing car park. The proposed car park is presented at two levels to minimise cutting and thus optimise integration in the landscape. The parapet style walls which are provided to mitigate visual impact in local and wider views will be finished out with natural stone to reflect the local dry-stone walling styles. Bituminous blacktop paving will be used to surface the roadway running through the car park, while the parking spaces are to be finished out with a reinforced grasscrete system.

4.5.7 Road Improvement Works

Improvement works are required on the R572 Regional Road – the main access route to the site of the proposed development – in order to address existing congestion problems and facilitate anticipated volumes of traffic as a result of the proposed development. Accordingly, a series of 11 no. passing bays (10 no. bays and 1 no. visibility splay) and a number of localised road improvements are proposed in order to prevent congestion and improve forward visibility.

Plate 4.34 Indicative design of passing bay to be constructed on R572

The locations of these improvements will be spaced at appropriate intervals so as to reduce the distances between two-way sections and passing bays and in order to allow opposing drivers to see each other in sufficient time to give way at one-way sections. The locations of the proposed passing bays are presented in Figures 4.12 – 4.22 of Volume 3 of this EIAR. Existing passing bays will need to be lengthened to create sufficient capacity to accommodate a short queue of traffic, thereby reducing the likelihood that the road will become blocked and that cars will need to reverse to previous passing bays. It is proposed to acquire the sections of privately-owned roadside land required for these works by CPO.

4.5.8 Lighting

In order to keep environmental light pollution (particularly of protected environmental areas and of the Kerry Dark-Sky Reserve) to a minimum, the lighting design will utilise lower brightness, unobtrusive lighting insofar as is possible. Outdoor lighting in particular will be kept to a minimum. There will be no roadside lighting. Bollards with low level lighting sufficient for safe access and egress will be used in the visitor car park.

The lighting design will be based on best practice and national and international industry standards, incorporating the following guidelines and regulations:

- *Guide to Obtrusive light, The ILP Guidance Notes for the Reduction of Obtrusive Light GN01:2011;*
- *Building Research Establishment Information Paper - DG 529 Obtrusive Light from Proposed Developments (2013);*
- *Guidance Notes for The Reduction Of Obtrusive Light' Institution of Lighting Engineers, 2011;*
- *Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations;*

- *Energy & Efficiency & Performance Standard for Light Bulbs, Public Consultation Document, October 2008;*
- *National Rules for Electrical Installations, Electro-Technical Council of Ireland 2008 (including recent Amendments);*
- *BS 5489 (2013) Code of Practice for the Design of Road Lighting – Part 1:*
- *Lighting Roads and Public Amenity Areas;*
- *IS EN 12464-2, 2014 'Lighting for Work Places. Outdoor work places';*
- *IS EN 13201 (2015) Road Lighting – Part 2: Performance Requirements, CIBSE / SLL Lighting Handbook, 2012;*
- *S.I. 151 of 2011*
- *Building Control (Amended) Regulations 2014*

Obtrusive light from floodlighting within the site boundary onto adjacent roads and habitats shall be minimized taking into consideration the following; (a) sky glow (direct upward waste light), (b) light trespass (intrusive light and light into windows/windscreens), over illumination, glare (source intensity). External general, feature and emergency lighting will be designed in line with standard requirements with input from the Project Architect and in conjunction with CCC.

4.5.9 'Net Zero Energy Buildings'

All new buildings are required to be 'Net Zero Energy Buildings' (NZEB) by 31st December 2020. In order to achieve NZEB compliance in the proposed development, the key focus will be minimising the Energy Performance Coefficient (EPC) which is the calculation of the primary energy of the actual building divided by the primary energy of a reference building. Getting this figure below 0.9 will allow us to have a renewable energy ratio (RER) of 10%, rather than the standard 20%. Discussions are still ongoing with the design team in terms of detailed design. Once details are agreed, the NZEB modelling will get underway. The calculation tool used currently for NZEB Compliance is the SBEM 5.5h nZEB Calculation Engine tool. Active elements that could potentially be utilised to achieve NZEB status within the new buildings are as follows:

Mechanical Services (Active Elements):

- Boiler seasonal efficiency –> 95%
- Toilet extract
- Fans - <0.6 W/(l/s) @ 10ach
- Full metering and sub metering with BMS "out of range values" controls
- Secondary circulation losses for DHW - <15 W/m

Electrical Services (Active Elements):

- Lighting power densities - < 1.8 W/m2/100lx (1.3 W/m2/100lx for open plan areas)
- Addressable photoelectric (daylight sensing) controls in open plan areas
- Occupancy controls in all ancillary areas (i.e. toilets, stairwells, etc).
- Metering provision for lighting systems

Renewable Technologies (Active Elements):

- Air to water heat pump

- Photovoltaics array

4.5.10 Renewable & Innovative Technologies

Sustainable development practices offer an opportunity to create environmentally sound and energy efficient buildings by using an integrated approach to the exemplar design, planning and construction. Sustainable development promotes resource conservation of our limited natural resources, which includes energy efficiency, renewable energy, water conservation, waste minimisation and also considers the environmental impact of the operation of a building for its entire 'life-cycle'.

The process to maximise the environmental and sustainable performance of the proposed development is driven by a holistic appraisal of the future requirements for any new building under current and forecasted building regulations. The Building will be designed to exceed the provisions of the current *Building Regulations Part L 2017* and will offer a sustainable design to meet future provisions to these standards.

4.5.11 Drainage

Currently, surface water runs off the existing areas of hard standing and either infiltrates to ground in the grassed areas or continues as overland flow over the cliff faces before discharging to the sea. A minor watercourse is culverted under the R572 at the eastern boundary of the proposed development. This subsequently discharges to sea over the cliff face. These existing surface water drainage pathways will be altered as a result of the development. The existing drainage network will be upgraded and expanded to accommodate the anticipated increase in visitors.

The proposed surface water drainage system will comprise predominantly Sustainable Drainage Systems (SuDS) features which will attenuate and treat the surface water runoff from the site prior to discharging to ground by infiltration and percolation through the subsoil. The proposed retaining wall drainage will incorporate a hydrocarbon interceptor prior to discharging to the minor watercourse at the site's eastern boundary, as presented in Figures 10.1 and 10.2 of Volume 3 of this EIAR.

4.5.12 Landscaping

Landscape proposals for the proposed development have been developed hand in hand with proposals for the built elements. The proposed landscape masterplan is presented in Figure 11.22 of Volume 3 of this EIAR. Landscape design inputs can be considered under the following headings:

Enhancement of Visitor Experience of 'Place'

The architectural footprint for the new facilities gives rise to a series of outdoor spaces which are an integral part of the visitor experience. The key spaces are located within the curtilage of the Visitor Centre and café buildings which the visitor negotiates *en route* to the mainland station.

The primary aim of these areas is the provision of spaces which facilitate circulation and informal stopping and gathering, thus enhancing the overall visitor experience of the facilities and coastal landscape setting. Materials and finishes within the courtyards are informed by the local landscape components of rock, water and heath and are expressed in paving patterns and the inclusion of green areas which are finished out to reflect the surrounding natural heathland. Natural stone is the predominant paving material and planting proposals are based on the vegetation found in the surrounding heathland as well as on Dursey Island itself. Corten steel is used as a reference to the history of the cableway and heritage of the site, and timber is also used as a suitable natural material for provision of seating. Design inputs are based on the principles of restoration of habitat, robustness and fitness for purpose of materials and finishes, enhancement of sense of place and ease of movement for site users.

Restoration of Heathland

All areas of the site outside the immediate curtilage of the new buildings, car park and access roads are to be protected and restored to natural heathland under the guidance of the Project Ecologist. The objective here is two-fold: firstly, disturbance of existing heathland within the site is to be minimised; secondly, disturbed sections of ground (notably the access ramp to the existing island-side platform at the western extremity of the site) are to be restored to heathland. This will enhance the perception of the development as nestling in the natural landscape setting.

4.6 Construction Stage Methodology

4.6.1 Introduction

This section outlines the predicted construction sequence and methodology for the construction works planned as part of the proposed development.

4.6.2 Tendering & Procurement Strategy

It is proposed that the form of contract for the main building and civil works will be Employer-designed with the possibility of identifying the cableway supplier as a novated specialist, requiring further consideration. This approach will give Cork County Council greater control of the design and construction of the proposed development to ensure compliance with the EIA, AA and any conditions attached by An Bord Pleanála.

4.6.3 Overview of Works

The main elements of construction for the proposed development can be summarised as follows:

- Site preparation including establishment of boundary security, site clearance, and diversion, removal or protection of existing services as necessary;
- Approach road improvement works;
- Earthworks (cutting and filling);
- Construction of cableway infrastructure – 2 no. stations, 2 no. pylons and installation of cableway machinery, ropes and cable cars;
- Buildings and associated services and civils works:
    - Visitor Centre / gift shop;
    - Café with toilet block;
    - Mainland station building (drive station) with staff facilities, workshop and storage;
    - Energy Centre;
    - Island station building (return station) with welfare facilities;
- Pavement, drainage and wastewater treatment installations;
- Landscaping and finishes

4.6.4 Construction Sequence

The anticipated construction sequence (illustrated in Figures 4.27 – 4.31 of Volume 3 of this EIAR) is as follows:

General

1. Contractor mobilises on site and sets up the site compound at a location agreed with CCC. The main compound will be located on the mainland site in the existing car park with a smaller storage compound on the island site. Suitable site security measures will be implemented on both sites.
2. Temporary traffic management arrangements are implemented to facilitate ongoing access to existing cableway throughout the works as much as possible. Limited parking will be maintained. VMS will be put in place early in the contract to highlight the construction works to road users.
3. Suitable environmental protection measures are put in place on both sites under the supervision of the Ecological Clerk of Works. These are expected to include measures to prevent run-off from the site entering the Dursey Sound.
4. Site clearance works are carried out on the mainland site, island site and at the locations of all proposed passing bays along the R572.
5. Existing overhead lines at the mainland site are diverted or protected, as necessary.
6. Approach road improvement works are completed. The contract will include measures requiring that the new passing bays are completed before the beginning of the high season (May – September) to prevent any possible congestion associated with construction traffic overlapping with high levels of visitor traffic. These works will include a combination of the following at each location:
   a. Traffic management;
   b. Site clearance;
   c. Earthworks;
   d. Pavement widening works;
   e. Signage and road markings (including installation of VMS); and,
   f. Boundary treatment – fencing and walls.
7. Reinforced concrete retaining wall is constructed along the southern boundary of the mainland site.
8. Earthworks, including rock breaking and backfilling, are carried out to achieve the required formation levels for buildings, cableway and car park.

Cableway

9. *In situ* reinforced concrete foundations for the cableway support structures are cast at the locations shown on the drawings.
10. Sections of tubular steel pylons and the cableway machinery are transported to site by road (and by ferry for island-side works), craned into position using mobile cranes and bolted and/or welded together on site.
11. Once the pylons have been erected and the cableway machinery assemblies are installed on both the mainland and island sites, the cableway ropes (ropeways) will be installed, and the cable cars raised onto them.

Buildings

12. Development of site services, surface water drainage, foul drainage, and water supply infrastructure occurs at this stage. The most significant works relate to the installation of the mainland wastewater treatment system. This will include the installation of large pre-cast concrete tanks and importing material to form a percolation area.
13. Development of building substructures is carried out. This involves excavation for foundations and pouring of concrete.
14. Construction of building superstructures is carried out. The storage building to the rear of the mainland station will be constructed last in order to maintain access to the existing mainland station building for as long as possible.
15. Fit-out of all buildings and connection of services is carried out.

Car Park and Landscaping

16. Reinforced concrete wall separating the upper and lower tiers of the mainland car park, and associated access steps are constructed.
17. Car park and other paved areas on mainland and island are paved.
18. Existing cableway is decommissioned, and demolition of other existing components is carried out.
19. Landscaping, finishes and placement of interpretive elements are carried out.

Since visitor numbers to the site are especially high during the summer months (particularly in July and August), it is proposed that the timing of the more disruptive works will be carried out during the off-season (October – April), insofar as possible. Best efforts will be made to maintain access for the islanders and farmers to the existing cableway throughout the construction period, but general access for the public is likely to be restricted at certain points during the construction phase on health and safety grounds.

4.6.5 Construction Programme

It is expected that the construction work will commence in October 2021 and that the duration of the construction period will be approximately 18 months (see Table 4.3). Since visitor numbers to the site are especially high during the summer months, and since it will be necessary to maintain the operation of the existing cableway throughout the construction phase (insofar as possible), earthworks will be carried out during the off-season (October – April), where possible.

The following is an envisaged indicative construction programme, assuming that each construction phase will follow on from the previous. This proposed phasing is an outline as to how the site is envisaged to be developed. The order of works, however, may be subject to change as development commences on site. Provided the construction programme unfolds accordingly, the envisaged first year of operation of the proposed development is 2023.

Table 4.3 Envisaged construction programme for the proposed development

Element of works:	Duration (months)	Expected Completion Date
Approach Road Improvement Works	3	Jan 2022
Earthworks and Retaining Walls	4	April 2022

Element of works:	Duration (months)	Expected Completion Date
Cableway Works (mainland & Island)	2	June 2022
Buildings (mainland & Island)	12	April 2023
Car park and Landscaping	2	April 2023
Decommissioning of existing Cableway & Final Landscaping	1	April 2023

4.6.6 Site Compound

A site construction compound will be required during the construction phase and will be situated completely within the mainland site. Initially it will be located adjacent to the existing cableway in the widest section of the existing carpark. The compound will be established at the commencement of the contract and remain in place throughout the construction period. However, as earthworks progress it will be required to be moved within this confined site, at all times staying within the red line boundary of the site. The Contractor will also require a smaller set down area/storage compound on the island which will be located within the red line boundary. Suitable site security measures will be implemented on both the mainland and island sites for the duration of the construction phase.

Potential impacts that need to be guarded against include:

- Accidental spillage of pollutants into surrounding water bodies; and,
- Dirt, mud and other materials being dropped from lorries and plant or spread onto approaching roads and carparking areas by traffic travelling to and from the site.

The exact location and mode of operation of the site compound will ultimately be chosen by the Contractor in agreement with CCC. The location will have to comply with all of the requirements/underlying measures contained in this EIAR and the NIS, as well as any An Bord Pleanála conditions. There will be early consideration given to locations for material stockpiles, which will be covered with geo-textile (or similar) to prevent mobilisation of suspended solids.

4.6.7 Site Preparation

Elements of the site preparation works may be conducted through an advance works contract to be completed before construction commences on site. Prior to any work commencing on the mainland or island sites, boundary security will be required to be established around the site to prevent unauthorised access. The boundary will be laid out so as to maintain safe access to the existing cableway, to maintain the aforementioned public right of way, and to maintain a portion of the existing parking facilities, where possible. Appropriate environmental protection measures will be put in place on both sites. These are expected to include measures to prevent run-off from the site entering the sound. Site clearance works will be carried out on the mainland site, island site and at the location of all proposed passing bays along the R572 approach road, over the extents indicated on the drawings. Existing overhead lines will be diverted or maintained and protected throughout the works as required by the contract. It is not expected that there will be any interruptions to local utility services as a result of any diversions carried out.

4.6.8 Approach Road Improvement Works and VMS

These works will include a combination of the following at each location:

1. Temporary traffic management;
2. Site clearance (including demolition of 1 no. disused building);
3. Minor earthworks;
4. Pavement widening works;
5. Signage and road markings; and,
6. Boundary treatment – reinstatement of fencing and walls.

It is also proposed to install 4 no. VMS at the following locations:

1. Castletownbere town;
2. R575 and R571 junction south of Eyeries;
3. R572-575 junction at Bealbarnish Gap;
4. Glengarriff village.

These works will include site clearance, minor excavations for foundations, casting of concrete foundations and installation of VMS posts and displays. There is an existing electricity connection available at each of the proposed sites. The signs will be connected into the existing supply, which will necessitate the laying of a short length of new ducting and the installation of new mini-pillars.

4.6.9 Reinforced Concrete Retaining Wall along Southern Boundary of Mainland Site

The rock excavated from the site will be used as back-fill to the proposed retaining wall, which will run along the southern boundary of the site. Therefore, it is likely that the Contractor will construct the wall in advance of any rock-breaking so that the excavated material can be processed and deposited immediately, in order to avoid the need to stockpile the material for a period of time. Construction of the wall will include the following activities:

1. Earthworks carried out to provide a flat formation level.
2. Steel fixing put in place to form reinforcement cages for higher sections of the wall. It is likely that the Contractor will assemble the cages at ground level and crane them into position.
3. Shuttering and pumping of concrete is carried out.
4. Formwork is removed, and waterproofing and back-of-wall drainage is installed.
5. Backfilling of walls using material won on site and/or imported fill material is carried out. Backfill material will be placed and compacted in layers, as required by the contract specification.

4.6.10 Earthworks

Cutting will be required to the rear (north-east) of the existing mainland car park in order to provide space for the proposed upper tier of parking. Backfilling will also be required to level the site along the seaward edge of the existing car park to accommodate the proposed buildings. The cutting will predominantly consist of rock-breaking. With careful planning it will be possible to balance the cut and fill volumes to some extent. It is highly likely that the excavated rock will form an acceptable fill material for levelling the site and for capping/pavement purposes. Topsoil will be stripped and reused, where possible. Relatively minor earthworks will be required on the island and at some of the proposed passing bay locations along the R572. On the mainland, an approximation of the proposed volume of cut material is 6,500m^3, while the requirement for fill to the required formation levels is 8,600m^3. However, when the volume of the retaining walls is taken into account, and bulking of the excavated material is allowed for (crushed rock has a greater volume than solid rock), the cut and fill volumes will approximately balance.

4.6.11 Cableway Works

Initially, reinforced concrete pad foundations will be constructed for the cableway pylons and stations. The stations will require relatively large concrete pads measuring approximately 9 x 9 m in plan by 1.2 m deep. The pylon foundations will measure approximately 5 x 5 m in plan by 0.6 m deep. All pads will bear directly on the existing bedrock which is at high level throughout the site. Construction of the pads will include the following construction activities:

1. Earthworks will be required to excavate down to formation level, as the pad foundations will be buried.
2. Steel fixing will be put in place to form reinforcement cages.
3. Shuttering and pumping of concrete will be carried out. It is anticipated that ready-mix concrete will be delivered to site for the mainland works. On-site mixing will likely be necessary for the island site concreting works.
4. Striking of formworks and application of waterproofing system will be carried out.
5. Pad foundations will be backfilled.

Each pylon foundation will also include a raised concrete plinth which will be cast as one with the pad. The plinths will not be buried and, as such, the durability of these components poses a significant concern. Given the severity of exposure conditions at the proposed pylon locations, stainless steel reinforcement is proposed for the pylon plinths. The holding-down anchors for the pylons will be cast into the plinths.

The mainland and island pylons will be of tubular steel construction and will be 33.5 m and 21.7 m high, respectively. Sections of the tubular steel pylons and the cableway machinery will be transported to site by road (and by ferry for island works), craned into position using a mobile crane and bolted and/or welded together on site. In order to get a suitable crane sufficiently close to the lifting site, it may be necessary to construct a temporary access road branching off the existing road to the proposed pylon locations at both the mainland and island sites. Once the pylons have been erected and the cableway mechanical and electrical equipment installed on both the mainland and island sites, the cableway ropes will be hung and tensioned. As per normal practice, it is assumed that the cableway ropes will be airlifted into position using a helicopter. Finally, the cable cars will be raised onto the ropes. Rigorous testing will be carried out at various stages throughout the process as well as prior to commissioning.

4.6.12 Buildings

The following buildings will be constructed as part of the proposed development:

Mainland site:

- Visitor Centre (including gift shop);
- Café (including toilet block);
- Mainland station building (drive station) with staff facilities, workshop and storage area to rear; and,
- Energy Centre.

Island site:

- Island station building (return station) with welfare facilities and sheltered waiting area.

All buildings are single storey structures and will include the following construction activities:

1. Development of site services, surface water drainage, foul drainage and water supply. The most significant works relate to the installation of the mainland wastewater treatment system. This will include the installation of large pre-cast concrete tanks and importing material to form a polishing filter/percolation area.
2. Development of building substructures – excavation for foundations and pouring of concrete will be required.
3. Construction of building superstructures – this will include the following works:
    - Construction of reinforced concrete floor slabs and walls;
    - Laying of concrete blockwork;
    - Cranage and installation of structural steelwork; and,
    - Installation of roofing systems.
4. The plant and workshop building to the rear of the mainland station will be constructed last to maintain access to the existing mainland station building for as long as possible.
5. Installation of glazing and fixing of cladding systems will be carried out.
6. Fit-out of all buildings and connection of services will be carried out.

Careful sequencing of the building works will be required to ensure the existing cableway can remain operational throughout the construction works (insofar as possible). Construction equipment and machinery such as a tower crane may be installed on a temporary platform erected in the sloped area in front of the existing car park, minimising disruption and interference with the main access road.

4.6.13 Car Park and Landscaping

The following works are considered to be main construction activities for the car park and landscaping element of the development:

1. Construction of the reinforced concrete wall, faced in stone, separating upper and lower tiers of visitor car park and the construction of access steps: the activities required for these works are the same as those described above for the southern boundary wall works.
2. Pavement works for car parks and other paved areas (mainland and island) will be carried out. Paving machinery and asphalt compacters/rollers will be required to lay the bituminous surfacing on the roadway running through the car park. Permeable grasscrete will be employed for parking spaces. The grasscrete elements will be put in place by pouring concrete onto pre-placed patterned formers and mesh, and levelled to the top of the formers. The formers will then be melted away using a flame gun. The patterned voids left behind are then top soiled and seeded.
3. Decommissioning of the existing cableway and demolition of those existing components to be removed.
4. Landscaping finishes and interpretive elements are completed. These works will include planting, grass seeding, and the installation and connection of low-level lighting bollards.

4.6.14 Decommissioning and Demolition Works

Once the new cableway is operational, some components of the existing cableway infrastructure will be dismantled and disposed of, and others will be retained on site as relics of the historic cableway. Initially, the cable car itself will be taken down and set aside for re-use. Then the track ropes and hauling rope will be taken down and disposed of. On the mainland site, works will include the demolition of the existing station building and associated civils, the adjacent reinforced concrete platform, and the access ramp. These works will require a pre-demolition asbestos survey. The existing mainland pylon, mainland station frame and a section of the cableway machinery on the mainland will be retained. The septic tank will have to be disconnected and removed earlier in the works, as it is currently located under the proposed location for the mainland station building. Temporary welfare facilities will be provided from that time onwards. On the island site, the existing station building, pylon and station frame will be demolished. Existing paving will be broken up and disposed of. Waste materials generated during demolition works may contain hazardous materials and will be disposed of according to the relevant regulations.

Demolition works for the island pylon will be carried out by component roped-access personnel with cutting equipment or by using a mobile elevated working platform (MEWP) where access permits. A paint chip analysis of the existing pylon and anchor frame steelwork has revealed the presence of a lead-based paint system. As a result, very onerous health & safety mitigation measures will be implemented in advance of any works to these structures. Temporary stability of the pylon structure during its demolition will be given careful consideration. All decommissioning works will be subject to a comprehensive temporary works design.

Existing paving will be broken up and disposed of. Waste materials generated during demolition works may contain hazardous materials, and will be disposed of according to the relevant regulations.

All waste materials (where necessary, after in-situ reuse and recycling options have been fully considered) shall be disposed of offsite, under appropriate Duty of Care and subject to approvals/consents from the relevant statutory bodies. It is the responsibility of the main contractor to ensure than any company to whom waste is transferred is legally permitted to do so and that the facility they bring the waste to is licensed to handle that type of waste, as outlined in *The Waste Management Acts* 1996-2006.

4.6.15 Construction Traffic Routing

It is anticipated that marine access will not be used to deliver materials to the mainland side of the site and, therefore, it will be necessary to transport materials (including significant prefabricated steel and/or concrete elements) to the site via the R572. This is the only access route to the mainland site until the junction of the R572 and R575 located 8km east of the existing cableway at Bealbarnish Gap. At this point, construction traffic could come from the direction of Allihies (to the north) or Castletownbere (to the east). It is assumed that most of the construction traffic will come from the Castletownbere direction since it is on the main route from Cork City.

Marine access will be required for construction works on the island. There are existing piers and slipways in the vicinity of both sides of the site. The mainland pier is approximately 250m southeast of the mainland station and the island pier is approximately 300m south of the island station. It is anticipated that materials required for works on the island will be ferried from the mainland pier to the island pier. This crossing is approximately 500 m long. From here materials will be transported up the existing pier access track to the location of the island works. However, the mainland pier is relatively exposed and, therefore, vulnerable to adverse weather and seafaring conditions, and its use may not be possible at all times. Consequently, the Contractor may at certain times need to depart from Garinish Point, a relatively sheltered pier and slipway located 1.8 km north-east of the cableway (3.6 km by road). This entails a 5 km trip by boat, provided seafaring conditions are suitable for passage through the Dursey Sound, or 20 km if it is considered necessary to circumnavigate the island due to unfavourable conditions.

4.6.16 Public Traffic and Access

It is proposed to carry out the majority of earthworks during the off-season months (October – April) in order to minimise disruption to the operation of the existing cableway. Some construction works will be carried out during the in-season months (May – September) but these works will not require as much machinery/HGV traffic, and are not anticipated to generate major disruption to regional traffic/operation of the existing cableway. Finalisation of the structural design of the proposed development will facilitate estimation of the increase in volume of HGV traffic over the construction period.

Public access will be maintained to two no. access routes (one of which is a public right of way) via the site throughout construction/operation, as described in Chapter 6 of Volume 2 of this EIAR – Population and Human Health. The existing cableway will remain operational throughout the works insofar as is possible to allow safe access to the cableway.

4.6.17 Site Utility Infrastructure

4.6.17.1 Water Supply

Mainland

Communications with Irish Water have confirmed that there is no water supply network system in place on the mainland side of the site. However, CCC have confirmed that there is a well located in the existing visitor car park.

In order to support the anticipated peak mainland-side demand of 12,705 L/day, a new water supply network will need to be created to service the visitor centre. There is a groundwater well located in the existing visitor car park, which has been tested as part of the site investigations. It is proposed to construct a new bored well adjacent to the existing well. Water will be pumped to reservoir tanks located within the mainland station building. The water distribution network will incorporate a new potable water treatment system and will be gravity fed, minimising the need for ongoing maintenance requirements.

The treated potable mains water will be distributed to each building through a water meter that will be linked to the building management system. Hot water generation plant will be provided locally in each of the buildings. The distribution of hot, cold and mains water throughout the buildings will consist of horizontal distribution generally taken through the corridor ceilings to the user points.

Island

There is a small-scale water supply network system on Dursey Island. This supply serves approximately 25 private properties but does not extend to the island side cable car landing point (eastern end of the island). In this delivery system, spring water is stored in a raw water holding tank and disinfected on demand using chlorination and UV reactor (*Trojan PRO 10*) treatments.

It is proposed to utilise a new rainwater harvesting/grey water recycling system at the island-side cableway terminal to support the anticipated peak visitor demand of 1,035 L/day. Raw rainwater/grey water will only be used in non-potable applications (e.g. flushing toilets, landscape maintenance). No potable water supply is to be provided at the Island cableway terminal, instead potable water shall be brought to site if required. Water distribution on the Island-side development will be gravity fed, minimising the need for ongoing maintenance.

4.6.17.2 Wastewater Treatment

Mainland

Communications with Cork County Council have confirmed that wastewater from the cableway welfare facilities are being discharged to an on-site septic tank, which is periodically de-sludged.

In order to adequately treat anticipated volumes of wastewater from the mainland facilities of the proposed development, a superior wastewater discharge and treatment system will need to be put in place. In accordance with the EPA Code of Practise (EPA, 2009) a site suitability assessment was carried out. The results of the site suitability assessment indicate that the site is suitable for a packaged wastewater treatment system and polishing filter. It is proposed to construct a tertiary wastewater treatment system with a sand polishing filter to service the visitor centre facilities. Effluent discharge values achieved within a typical treatment system – such as this one – would be 20 milligrams per litre (mg/L) BOD, 30mg/L suspended solids (SS) and 20 mg/L ammonium, prior to discharge to the polishing filter for further treatment. The system will include a primary settlement tank, combined biological treatment and secondary settlement tank; and pumping station. It is proposed that domestic wastewater at the proposed development be treated on-site by means of a proprietary Wastewater Treatment Plant (WWTP) with the final treated effluent discharged to ground through a sand polishing filter.

It should be noted that due to the high level of the rock in the area, it is likely that both the polishing filters/percolation areas on the mainland and the island would need to be contained in raised beds rather than fully underground. It is proposed to incorporate these filters into landscaping to minimise any associated visual and environmental impacts on the surrounding environment. Ongoing monitoring of the effluent wastewater will be required in order to ensure that the treatment plant is operating as intended. In addition, the use of particular detergents and cleaning products during the operational phase will need to be reviewed in order to ensure that no substances are discharged which might have a detrimental impact on the operation of the treatment system. Ongoing maintenance of the treatment system will be required, as well as periodical de-sludging. A Groundwater Discharge Licence for the above development will be sought and obtained from the Local Authority once planning consent has been achieved – this is in accordance with EPA guidance.

Soils and Waste pipework above ground level will form part of the Mechanical Services Installation and will consist of PVC piping with adequate cleaning eyes, vents, etc. The Soils & Wastes systems will be designed and installed in accordance with BS EN12056-2:2000.

Island

There are currently no public toilets available to visitors on the island side of the site. There is no formal wastewater drainage and treatment system in place on the island. Residences are serviced by private septic tanks.

The criteria for estimating the maximum additional wastewater hydraulic and BOD load based on the potential capacity of the proposed development was carried out with regard to expected growth in visitor numbers. For the island-side development it was assumed that 50% of the maximum number of allowable visitors to the island would use the proposed toilet facilities which is considered reasonable given that the main development focus, including food and drink offerings, are to be located at the mainland site. It is anticipated that approximately 207 persons visiting the island in a day will use the island toilet facilities, the resultant wastewater hydraulic load would be approximately 1,035 L/day, with a total organic loading of 2,070 grams BOD per day (according to current Irish Water standards). It is proposed to construct a proprietary wastewater treatment system with a sand polishing filter to service the facilities at the island-side line station. Due to the lack of subsoil at the island-side station, the proposed sand polishing filter will be raised and bunded above existing ground level and formed from imported suitable material. The proposed plan area of the sand distribution area will provide adequate assimilative capacity in the underlying groundwater.

Effluent discharge values achieved within a typical treatment system – such as this one – would be 20 milligrams per litre (mg/L) BOD, 30mg/L suspended solids (SS) and 20 mg/L ammonium, prior to discharge to the polishing filter for further treatment. The system will include a primary settlement tank, combined biological treatment and secondary settlement tank; and pumping station. It is proposed that the final treated effluent will be discharged to ground through a sand polishing filter and raised percolation area. It is anticipated that this will not give rise to significant adverse environmental effects in the adjacent Kenmare River SAC.

Ongoing monitoring of the effluent wastewater will be required to ensure that the treatment plant is operating as intended. In addition, the use of particular detergents and cleaning products during the operational phase will need to be reviewed in order to ensure that no substances are discharged which might have a detrimental impact on the operation of the treatment system. Ongoing maintenance of the treatment system will be required, as well as periodical de-sludging. A Groundwater Discharge Licence for the above development will be sought and obtained from the Local Authority once planning consent has been achieved.

Again, the Soils and Waste pipework above ground level will form part of the Mechanical Services Installation and will consist of PVC piping with adequate cleaning eyes, vents, etc. The Soils & Wastes systems will be designed and installed in accordance with BS EN12056-2:2000.

4.6.17.3 Telecommunications and Internet Connectivity

EIR's Network Design Bureau Services Office were consulted in relation to the location of phone lines in the vicinity of the proposed Visitor Centre. There is currently a phone line network system in place for the study area. However, there is no broadband connectivity at the site. It is proposed to introduce point-to-point high-speed overhead fibre broadband from Lehanmore Community Centre to the mainland Visitor Centre buildings. Consultation will continue with EIR during the detailed design of the proposed development.

The proposed overhead fibre broadband will necessitate the running of new fibre optic cable along the R572 Regional Road from Lehanmore Community Centre to the proposed development 4.3km away. The new overhead line will utilise existing telephone poles with new fibre optic joint boxes (small black boxes) fixed to the poles at regular intervals. The broadband works will be carried out as part of a separate advanced works contract which will be complete before the main works commence.

4.6.17.4 Electricity

The site of the proposed development is serviced by a phase 3 supply connectivity. The energy provider to the existing cableway is SSE Airtricity. The meter point reference number (MPRN) is 1000 706 3245. The current maximum import capacity (MIC) is 15 kilovolt-amps (kVA). In order to meet increased electrical demand during the operational phase of the proposed development, it will be necessary to increase the MIC of the site's supply.

Following on from preliminary discussions with ESB Networks, it was agreed that a new/upgraded, dedicated ESB supply will be provided to the site. The ESB will be required to provide an increased 3ph power supply at low voltage to the site. The new utility supply will terminate in a new ESB substation located at the rear of the site. This will be a purpose built ESB substation constructed in line with ESB Networks requirements. The client intake/meter room will be located next to the ESB substation. This room will contain a new client intake panel containing the supply feeding the new mainland buildings and cable car.

The new incoming supply will enter the new main LV switch-room, located at ground level in the building from the client intake board. The final location of the new main electrical LV switch-room has been agreed with the architects and is indicated on the General Arrangement Drawings. Communications with ESB are ongoing and a review is scheduled to take place on-site. There is a requirement as part of the brief for a Back-Up Generator Set to supply the electrical load of the building & new cable car on mains failure. This is located at the rear of the site in a fenced enclosure. The generator comes with a built-in day tank with a run time capacity of 8 hours on full load. The generator control panel and automatic change-over panels will be located in the client intake room. Consideration will be made in the next stage of the project to providing a mobile plug-in generator point. Having a mobile plug-in point in addition to the permanent standby generator offers greater resilience for the system.

4.6.17.5 Fuel Supply Networks

Communications with Bord Gáis have confirmed that there is no gas networks supply system in place for the study area. In order to run the heating system for the mainland buildings, a fuel supply will be required. Although subject to detailed design it is proposed at this stage that the heating system will be provided by a series of electrically driven Air to Water Heat Pumps. This negates the requirement for fossil fuel storage onsite. The installation of Heat Pump Technology will also satisfy the renewable energy requirements for the "Nearly Zero Energy Buildings." The Heat Pumps indoor unit will be located in the Mechanical Plant Room with the condenser unit located externally. The Heat Pumps will feed the low-pressure hot water heating installation and be distributed through corridor ceiling voids into the heated areas. It is intended to utilise a mix of underfloor heating and radiators at this stage of the project.

4.6.18 Construction Materials

The project requires the use of natural, local and tactile materials that can weather and age over time. Timber, oxidized steel and other metals, natural stone, cast concrete, rubber, wool, netting and textiles will be used in order to complete the proposed development.

It is proposed to use material excavated on-site for back-filling retaining walls and levelling the site. Tables 4.4 and 4.5, below, provide an overview of the materials to be imported and exported (respectively) during the construction phase of the proposed development.

Table 4.4 Volume of materials to be imported

Nature of material	Volume
Concrete (buildings)	1200m³
Concrete (cableway foundations)	230 m³
Concrete (retaining walls)	840 m³
Granular fill	150m³
Steel reinforcement (buildings)	120 tonnes
Steel reinforcement (cableway foundations)	30 tonnes
Steel reinforcement (retaining walls)	130 tonnes
Structural steelwork (buildings)	50 tonnes
Structural steelwork (pylons)	20 tonnes

Table 4.5 Volume of materials to be exported

Nature of material	Volume
Concrete	25m³
Stone and rubble	20m³
Excavated material (including surfacing)	10m³
Structural steelwork (island pylon)	10 tonnes

4.6.19 Working Hours

Normal working hours will be employed during the construction phase as follows:

- Monday – Friday: 07:00 – 19:00 hrs
- Saturday: 08:00 – 16:30 hrs
- Sunday and Bank Holidays: 08:00 – 16:30 hrs

Works on Sundays and Bank Holidays will only be permitted with the approval of the Client. Similarly, emergency works outside of the normal working hours will only be permitted with the approval of the planning authority.

It is anticipated that there will be typically 20-30 personnel on site at any one time during the course of construction.

4.7 Maintenance and Operation

The envisaged first year of operation of the proposed development is 2023. The proposed development will be operated and maintained by CCC. It is anticipated that the proposed cableway will continue to operate with roughly the same opening hours and days of operation as the existing cableway. It is expected that three employees will continue to serve as cableway operators. In addition, it is envisaged that 3 – 5 additional (likely seasonal) employees will be required to staff the Visitor Centre, gift shop and café. It is expected that the proposed Visitor Centre, gift shop and café will close during the off-season months (October – April), when the site is less popular among non-local users – although the specific opening weeks/months are yet to be determined. The cableway will continue to operate year-round, with associated operators retained. It is proposed to marginally increase ticket prices for cable car users, although the precise pricing is yet to be decided by CCC.

The maintenance and operation of the proposed cableway will be in line with the 2016 report for the existing cableway "*Safety Requirements for Dursey Island Cable Car – Precommissioning Inspection, Maintenance, Operational Inspection and Checks*".

The elements of the proposed development which are envisaged to be operated and maintained by Cork County Council are as follows:

- Landscaping maintenance of all landscaping areas;
- Road sweeping and de-icing operations of the carpark and approach road;
- Regular maintenance of the permeable pavements in the form of brushing and vacuuming;
- Resurfacing works of the carpark and approach road, as necessary; and
- Periodic inspection and maintenance of all civil infrastructure elements.

The maintenance and operation of the visitor centre and café will be undertaken by CCC and will include the following:

- Maintenance of all mechanical and electrical equipment located within each building; and
- Internal and external cleaning.

A Visitor Management Plan is being developed by CCC in communication with Fáilte Ireland to ensure the sustainable management of visitors and the visitor experience at the proposed development through appropriate management of marketing and parking facilities.

4.8 Decommissioning Methodology

4.8.1 Existing Cableway Decommissioning

Demolition of the existing cableway infrastructure is detailed in Section 4.6.14, above.

4.8.2 Decommissioning of the Proposed Development

The proposed development will need to be decommissioned at the end of its serviceable life. Decommissioning works will include the following steps:

- Cable cars will be removed from ropes.
- The ropes (track and haul) will be taken down.
- Cableway machinery will be dismantled.
- Pylons will be removed in sections using a mobile crane.
- Pylon and station concrete foundations will be broken up on site before removal.
- All buildings will be demolished by conventional means. These relatively low-rise structures have no particular requirements with regards to their demolition.
- Finishes and surfacing will be taken up and disposed of appropriately.

There is potential to re-use or recycle almost all of the materials generated from the decommissioning of the proposed facility. Where recycling isn't feasible, waste material will be disposed of to a licensed waste facility according to the relevant regulations.

4.9 Environmental Management Plans

The following outline Environmental Management Plans, which will be used by the Contractor to develop the construction stage Environmental Management Plans, are outlined below and are contained within Appendix 4.1 of this EIAR.

4.9.1 Environmental Operating Plan

The Environmental Operating Plan (EOP) is defined as a document that outlines procedures for the delivery of environmental mitigation measures and for addressing general day-to-day environmental issues that can arise during the construction phase of a construction project. Essentially the EOP is a project management tool. It is prepared, developed and updated by the Contractor during the project construction stage and sets out mitigation measures proposed by the EIAR, NIS and An Bord Pleanála's decision. An Outline EOP has been included in Appendix 4.1 of this EIAR and will be further developed by the Contractor.

Before any works commence on site, the Contractor will be required to prepare an EOP in accordance with the National Roads Authority (NRA), now known for operational purposes as Transport Infrastructure Ireland (TII), guidance document *Guidelines for the Creation and Maintenance of an Environmental Operating Plan*. Details within the plan will include:

- All environmental commitments and mitigation measures included as part of the planning approval process and any requirements of statutory bodies such as the National Parks and Wildlife Service (NPWS) as well as a method documenting compliance with the measures;
- A list of all applicable environmental legislation requirements and a method of documenting compliance with these requirements; and
- Outline methods by which construction work will be managed to avoid, reduce or remedy potential adverse impacts on the environment.

To oversee the implementation of the EOP, the Contractors will be required to appoint a person to ensure that the mitigation measures included in the EIAR, the EOP and the statutory approvals are executed in the construction of the works and to monitor that those mitigation measures and planning conditions are functioning properly. The EOP integrates the requirements of the Incident Response Plan (IRP), the Construction Environmental Management Plan (CEMP) and the Construction and Demolition Waste Management Plan (CDWMP), which are described in turn in the following sections.

4.9.2 Incident Response Plan

The Incident Response Plan (IRP) shall include arrangements for dealing with accidental spillage or other incidents during the construction stage, and ensuring that relevant staff shall be trained accordingly. The outline IRP describes the procedures, lines of authority and processes that will be followed to ensure that incident response efforts are prompt, efficient, and appropriate to particular circumstances. It is developed to provide the information that each employee may need in order to respond to an emergency and to handle it effectively. An outline IRP is located in Appendix 4.1a of this EIAR.

4.9.3 Construction Environmental Management Plan

Prior to any demolition, excavation or construction a Construction Environmental Management Plan (CEMP) will be produced by the successful contractor for the proposed development. The CEMP will set out the Contractor's overall management and administration of a construction project. An Outline CEMP has been prepared as part of this EIAR (see Appendix 4.1b). The CEMP will be developed by the Contractor during the pre-construction phase to ensure commitments included in the statutory approvals are adhered to. The Contractor will include details in relation to all of the following in the CEMP

- Details of working hours and days;
- Details of emergency plan - in the event of fire, chemical spillage, cement spillage, collapse of structures or failure of equipment or road traffic incident within an area of traffic management. The plan must include contact names and telephone numbers for: Local Authority (all sections/departments); Ambulance; Gardaí and Fire Services;
- Details of chemical/fuel storage areas (including location and bunding to contain runoff of spillages and leakages);
- Details of construction plant storage, temporary offices;
- A Traffic Management Plan (to be developed in conjunction with the Local Authority's Roads Section) including details of routing of network traffic; temporary road closures; temporary signal strategy; routing of construction traffic; programme of vehicular arrivals; on-site parking for vehicles and workers; road cleaning; other traffic management requirements;
- Truck wheel wash details (including measures to reduce and treat runoff);
- Dust management to prevent nuisance (demolition and construction);
- Site run-off management;
- Noise and vibration management to prevent nuisance (demolition and construction);
- Landscape management;
- Management of contaminated land including asbestos and lead-based paint and assessment of risk for same by suitably qualified, trained and licenced personnel;
- Management of demolition of all structures and assessment of risks for same;
- Stockpiles;
- Project procedures & method statements for:
    - Site clearance, site investigations, excavations and working with asbestos containing materials (ACMs) if necessary;
    - Management and removal of ACMs if necessary;
    - Demolition and removal of buildings, services, pipelines (including risk assessment and disposal);
    - Diversion of services;
    - Excavation and blasting (through peat, soils and bedrock);
    - Construction of pipelines;
    - Temporary hoarding & lighting;
    - Borrow pits and location of crushing plant;
    - Disposal of surplus geological material (peat, soils, rock etc.);
    - Earthworks material improvement; and
    - Protection of watercourses from contamination and silting during construction; and
    - Site Compounds.

The production of the CEMP will also detail areas of concern with regard to health and safety and any environmental issues that require attention during the construction phase. The adoption of good management practices listed in the CEMP during the construction phase will contribute to reducing environmental impacts.

4.9.4 Construction and Demolition Waste Management Plan

The Construction and Demolition Waste Management Plan (CDWMP) will clearly set out the Contractor's proposals regarding the treatment, storage and disposal of waste related to the construction of the proposed development. An Outline CDWMP has been prepared for the proposed development (see Appendix 4.1c). The Outline CDWMP is a live document that will be amended and updated to reflect current conditions on site as the project progresses. The obligation to develop, maintain and operate a CDWMP will form part of the contract documents for the project. The plan itself will contain, but not be limited to, the following measures:

- Details of waste storage to be provided for different waste;
- Details of where and how materials are to be disposed of - landfill or other appropriately licensed waste management facility;
- Details of storage areas for waste materials and containers;
- Details of how unsuitable excess materials will be disposed of where necessary; and
- Details of how and where hazardous wastes such as oils, diesel and other hydrocarbon or other chemical waste are to be stored and disposed of in a suitable manner.

4.10 TII/NRA Environmental Assessment and Construction Guidelines

The TII/NRA Environmental and Construction Guidelines provide guidance with regard to environmental best practice methods to be employed in construction on national road schemes. The following guidelines have been implemented during the various environmental assessments for the proposed development:

- *Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes;*
- *Guidelines for the Treatment of Bats during the Construction of National Road Schemes;*
- *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes;*
- *Guidelines for the Testing and Mitigation of the Wetland Archaeological Heritage for National Road Schemes;*
- *Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post-Construction of National Road Schemes;*
- *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes;*
- *Guidelines on the Management of Noxious Weeds on National Roads;*
- *Guidelines for the Treatment of Noise and Vibration in National Road Schemes;*
- *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes;*
- *Guidelines for the Management of Waste from National Road Construction Projects; and*

- *Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan.*

This is a non-exhaustive list and relevant guidance current at the time of construction will be followed. Other guidelines to be implemented in the construction of the proposed development are referred to in the various chapters of this EIAR, as appropriate. It is proposed to employ these guidelines, as and where relevant, for the proposed development.

Appendix 4.1 Outline Environmental Operation Plan

Cork County Council
Comhairle Contae Chorcaí

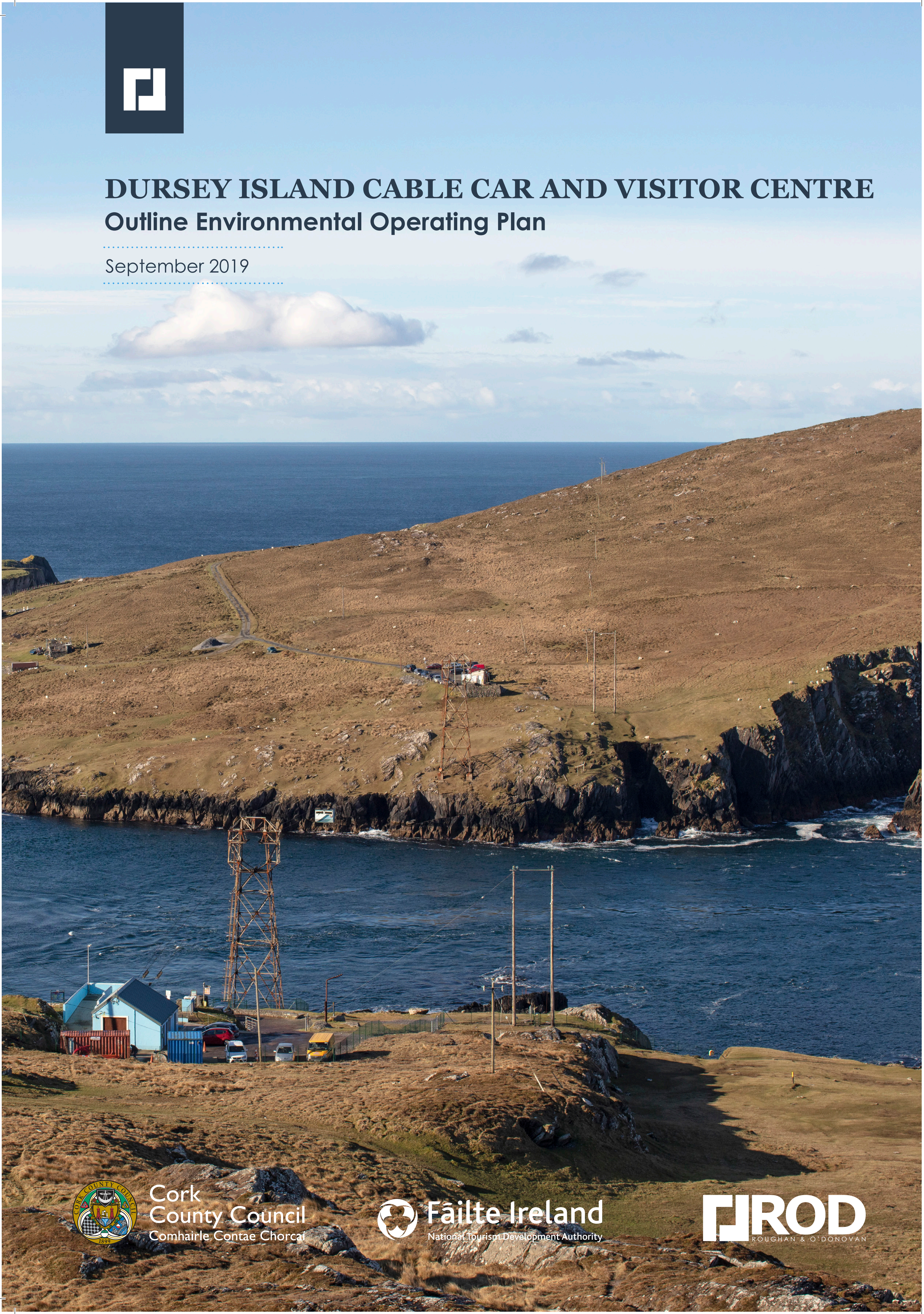
Fáilte Ireland
National Tourism Development Authority

ROD
ROUGHAN & O'DONOVAN

DURSEY ISLAND CABLE CAR AND VISITOR CENTRE

Outline Environmental Operating Plan

September 2019



Cork County Council
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Dursey Island Cable Car and Visitor Centre

Outline Environmental Operating Plan

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1.0 INTRODUCTION

This document is a project-specific outline Environmental Operating Plan (EOP). It is presented to inform and provide practical experience of developing, submitting and maintaining an EOP for the construction and operation of the Dursey Island Cable Car and Visitor Centre.

1.1 Purpose and Scope

This outline EOP sets out the mechanism by which environmental protection is to be achieved on the Dursey Island Cable Car and Visitor Centre. This outline EOP describes the Environmental Management System (EMS) of the proposed development, which will be devised according to the criteria of ISO 14001:2015 – Environmental Management Systems and developed in line with the NRA (now known for operating purposes as Transport Infrastructure Ireland (TII)) *"Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan".* This EOP will be complemented by General Procedures, Work Procedures and Operations Instructions. These documents will be in place within the site administration offices and appropriate site locations during works.

This outline EOP covers the activities of [*Successful Contractor Name*] and that of its sub-contractors. It outlines the environmental commitments in relation to the construction works and how these commitments are to be managed, including details of the monitoring systems and mitigation measures to be employed by the successful contractor. It also assigns responsibilities for ensuring the effective implementation of this EOP.

1.2 Environmental Policy Statement

Environmental management is fundamental to the successful operation of construction activities. Therefore, the Environmental Policy must, as a priority, be understood by all parties involved in the contract and adhered to throughout the course of the works to allow for legal compliance and continuous improvement.

[*Successful Contractor Name*]'s Environmental Policy Statement is detailed below.

[*Successful Contractor to insert policy statement*]

2.0 GENERAL PROJECT DETAILS

This section will be completed by the successful contractor once appointed:

- Brief overview;
- Location of the Project;
- Location of compounds;
- Contact Sheets for site, employer and third party contacts;
- Register of all applicable legislation, including relevant standards, Codes of Practice and Guidelines;
- Organisational chart; and,
- Duties and responsibilities.

Project details which have been identified prior to appointment of the contractor are described in the subsequent subsections.

2.1 Concrete Works

2.1.1 Introduction

There will be no use of concrete within any watercourse. The use and management of concrete close to watercourses must be carefully controlled to avoid spillage which can have a deleterious effect on water chemistry and aquatic habitats and species. Alternative construction methods have been proposed where possible, e.g. use of pre-cast units and permanent formwork will reduce the risks associated with concreting works. Where the use of in-situ concrete near watercourses cannot be avoided, the following control measures will be employed:

- When working near surface water and the application of in-situ materials cannot be avoided, the use of alternative materials such as biodegradable shutter oils shall be used;
- Hydrophilic grout and quick-setting mixes or rapid hardener additives shall be used to promote the early set of concrete surfaces exposed to water;
- Any plant operating close to the water will require special consideration on the transport of concrete from the point of discharge from the mixer to final discharge into the delivery pipe (tremie). Care will be exercised when slewing concrete skips or mobile concrete pumps near Dursey Sound;
- Placing of concrete near the watercourses will be carried out only under the supervision of the Ecological Clerk of Works (ECoW);
- There will be no hosing into surface water drains of spills of concrete, cement, grout or similar materials. Such spills shall be contained immediately, and runoff prevented from entering the watercourse;
- Concrete waste and wash-down water will be contained and managed on site to prevent pollution of all surface watercourses;
- On-site concrete batching and mixing activities will only be allowed at the identified construction compound areas;
- Washout from concrete lorries, with the exception of the chute, will only take place at the construction compound (or other appropriate facility designated by the manufacturer);
- Chute washout will be carried out at designated locations only. These locations will be signposted. The Concrete Plant and all Delivery Drivers will be informed of their location with the order information and on arrival on site; and,

- Chute washout locations will be provided with appropriate designated, contained impermeable area and treatment facilities including adequately sized settlement tanks. The clear water from the settlement tanks shall be pH corrected prior to discharge (which shall be by means of one of the construction stage settlement facilities) or alternatively disposed of as waste in accordance with the Contractor's Construction and Demolition Waste Management Plan.

2.2 Construction Compounds

2.2.1 Introduction

A site construction compound will be required during the construction phase and will be situated completely within the mainland site. Initially it will be located adjacent to the existing cableway in the widest section of the existing carpark. The compound will be established at the commencement of the contract and remain in place throughout the construction period. However, as earthworks progress it will be required to be moved within this confined site, at all times staying within the red line boundary of the site. The Contractor will also require a smaller set down area/storage compound on the island which will be located within the red line boundary. Suitable site security measures will be implemented on both the mainland and island sites for the duration of the construction phase.

The construction compound may include stores, a site office, material processing areas, plant storage, parking of site and staff vehicles, and other ancillary facilities and activities.

2.2.2 Control Measures

The construction compound will have appropriate levels of security to deter vandalism, theft and unauthorised access.

Suitable site security measures will be implemented on both sides of the site. Potential impacts that need to be guarded against include:

- Accidental spillage of pollutants into surrounding water bodies; and,
- Dirt, mud and other materials being dropped from lorries and plant or spread onto approaching roads and carparking areas by traffic travelling to and from the site.

Surface runoff from the compound will be minimised by ensuring that the paved/ impervious area is minimised. All surface water runoff will be intercepted and directed to appropriate treatment systems (settlement facilities and oil trap) for the removal of pollutants prior to discharge. The site compound will be fenced off and a silt fence erected and maintained on the site boundary.

Wastewater drainage from the site office and construction facilities will be contained and disposed of in an appropriate manner to prevent water pollution and in accordance with the relevant statutory requirements.

The storage of all fuels, other hydrocarbons and other chemicals shall be within the construction compound only and shall be in accordance with relevant legislation and best practice. In particular:

- Fuel storage tanks shall have secondary containment provided by means of an above ground bund to capture any oil leakage;

- All hazardous materials will be stored within secondary containment designed to retain at least 110% of the storage contents. Temporary bunds for oil/diesel storage tanks will be used on the site during the construction phase;
- Safe materials handling of all potentially hazardous materials will be emphasised to all construction personnel employed during construction; and
- Storage tanks and associated provision, including bunds, will conform to the current best practice for oil storage and will be undertaken in accordance with *Best Practice Guide BPGCS005 – Oil Storage Guidelines* (Enterprise Ireland).

The Incident Response Plan (IRP) (an outline IRP is located in Appendix A of this outline EOP) shall include arrangements for dealing with accidental spillage and relevant staff shall be trained in these procedures.

Mitigation measures during the construction phase will include implementing best practice to avoid sediment entering the watercourses, particularly Dursey Sound. Runoff will be controlled and treated to minimise impacts to surface water and groundwater, (refer to Chapters 9 and 10 in Volume 2 of this Environmental Impact Assessment Report (EIAR)).

2.3 Site Environmental Manager (SEM)

In order to ensure the successful development, implementation and maintenance of the EOP, the Contractor will be required to appoint an independent Site Environmental Manager (SEM) to provide independently verifiable audit reports.

The SEM must possess sufficient training, experience and knowledge appropriate to the nature of the task to be undertaken, a Level Eight qualification recognised by the Higher Education and Training Awards Council (HETAC), or a University equivalent, or other qualification acceptable to the Employer, in Environmental Science, Environmental Management, Environmental Hydrology, Engineering or other relevant qualification acceptable to the Employer. The SEM will demonstrate experience working in the protection of European Sites.

Separate from the on-going and detailed monitoring carried out by the Contractor as part of the EOP; the SEM shall carry out the inspection/ monitoring regime described below, and report to the Contractor. The results will be stored in the SEM's monitoring file and will be available for inspection/ audit by the Client and National Parks and Wildlife Service (NPWS) staff. All inspections/ monitoring/ results will be recorded on standard forms.

(i) Control measures for works near watercourses shall be inspected on a daily basis;

(ii) In-situ concrete operations near watercourses shall be supervised and designated chute washing out facilities shall be inspected on a daily basis;

(iii) Site compounds shall be inspected on a weekly basis;

(iv) Vibration monitoring is recommended during demolition works in order to ensure compliance with defined thresholds;

(v) Hydroacoustic monitoring will be undertaken for the full duration of the construction of the proposed development. The results will be frequently reviewed (at least fortnightly) by the Ecological Clerk of Works.

2.4 Ecological Clerk of Works (ECoW)

In order to ensure the successful development and implementation of the EOP, the Contractor will appoint an independent Ecological Clerk of Works (ECoW). The ECoW must possess training, experience and knowledge appropriate to the role, including:

- An NFQ Level 8 qualification or equivalent or other acceptable qualification in Ecology or Environmental Biology; and,
- Demonstrable experience in the protection of European sites.

The principal functions of the ECoW are:

- To provide ecological supervision of the construction of the proposed development and thereby ensure the full and proper implementation of all the mitigation measures relating to biodiversity prescribed in the EIAR and NIS;
- To regularly review the outcome of the specialist hydroacoustic monitoring and, on that basis, make any necessary adjustments to the mitigation; and,
- To carry out weekly inspections and reporting on the implementation of the Contractor's Biosecurity Protocol.

During the preparation of the Contractor's EOP, the SEM may, as appropriate, assign other duties and responsibilities to the ECoW.

In exercising his/her functions, the ECoW will be required to keep a monitoring file and this will be made available for inspection or audit by Cork County Council or the NPWS at any time.

3.0 PLANNING CONSENT

If planning permission is granted for the proposed development, the entire contents of the planning consent should be inserted here.

[*Successful Contractor to insert planning consent*]

4.0 SCHEDULE OF COMMITMENTS

The Schedule of Commitments comprises the mitigation measures as outlined in Chapter 18 Mitigation Measures in Volume 2 of this EIAR and any additional commitments arising during the EIA process up to and including the Oral Hearing.

The current Schedule of Commitments is as follows:

[*Successful Contractor to insert Schedule of Commitments*]

In addition, the Contract documents, the conditions imposed by An Bord Pleanála, the Schedule of Commitments, and relevant environmental legislation all prescribe environmental performance criteria.

The following table lists the complete suite of Environmental Commitments together with the relative specification and evidence of how each commitment will be met. An example of the layout of this table and potential entries are given below.

Table 1 Environmental Commitments

Environmental Commitment	Legislation / Specific Ref.	Action Owner	Evidence	Target Date	Close Date
Noise and Vibration	EIAR Volume 2, Chapter 12 Noise and Vibration; EIAR Volume 2, Chapter 18 Mitigation Measures	Env. Manager / Noise Specialist / Env. Designer / Site Agent / Foreman	Method Statement / Site Inspections / Monitoring Data / Environmental Control Measure Sheet	Ongoing	End of contract
Biodiversity	EIAR Volume 2, Chapter 7 Biodiversity; EIAR Volume 2, Chapter 18 Mitigation Measures	Env. Manager/ specialist ecologist/ Env. Designer / Site Agent / Foreman	Method Statement / Ecological Walkover / Pre-surveys / agreement from NPWS / Site Inspections	Ongoing	End of Contract

5.0 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT PLAN

A Construction and Demolition Waste Management Plan (CDWMP) is prepared to ensure that waste arising during the construction and demolition phase of the development on site will be managed and disposed of in a way that ensures the provisions of the Waste Management (Amendment) Acts, 1996-2011 and associated Regulations (1996-2011) are complied with and to ensure that optimum levels of reduction, re-use and recycling are achieved.

An outline CDWMP, consistent with mitigation measures as contained within the EIAR and the Schedule of Commitments, is contained in Appendix C of this outline EOP.

6.0 INCIDENT RESPONSE PLAN

The Incident Response Plan (IRP) describes the procedures, lines of authority and processes that will be followed to ensure that incident response efforts are prompt, efficient, and appropriate to particular circumstances.

An outline IRP, consistent with mitigation measures as contained within the EIAR and the Schedule of Commitments, is contained in Appendix A of this EOP.

Appendix 4.1A Outline Incident Response Plan

Cork County Council
Comhairle Contae Chorcaí

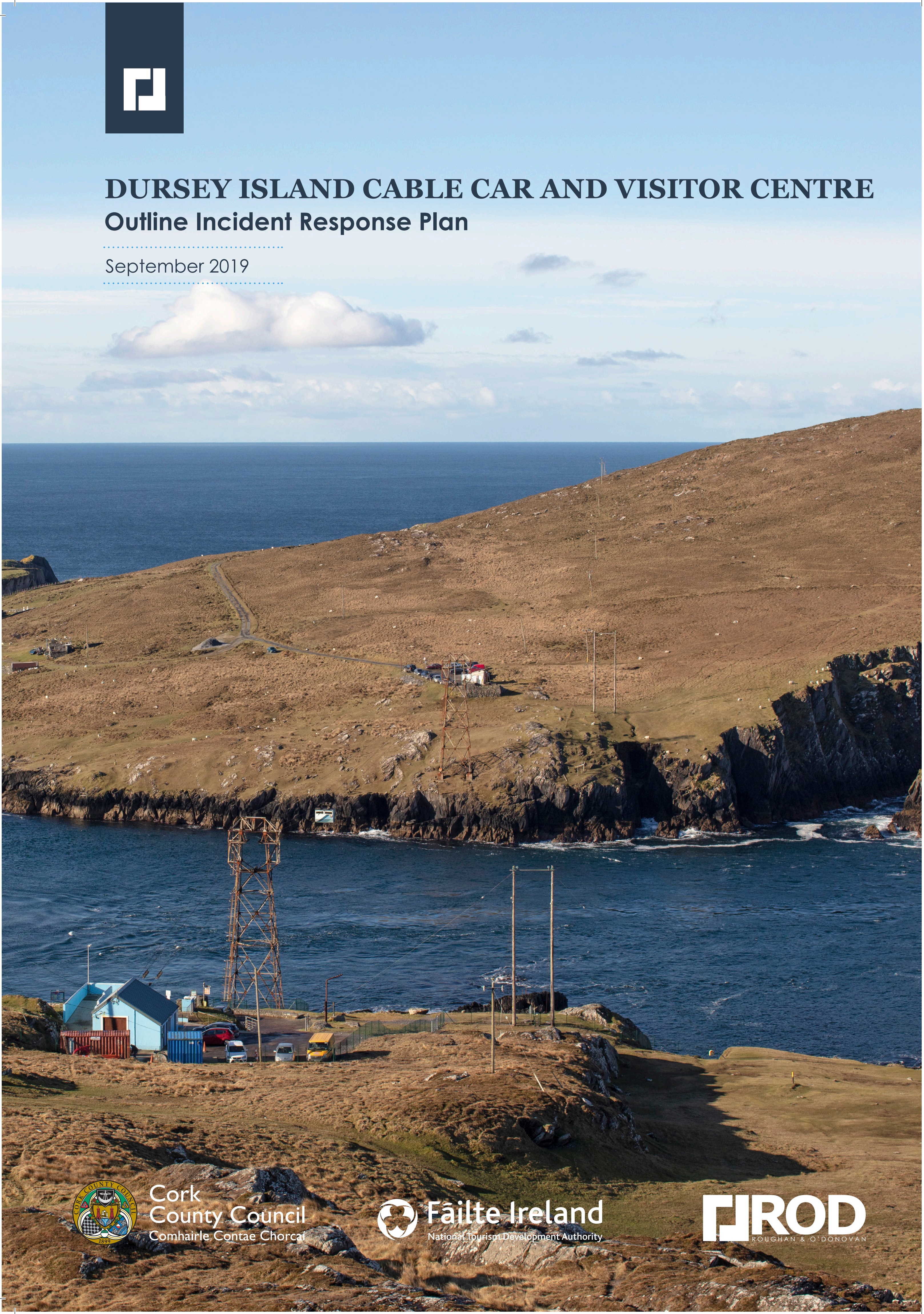
Fáilte Ireland
National Tourism Development Authority

ROD
ROUGHAN & O'DONOVAN

DURSEY ISLAND CABLE CAR AND VISITOR CENTRE

Outline Incident Response Plan

September 2019



Cork
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Dursey Island Cable Car and Visitor Centre

Outline Incident Response Plan

TABLE OF CONTENTS

1.0 INTRODUCTION

This Outline Incident Response Plan (IRP) describes the procedures, lines of authority and processes that will be followed to ensure that incident response efforts during the construction stage of the proposed development are prompt, efficient, and appropriate to particular circumstances. It has been developed to provide the information that each employee may need in order to respond to an emergency and to handle it effectively.

2.0 OBJECTIVE OF PLAN

The primary objective of this document is to:

- Ensure the health and safety of workers and visitors at and in proximity to the site during the construction stage of the proposed development;
- Minimise any impacts to the environment as a result of works, and to ensure protection of the water quality and the aquatic species dependant on it;
- Protect property and operations at the proposed site and to minimise the impact on the continuity of business; and,
- Establish procedures that enable personnel to respond to incidents with an integrated multi-departmental effort and in a manner that minimises the possibility of loss and reduces the potential for affecting health, property and the environment.

3.0 RESPONSIBILITY

It is the responsibility of the Site Environmental Manager (SEM) to maintain and update this Outline IRP as required.

This Outline IRP shall be completed by the Contractor prior to the commencement of works. It will be reviewed on an ongoing basis and amended, as necessary, when one or more of the following occur:

- Applicable regulations are revised;
- The IRP fails in an emergency;
- The project changes in its design, construction, operation, maintenance, or other circumstance in a way that materially increases the potential for impacts on the environment, workers or visitors to the site during construction; and/or,
- Amendments are required by a regulatory authority.

4.0 OTHER PLANS

Cork County Council has a Major Emergency Plan prepared in accordance with the Government's Major Emergency Management Framework. This plan details the initial contact that should be made in the case of an emergency incident as well as those responsible for following up once an emergency event is declared. This plan will be available to the Contractor and may be referred to during both the construction and operation phases. The Major Emergency Plan is presented in Appendix A of this IRP.

5.0 OUTLINE INCIDENT RESPONSE PLAN

Name and address of the Client:

Cork County Council

County Hall, Carrigrohane Road, Cork

The contact within the Client organisation is Mr Liam Lynch (tel. 021 428 5939).

Site Location:

The proposed development is directly adjacent to the existing cableway, which straddles the Dursey Sound, connecting the easternmost tip of Dursey Island with the townland of Ballaghboy, on the western end of the Beara Peninsula in west County Cork (Appendix B Figure 1 Location Plan of this Outline IRP).

Overview of the activities on site:

The development comprises the following major elements:

- Erection of a two-car desynchronised reversible ropeway cableway ('cableway' hereafter)[1] with a capacity of 200-300 passengers per hour in each direction;
- Erection of two supporting line structures ('pylons' hereafter) - one on the mainland and one on the island;
- Construction of a mainland-side drive station ('mainland station' hereafter) including all necessary operating machinery, facilities for operating staff, and a platform for embarking/disembarking;
- Construction of an island-side return station ('island station' hereafter) including all necessary operating machinery, platform for embarking/disembarking, a sheltered waiting area and welfare facilities;
- Construction of a mainland-side interpretive exhibition centre with a gift shop ('Visitor Centre' hereafter);
- Construction of a mainland-side café with seating for 40 indoors, an additional 44 seats on an outdoor terrace/balcony overlooking the Dursey Sound, and welfare facilities;
- Construction of a mainland-side visitor car park with approx. 100 no. parking spaces and 1 no. bus bay;
- Retention of the existing residents' car park on Dursey Island;
- Upgrades of associated utilities infrastructure (including mainland water supply and telecommunications connectivity and mainland and island wastewater treatment systems);
- Completion of road improvement works (construction of 10 no. passing bays, 1 no. visibility splay at Bealbarnish gap (hereafter referred to as '11 no. passing bays') and completion of a number of local improvements to improve visibility) on an 8km stretch of the mainland-side approach road R572 (between the R572-R575 junction at Bealbarnish Gap and the mainland side of the cable car site);
- Demolition/removal of some elements of the existing cableway infrastructure (ropeway, island-side pylon), mainland-side visitor car park and island and mainland station buildings;
- Erection of interpretive/informative signage at strategic locations;
- Erection of 4 no. Variable Message Signs (VMS) at four locations along the approach roads to the site:
  1. Bealbarnish Gap;
  2. R572 at Castletownbere;
  3. R575 at Eyeries Cross; and
  4. N71 at Glengarriff;

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[1] The term 'Cable Car' refers to the carrier cabin which conveys passengers to and from the island via the cableway.

- Retention of the cable car, mainland pylon and a section of the mainland-side hauling machinery of the existing cableway in order to facilitate ongoing appreciation of their industrial architectural and cultural heritage value;
- Soft and hard landscaping; and
- All other ancillary works.

Description of the proposed development and surrounding area:

The proposed development is located in a rural area of the Beara Peninsula in west County Cork, c. 145km from Cork City. The Dursey Sound is a rocky tidal channel dividing the Dursey Island from the peninsula, which is particularly dangerous to traverse by boats. As a result, a cableway is the only viable option of providing connection to, and from the island. The proposed development comprises the decommissioning of the existing Dursey Island cableway and the construction of a new cableway and associated structures, including a visitor interpretive centre and café on the mainland. Cork County Council owns and operated the cableway. Some elements of the existing cableway infrastructure will be retained onsite to promote their industrial architecture and cultural values. The proposed cableway will run parallel to the existing alignment offset by approximately 14m to the north. The end-to-end length of the proposed cableway will be approximately 375m which is slightly shorter than the length of the existing cableway. The majority of the proposed works will be carried out on lands currently owned by Cork County Council, with the exception of the island station, island pylon and improvement works to the R572 approach road which will necessitate the compulsory purchase order (CPO) of private land in these areas.

Potential Incidents:

Potential incidents requiring emergency response procedures include:

- Fuel and oil spills;
- Road traffic accidents involving chemical or biological spills;
- Earth slippages;
- Coastal flooding;
- Fires;
- Activities resulting in noise and vibration, air pollution, hazardous substances or impacts on water;
- Waste management; and,
- Discharge of effluent.

The Contractor will update the list of potential incidents based on their proposed construction methods and programme for the Dursey Island Cable Car and Visitor Centre and include, as a minimum, the following:

- The measures to be taken to avoid or reduce the risk potential;
- Procedures to be put in place to deal with the risk;
- Person responsible for dealing with incidents;
- Procedures for alerting key staff;
- Standby/rota systems;
- Clearly defined roles and responsibilities;
- Names of staff and contractors trained in incident response;
- The types and location of emergency response equipment available and appropriate personal protective equipment to be worn;
- A system of response coordination;
- Off-site support; and,
- Particular emergency service or persons to be notified in case of incident.

Date and version of the plan: August 2019 V1	**Name or position of person responsible for compiling/approving the plan:**

	Christine Murphy and Barry Corrigan Roughan & O'Donovan
Review Date:	**Date of next exercise:**

Objectives of the IRP:

To ensure works are carried out in such a way as to avoid injury, health hazards or pollution incidents, however, should any such incident occur, procedures and measures will be implemented to contain, limit and mitigate the effects as far as reasonably practicable.

List of external organisations consulted in the preparation of the IRP:

TBC by Contractor when preparing IRP

Distribution of the IRP

Recipient	No. of copies	Version

6.0 EXTERNAL CONTACTS

External Contacts

Contact	Office Hours	Out of Hours
Castletownbere Fire Service	(027) 70976	999 / 112
Gardaí: Emergency	999 / 112	999 / 112
Gardaí: Castletownbere Garda Station	(027) 70002	(027) 70002
St. Joseph's Community Hospital, Derrymihin West	(027) 70004	(027) 70004
EPA Regional Inspectorate Cork	(021) 487 5545	-
Cork County Council Emergency Planning Department	(021) 480 0048	(021) 480 0048
ESB	1850 372 757	1850 372 999
Bord Gáis	1850 200 694 / 1850 20 50 50	1850 20 50 50
Waste Management Contractor	TBC	
Specialist Advice	TBC	
Specialist Clean up Contractor	TBC	
Cork County Council	(021) 427 6891	(021) 480 0048
National Parks & Wildlife Service		To be agreed with NPWS

7.0 INTERNAL (CONTRACTORS) CONTACTS

Internal Contacts		
Contact	**Office Hours**	**Out of Hours**
Names and positions of staff authorised/trained to activate and coordinate the IRP	TBC	
Other Staff	TBC	
Managing Director	TBC	
Site Manager	TBC	
Health & Safety Manager	TBC	
Site Environmental Manager	TBC	

8.0 CHEMICAL PRODUCT AND WASTE INVENTORY

Inventory of Chemical Products and Wastes						
Trade Name / Substance	**Solid / liquid / gas or powder**	**UN number**	**Maximum amount**	**Location marked on site plan**	**Type of containment**	**Relevant health and environmental problems**

9.0 POLLUTION PREVENTION EQUIPMENT INVENTORY

Inventory of Pollution Prevention Equipment (on- and off-site resources)			

10.0 DRAWINGS

A drawing showing the location of the proposed development is included in **Appendix B** of this Outline IRP.

Site Plan
Figure 1 - Location Plan

11.0 RESPONSE PLANNING

11.1 Incident Response Plan

The Contractor's Environmental Operating Plan (EOP) will include an Incident Response Plan, which will detail the controls to be adopted to manage the risk of pollution incidents and procedures to be followed in the event of any pollution incidents.

11.2 The Incident Response Plan will include the following, as appropriate:

- Reference to the Method Statements and Management Plans for other construction activities, insofar as they are relevant for the purposes of mitigating against health and safety and pollution incidents;
- Procedures to be adopted to contain, limit and mitigate any adverse effects, as far as reasonably practicable, in the event of a health and safety or pollution incident;
- Details of spill clean-up companies appropriate to deal with pollution incidents associated with the materials being used or stored on site.
- Procedures to be followed and appropriate information to be provided in the event of any incident, such as a spillage or release of a potentially hazardous material;
- Procedures for notifying appropriate emergency services, authorities, the Employer's Representative and personnel on the construction site;
- Procedures for notifying relevant statutory bodies, environmental regulatory bodies, local authorities and local water and sewer providers of pollution incidents, where required;
- Maps showing the locations, together with address and contact details, of local emergency services facilities such as police stations, fire authorities, medical facilities and other relevant authorities; and,
- Contact details for the persons responsible on the construction site and within the Contractor's organisation for pollution incident response.

11.3 Monitoring

The Contractor will investigate and provide reports on any health and safety or pollution incidents to the Employer's Representative, including, as appropriate:

- A description of the incident;
- Contributory causes;
- Adverse effects;
- Measures implemented to mitigate adverse effects; and,

- Effectiveness of measures implemented to prevent pollution.

The Contractor will undertake appropriate monitoring of the procedures and measures set out in the management plans for construction activities required to prevent health and safety or pollution incidents to ensure they are being adequately implemented.

The Contractor will monitor the effectiveness of the procedures and measures implemented in the event of an incident and the effectiveness of the response procedures set out in the IRP to identify any areas where improvement is required.

APPENDIX 4.1A - A
Cork County Council Major Emergency Plan

CORK COUNTY COUNCIL
MAJOR EMERGENCY PLAN

Valid From: 18th December 2018

ABRIDGED VERSION

Title:	**Major Emergency Plan**
Version:	**5.0**
Prepared By:	**Major Emergency Management Committee**
Approved By:	**James Fogarty, Divisional Manager**

Record of Issues and Amendments

Version No.	Date	Section Amended	Issued By
1.0	Sept. 2008	Original Issue	DH
2.0	Jan. 2011	All	DH
2.1	July 2012	Appendix 3 – Contact details amended Appendix 22 – EPA MoU added	DH
2.2	Aug. 2013	Appendix 5 – Flood Emergency Response Plan amended Appendix 11 – Port of Cork Emergency Plan amended Appendix 12 – Bantry Bay Port Emergency Plan amended	DH
2.3	Dec. 2013	Appendix 3 – Contact details Appendix 4 – Severe Weather Plan (excluding flooding) Appendix 10 –Cork Airport Plan Appendix 18 – Persons authorised to activate the major emergency plan	DH
3.0	Dec. 2014	Main plan (all sections) Appendix 1 – Mobilisation Procedure Appendix 3 – Contact details Appendix 4 – Severe Weather Plan Appendix 5 – Flood Emergency Response Plan Appendix 9 – Procedure for requesting DF Appendix 16 – Multiple Fatality Guide Appendix 18 – Persons authorised to activate the major emergency plan Appendix 20- Evacuation Guide Appendix 21 – Contact Centre arrangements Appendix 23 – Voluntary Emergency Services Guide	DH
3.1	Sept 2015	Appendix 3 – Contact details Appendix 18 – Persons authorised to activate the MEP	DH
3.2	Dec 2015	Appendix 3 – Contact details Appendix 4 – Severe Weather Plan Appendix 21 – Contact Centre Arrangements	DH
4.0	Dec 2016	Main plan (minor edits) Appendix 1 – Major Emergency Mobilisation procedure Appendix 3 – Contact details Appendix 4 – Severe Weather Plan Appendix 5 – Flood Emergency Response Plan Appendix 9 – Procedure for requesting DF Appendix 18 – Persons authorised to activate the MEP Appendix 24 – Inter-Agency Emergency Plan for Jack Lynch Tunnel added Appendix 25 – Oil & HNS Spill Plan added	DH
5.0	Dec 2018	Appendix 3 – Contact details (Updated) Appendix 4 – Severe Weather Plan (Updated) Appendix 5 – Flood Emergency Response Plan (Updated)	FM

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Foreword

This forth issue of Cork County Council's Major Emergency Plan takes effect from noon on the 22nd December 2016. The plan has been prepared and reviewed in accordance with the *Frameworkfor Major Emergency Management.*

Under the Framework, a network of robust arrangements for the management of major emergencies has been developed and put in place in Local Authorities, An Garda Síochána and the HSE at local, regional and national level. The Framework emphasises a systematic approach to major emergency management and the *Major Emergency Plan* itself is a critical document underpinning our preparedness to deliver a first class response should disaster strike. It is a priority of the Council to be at all times prepared to measure up to best international standards in major emergency management.

While no contingency plan can cater for every possible scenario the procedures set out in the *Major Emergency Plan* will ensure that staff at all levels are aware of their responsibilities and that appropriate actions are initiated in a timely and effective manner to deal with a major emergency through all its phases.

The *Major Emergency Plan,* and indeed the many more specific plans that support it, will be subject to regular review and appraisal under the terms of the Framework. In particular, the lessons to be learned from emergencies that occur in County Cork and elsewhere will be captured and used to continually improve and strengthen our arrangements.

Tim Lucey
Chief Executive

Activation Procedure

THIS SECTION HAS BEEN
OMITTED FROM THIS VERSION FOR
CONFIDENTIAL
REASONS

CORK COUNTY COUNCIL
MAJOR EMERGENCY PLAN

Cover Sheet for Munster Regional Communications Centre

On activation of the Cork County Councils Major Emergency Plan by an Authorised Officer, MRCC will:

1) **Mobilise the Fire Brigade according to Control Room Procedures and inform RSFO.**
2) **Notify Principal Response Agencies (PRA's)**

Where MRCC receive notification of a Major Emergency from another PRA, MRCC as part of pre-set actions, confirm to the other 2 PRA's involved that the Cork County Councils Major Emergency Plan has been activated.

3) **Notify RSFO (N&E), Cork County Fire Service**
4) **Notify RSFO (S&W), Cork County Fire Service**
5) **Notify RSFO (Serious Incidents) Cork County Fire Service**
6) **Notify Chief Fire Officer, Cork County Fire Service**
7) **Notify Chief Executive or Divisional Manager by phone.**
8) **Notify All of Cork County Council's Major Emergency Staff via Saadian Text Alert**

Section 1 - Introduction to Plan

1.1 Cork County Council

Cork County Council is the local authority responsible for local government in County Cork.

1.2 Purpose

The purpose of this plan is to put in place arrangements that will enable the three Principal Response Agencies (PRA's) for the area, An Garda Síochána, the Health Service Executive and the Local Authority to co-ordinate their efforts whenever a major emergency occurs.

1.3 The Objectives of the Major Emergency Plan

The objective of this Major Emergency Plan is to protect life and property, to minimise disruption to the community and to provide immediate support for those affected. To achieve this objective the Plan sets out the basis for a co-ordinated response to a major emergency and the different roles and functions to be performed by the various agencies. The fact that procedures have been specified in the Plan should not restrict the use of initiative or common-sense by individual officers in the light of prevailing circumstances in a particular emergency. The priorities of Cork County Councils response in an emergency are;

- Protection and care of the public at times of vulnerability.
- Clear leadership in times of crisis.
- Early and appropriate response.
- Efficient, coordinated operations.
- Realistic and rational approach, capable of being delivered.
- Transparent systems, with accountability.
- Harnessing community spirit.
- The ethos of self protection.
- Maintenance of essential services.
- Safe working.

1.4 The scope of the Major Emergency Plan and the situations / conditions in which the Plan will be activated.

This Major Emergency Plan provides for a co-ordinated response to major emergencies that may arise, for example, from fires, explosions, gas releases, transportation accidents, spillages of dangerous substances and from severe weather. The types of emergency normally resulting from oil supply crises, electrical power blackouts, industrial disputes etc. are of a different nature and are not catered for in this Plan. It is recognised, however, that such emergencies could result in a situation, such as a major gas explosion, requiring activation of the Major Emergency Plan.

This plan consists of **two** distinct parts;

- the plan proper is intended to provide uniform procedures in relation to those matters which can be standardised nationally e.g. activation of Plan, control of operations, allocation of functions etc.;
- the appendices which are attached to this Plan which contain further specific procedures and protocols relevant to the operation of the Plan;

1.5 The relationship / inter-operability of the Major Emergency Plan with other emergency plans.

An Garda Síochána, the Health Service Executive and Cork County Council are the PRA's charged with managing the response to emergency situations which arise at a local level in Cork County Councils functional area.

In certain circumstances, the local response to a major emergency may be scaled up to a regional level response, requiring the activation of the Plan for Regional Level Co-ordination

The Major Emergency Plan also contains specific sub-plans such as the Severe Weather Plan, Flood Emergency Response Plan, Drinking Water Incident Response Plan and External Emergency Plans for Upper Tier Establishments coming under the Seveso Regulations. *See Appendices 4, 5, 6 & 7.*

1.6 The language / terminology of the Plan

A full set of relevant terms and acronyms are provided in *Appendix 13*, which should be used by **all** agencies.

1.7 The distribution of the Plan

Full Copies of the plan will be distributed in hardcopy or electronic format to all appropriate officers and departments of Cork County Council.

Name / Organisation
Cork County Council • Chief Executive • Divisional Managers • Director of Services • Heads of Function • County Engineer • Senior Engineers • Area Engineers • Media Liaison Officers • Chief Fire Officer • Rostered Senior Fire Officers • Civil Defence Officer's • Local Co-ordination Room • Crisis Management Team Room • Each Fire Station
Other Local Authorities Available via Inter-Agency Emergency Management Office website www.iaemo.ie
An Garda Síochána Available via Inter-Agency Emergency Management Office website www.iaemo.ie
Health Service Executive (South) Available via Inter-Agency Emergency Management Office website www.iaemo.ie
Munster Regional Communications Centre
Department of Housing, Planning, Community & Local Government
Defence Forces Available via Inter-Agency Emergency Management Office website www.iaemo.ie
Airports / Ports Available via Inter-Agency Emergency Management Office website www.iaemo.ie

1.8 The status of the Plan and when and how it will be reviewed / updated

This Plan will be reviewed annually or as required.

1.9 Public access to the Plan

An abridged version of the Major Emergency Plan is available to the public on Cork County Councils website at www.corkcoco.ie

Section 2 - Cork County Council and its Functional Area

2.1 Functional area of Cork County Council

The functional area of Cork County Council is the administrative area of Cork County. The county is served by 55 councillors, representing eight Municipal Districts and is the largest elected assembly outside of Dublin. The main administrative office is located at County Hall, Carrigrohane Road, Cork. There are three divisional offices in Mallow, Clonakilty & Skibbereen, 8 Municipal District Offices, 22 Area Offices and 21 Fire Stations in County Cork. Other premises include Local Enterprise Offices, Environmental Laboratories, Water & Wastewater Treatment Plants, Pumping Stations, Libraries, Road Design Offices and the Energy Office. Cork County Council employs over 2,000 people with an annual revenue budget of approximately €300 million.

Cork County Council delivers its functions and services through the structure outlined in Section 4.1.

2.2 Boundaries and characteristics of the area.

County Cork covers an area of 7,459 square kilometres (2,880 square miles), which is 11% of the Irish State and makes Cork, Ireland's largest county. In the 2016 census, the population of County Cork was 416,574 which represents a 4.2% increase over the 2011 Census. County Cork has a coastline of 1,100 km and has seven inhabited islands. The County has a number of major rivers including the Munster Blackwater, River Lee and River Bandon. There are a number of mountain ranges in the County including the Caha, Slieve Mish, Derrynasaggart, Boggeragh and Knockmealdown mountains. There is a strong agricultural base in the county with much of north Cork lying within the "Golden Vale" which is a fertile dairy-farming region. Cork Harbour is one of the largest natural harbours in the world and the Port of Cork is a busy commercial port with seasonal ferry crossings to France. Cork International Airport has direct flights to the UK and Europe and connecting flights to other International destinations. County Cork has a strong industrial base, particularly in the Cork Harbour area where a high number of chemical, pharmaceutical and petrochemical companies are based primarily in Ringaskiddy, Little Island, Carrigtwohill and Whitegate. (*See* *Cork County Council - Risk Assessment in Major Emergency Management* *for a more detailed assessment of the characteristics of the area).*

2.3 Partner Principal Response Agencies

Other agencies responsible for Emergency Services in this area are:-

- Health Service Executive (South): comprising of counties Kerry, Cork, Waterford, Wexford, Carlow, Kilkenny and South Tipperary.
- An Garda Síochána: Cork City Division, Cork North Division & Cork West Division.
- Cork City Council (A City/County Agreement is in place for Fire Service cover in the Cork City environs area of the County).

Assistance may be required by other agencies such as the Irish Coastguard, Defence Forces, Civil Defence, Irish Red Cross, Mountain Rescue etc.

2.4 Regional Preparedness

Under certain specific circumstances regional level major emergencies may be declared and the Plan for Regional Level Co-ordination activated. This will provide for mutual aid, support and co-ordination facilities to be activated in a region, the boundaries of which are determined to suit the exigencies of the particular emergency. There are eight regions in total that have been created for Major Emergency purposes. The regions are shown in the Map below.

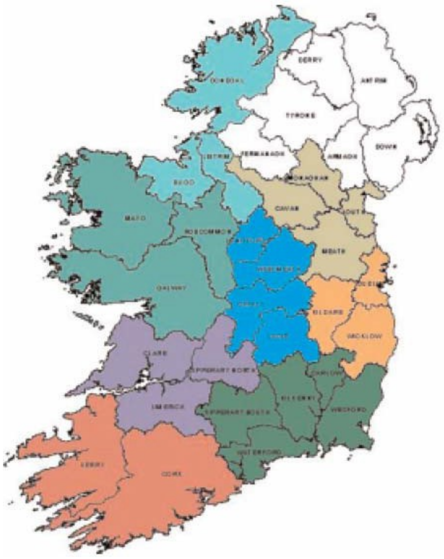

Figure 2.1

Map of the Major Emergency Management regions

Cork County Council is part of the Major Emergency Management South Region. The Principal Response Agencies for the region include:

- Cork County Council
- Cork City Council
- Kerry County Council
- H.S.E. (South)
- An Garda Síochána (Cork City Division, Cork North Division, Cork West Division & the Kerry Division)

An inter-agency Regional Steering Group has been established for the South Region. This group is representative of the senior management from each of the Principal Response Agencies (PRA's) with the chair of the group rotating every two years between agencies.

A Regional Working Group on Major Emergency Management has also been established to support the work of the Steering Group. The membership of the Regional Working Group is drawn from key operational personnel in the Principal Response Agencies and also representatives from the Defence Forces, Irish Coastguard and the Port of Cork. The Chairperson of the group also rotates every two years between agencies.

Section 3 - Risk Assessment for the Area

3.1 History of area in terms of emergency events

To prepare effectively to deal with potential emergencies it is necessary to have regard to specific risks faced by a community. Risk Assessment is a process by which the hazards facing a particular community are identified and assessed in terms of the risk which they pose. (*See Cork County Council - Risk Assessment in Major Emergency Management for detailed Risk Assessment)*

A number of Major Emergencies and large scale serious incidents have occurred within County Cork or off the Cork coast over the years including:

- Glounthaune Bus Crash, 1978
- Whiddy Island Disaster, 1979
- Buttevant Rail Crash, 1980
- Air India, 1985 (off south-west coast)
- Hickson's Pharmachem Fire, Ringaskiddy, 1993
- Manx2 Air-crash, Cork Airport, 2011

3.2 The general and specific risks that may be faced locally and regionally

Cork County Council has undertaken a Risk Assessment in accordance with the Framework for Major Emergency Management and A Guide to Risk Assessment in Major Emergency Management. A Regional Risk Assessment has also been undertaken by the Principal Response Agencies in the South Region and approved by the Regional Steering Group. (*See MEM Risk Assessment – Region South for detailed information)*

3.3 Scenarios

The following have been selected as exemplars on which preparedness for Major Emergencies in Cork County Council has been based.

- Flooding & Severe Weather
- Aircraft Collision / Loss
- Water Contamination / pollution incident
- Fire / Explosion / Toxic Cloud release at industrial site
- Fire/ Major Crowd Safety incident

- Major Road / Rail Incident
- Marine Emergency in Port (passenger ferry)
- Hazardous materials incident (Transportation)
- Loss of critical infrastructure
- Pandemic Influenza outbreak

3.4 Site / event specific emergency plans associated with the Major Emergency Plan

Associated with this PLAN are site/event specific emergency plans for Cork County Council and other agencies/sites. *(See Appendices 4, 5, 6, 7, 10, 11 &12)*

- Severe Weather Plan (excluding flooding)
- Flood Emergency Response Plan
- Drinking Water Incident Response Plan
- External Emergency Plans for Upper Tier Seveso Sites
- Inter-agency Emergency Plan for Cork Airport
- Inter-Agency Emergency Plan for the jack Lynch Tunnel
- Port of Cork Emergency Plan
- Bantry Bay Port Emergency Plan

Section 4 - Resources for Emergency Response

4.1 Structure / resources / services of the Council, which may be used for emergency response

Cork County Council delivers its functions and services through the following Divisions and Directorates.

- Roads & Transportation
- Municipal District Operations & Rural Development
- Housing
- Environment & Emergency Services
- Planning & Development
- Economic Development, Enterprise & Tourism
- County Engineer & Water Services
- Corporate Services
- Finance
- Personnel
- ICT

All or any part of the above directorates may be called upon in the event of a major emergency event occurring in County Cork.

Fire Service

The Fire Service will usually form Cork County Councils primary response to a Major Emergency and is structured as follows:

Headquarters:-

- Ballincollig

4 Divisional offices:–

- Midleton, Mallow, Carrigaline and Bantry

21 Retained Fire Stations in four divisions:-

- South – Ballincollig, Bandon, Carrigaline, Crosshaven, Kinsale, Macroom
- North - Charleville, Fermoy, Kanturk, Mallow, Millstreet, Mitchelstown.
- West – Bantry, Castletownbere, Clonakilty, Dunmanway, Schull, Skibbereen
- East – Cobh, Midleton & Youghal

Personnel (Full-Time):-

The Fire and Building Control Department of Cork County Council is comprised of 261 staff as follows:

- 31 Senior Fire Officers each holding a professional qualification
- 11 Administrative Staff
- 21 Station Officers
- 21 Sub-Station Officers
- 174 Fire-fighters
- 3 Fitter Mechanics/Technician Staff

Vehicle Fleet

37 No. Water tenders (Class B Appliances), 1 No. Hydraulic Platform, 3 No. Water Carriers, 3 No. Emergency Tenders, 4 No. 4X4 vehicles,3 No. Mobile Workshops, 3 No. General Purpose Vans.

Rostered Senior Fire Officers

There are three Rostered Senior Fire Officers on-call at any one time and these officers will be available to respond to a Major Emergency including:

- Rostered Officer (North & East)
- Rostered Officer (South & West)
- Serious Incidents Rostered Officer

4.2 Special staffing arrangements during a Major Emergency

Cork County Council will call-in off-duty staff on a voluntary basis to assist the organisation in the response to a Major Emergency. In addition, the Civil Defence under the Authority of Cork County Council can be mobilised by the Civil Defence Officer for the area. However, the Civil Defence response is dependent on the availability of volunteers, *see section 4.4.1.*

4.3 Other organisations / agencies that may be mobilised to assist in the response to a Major Emergency

There are a number of organisations and agencies which may be called upon to assist the PRA's in responding to major emergencies in addition to specialist national and local organisations. These organisations are as follows;

- Defence Force

- Civil Defence
- Irish Coast Guard
- The Irish Red Cross
- Voluntary Emergency Services such as Mountain Rescue groups, River Rescue, SARDA (Search and Rescue Dog Association), I.C.R.O. (Irish Cave Rescue Organization), Order of Malta.
- Community Volunteers
- Utility companies (ESB, Bord Gáis, Bus Éireann etc)
- Communications providers (Eircom, Vodafone, O2, Three etc)
- Private contractors

(See Appendix 8 – Regional Contact Details & Appendix 23- – Voluntary Emergency Services Guide)

4.3.1 Civil Defence

There are three branches of Civil Defence within Cork County's region. These are based in Mallow, Kinsale & Skibbereen. In the event of a Major Emergency, Civil Defence units will report to their respective headquarters and be at the disposal of the Local Authority Controller of Operations. Civil Defence ambulance units based close to Cork City will report to Ambulance Control, Kinsale Business Park, Kinsale Road, if requested.

Civil Defence Skills\Capabilities

The skills\capabilities available within Civil defence include the following:

- First aid – ambulance based
- Search and rescue – land based
- Search and recovery – water based
- Radiation monitoring
- Radio communications
- Auxiliary Fire Service
- Portable fire pump skills
- Welfare provision

See Appendix 23- – Voluntary Emergency Services Guide

4.3.2 The Defence Forces

The Defence Forces can provide a significant support role in a major emergency response. However, there are constraints and limitations, and their involvement has to be pre-planned. It should not be assumed that local military units have personnel available, with either the skill set or equipment to undertake specialist tasks. Provision of Defence Forces capabilities is dependent on the exigencies of the service and within available resources at the time.

It is recognised that assistance requested from the Defence Forces should be either in Aid to the Civil Power (An Garda Síochána) or in Aid to the Civil Authority (Local Authority or Health Service Executive). The major distinguishing feature between the two types of Aid is that the Defence Forces response to requests for Aid to the Civil Power is primarily an armed response while Defence Forces response to requests for Aid to the Civil Authority will be unarmed.

4.3.3 The Irish Red Cross

The Irish Red Cross is established and regulated under the Red Cross Acts, 1938-54. These statutes define a role for the Irish Red Cross as an auxiliary to the state authorities in time of emergency and also provide a specific mandate to assist the medical services of the Irish Defence Forces in time of armed conflict. The main relationship with the principal response agencies in major emergency response is as an auxiliary resource to the ambulance services. Subsidiary search and rescue and in-shore rescue units of the Irish Red Cross support An Garda Síochána and the Irish Coast Guard.

4.3.4 Voluntary Emergency Services Sector

See Appendix 23- – Voluntary Emergency Services Guide)

4.3.5 The community affected

In emergency situations, such as flooding, land-slides, bog and forest fires, a sense of solidarity and community prompts people to become involved.

Individuals acting in this way are termed "community volunteers" in major emergency management and they can provide a valuable resource to the Principal Response Agencies, as well as to casualties and those needing assistance. It is recognised that communities that are empowered to be part of the response to a disaster, rather than allowing themselves to be simply victims of it, are more likely to recover and to restore normality quickly, with fewer long-term consequences.

The activities of the “community volunteer” may fall into two categories:

- those which are instinctive and unplanned in the immediate aftermath of an emergency occurring; and
- those which are part of a planned response to a situation (such as a search for missing persons).

In the first case, the involvement of community volunteers could give rise to conflict with the designation of cordons as part of site management arrangements. It is important that at an early stage the On-Site Co-ordinator, in association with the other Controllers, should determine if on-going assistance is required from community volunteers, so that An Garda Síochána cordoning arrangements can take account of this.

Where the On-Site Co-ordinator determines that community volunteers should be integrated into the response, it is recommended that the service tasking them, or confirming them in tasks on which they are engaged, should request volunteers to form teams of three, four or five persons, depending on the tasks, with one of their number as team leader. Where available, orange armbands emblazoned with the word ‘Volunteer’ or suitable abbreviation, e.g. ’VOL’, will be issued by Civil Defence with whom they will be offered a temporary volunteer status.

4.3.6 Utilities

Utilities are frequently involved in the response to emergencies, usually to assist the principal response agencies in making situations safe. They may also be directly involved in restoring their own services, for example, electricity supply in the aftermath of a storm. It is important that there is close co-ordination between the principal response agencies and utilities involved in or affected by an emergency. Utilities operate under their own legislative and regulatory frameworks but, during the response to an emergency, they need to liaise with the On-Site Co-ordinator. It is also recommended that representatives of individual utilities on-site should be invited to provide a representative for the On-Site Co-ordination Group. It is recommended that individual utilities be invited to attend and participate in relevant work of Local Co-ordination Groups. *(See Appendix 8 – Regional Contact Details)*

4.3.7 Private Sector

Private sector organisations may be involved in a major emergency situation in two ways. They may be involved through, for example, ownership of the site where the emergency has occurred or through ownership of some element involved in the emergency e.g. an aircraft, bus, factory, etc. They may also be called on to assist in the response to a major emergency by providing specialist services and equipment, which would not normally be held or available within the Principal Response Agencies.

4.4 Mutual-aid

In the event that resources within Cork County Council are not sufficient to bring a situation under control, or the duration of an incident is extended such that additional resources are required, then support may be obtained from neighbouring counties. Local Authorities will support each other on a mutual aid basis. Support is most likely to be requested from;

- Cork City Council
- Kerry County Council
- Limerick County Council
- Tipperary County Council
- Waterford County Council

4.5 Regional level co-ordinated response

Cork County Council is one of three Local Authorities in the South Region, *see section 2.5*. In certain circumstances, the local response to a major emergency may be scaled up to a regional level emergency. This may occur where the nature of an emergency is such that:

- the resources available in the local area where the incident occurs do not appear to be sufficient to bring the situation under control in an expeditious and efficient manner; or,
- the consequences of the emergency are likely to impact significantly outside of the local area; or,
- the incident(s) is spread over the area of more than one Local Authority or Division of An Garda Síochána; or,

- the incident occurs at or close to a boundary of several of the Principal Response Agencies.

The Chair of the Local Co-ordination Group may declare that a regional level major emergency exists and activate the Plan for Regional Level Co-ordination. The key provision for ensuring co-ordination of the extended response is the activation of a Regional Co-ordination Group. The primary function of the Regional Co-ordination Group is to maintain co-ordination of the principal response agencies involved from the extended "response region". The boundaries of the actual "region" for response purposes should be determined by the lead agency, which has declared the regional level emergency, in light of the circumstances prevailing, or likely to develop. The lead agency which has declared the regional level emergency will convene and chair the Regional Co-ordination Group.

Note: The regions for response purposes need not necessarily coincide with the designated regions for preparedness.

4.6 National / International assistance

In the event that the scale of the emergency becomes too large, complex or long in duration a request may be made to seek assistance from neighbouring or other regions of the country, or from outside the state. This decision should be made by the lead agency in consultation with the other Principal Response Agencies at the Regional Co-ordination Centre.

The Regional Co-ordination Group shall identify and dimension the level/type of assistance likely to be required and its duration. It shall also seek to identify the possible options for sourcing such assistance, be that from neighbouring regions, elsewhere in the state, the United Kingdom or from other EU member states.

The Regional Co-ordination Group may also request assistance from Government. National resources will be available in the event of a major emergency at local or regional level. Requests for assistance should be developed at local or regional co-ordination level and directed by the lead agency to the lead Government Department.

The European Union has established a Community Mechanism to facilitate the provision of assistance between the member states in the event of major emergencies. Requests for such assistance should be made by the chair of the Local or Regional Co-ordination Group to the National Liaison Officer at the Department of Housing, Planning Community & Local Government.

Section 5 - Preparedness for Major Emergency Response

5.1 Assignment of responsibility for Major Emergency Management

The Chief Executive is responsible for Cork County Councils Major Emergency Management arrangements and preparedness, as well as for the effectiveness of the agency's response to any major emergency which occurs in its functional area.

5.2 Documentation of a Major Emergency Management Programme

The responsibility for overseeing the implementation of the Major Emergency Management Programme within Cork County Council is assigned to the Divisional Manager (West), supported by the Major Emergency Management Committee including sub-groups and support teams across the whole organisation.

5.3 Key roles identified in the Major Emergency Plan

Cork County Council has nominated competent individuals and alternates to the following key roles.

- Controller of Operations
- On-Site Co-ordinator
- Chair of Crisis Management Team
- Chair of Local Co-ordination Group
- Information Management Officers / Action Management Officers
- Media Liaison Officers

See Appendix 3(i) for list of nominations and contact details

5.4 Support teams for key roles

Support teams will be mobilised and tasked by the Crisis Management Team to support and assist individuals in key roles in the response to a Major Emergency.

5.5 Staff development programme

The provisions of the Framework and the tasks arising from the new major emergency management arrangements involve a significant level of development activity, both within Cork County Council and jointly with our regional partners.

In parallel with risk assessment and mitigation processes and the preparation of the Major Emergency Plan, Cork County Council has initiated an internal programme to develop its level of preparedness, so that in the event of a major emergency it will be in a position to respond in an efficient and effective manner and discharge the assigned functions in accordance with the Framework.

5.6 Training programme

Training is a key element in the development of preparedness for Cork County Council, to ensure the provision of an effective, co-ordinated response to major emergencies when required. There are many levels of training, ranging from general awareness of the major emergency management arrangements to equipping people with knowledge and skills to perform key roles.

The training programme encompasses the following areas:

- Information Management
- On-Site Co-ordinator / Controller of Operations
- Crisis Management Team
- Media skills
- Inter-Agency Training

5.7 Internal exercise programme

Internal exercises and training is used to raise awareness, educate individuals on their roles and the roles of others and promote co-ordination and co-operation, as well as validating plans, systems and procedures.

5.8 Joint / inter-agency training and exercise programmes

Joint inter-agency training and exercises are provided at a regional level, co-ordinated by the Regional Working Group. The aims of the training and exercising programme are to improve awareness and educate all involved in the roles and responsibilities of Principal Response Agencies in the event of a major emergency.

5.9 The allocation of specific resources including a budget for preparedness

Cork County Council provides a budget for major emergency preparedness, which reflects the expenditure required to meet the costs of implementing Cork County

Councils internal preparedness, as well as Cork County Councils contribution to regional level inter-agency preparedness.

5.10 Procurement and use of resources (including engaging third parties) to assist in response to major emergencies

The Crisis Management will sanction the use of emergency funds to assist in the response to a Major Emergency.

5.11 Annual appraisal of preparedness

Cork County Council will carry out and document an annual internal appraisal of its preparedness for major emergency response. The appraisal shall be undertaken in accordance with *A Guide to undertaking an Appraisal* and shall be sent for external appraisal to the Regional Steering Group and the Department of Housing, Planning, Community & Local Government.

Section 6 - The Generic Command, Control and Co-ordination Systems

6.1 Command arrangements

Cork County Council shall exercise command over its own services in accordance with its normal command structure. Control of Cork County Councils services at the site of the emergency shall be exercised by the Controller of Operations. *See also Section 6.2.2 for control of other services.*

6.2 Control arrangements

Cork County Council shall appoint a Controller of Operations at the site (or at each site) of the emergency. The officer-in-charge of the initial response of each Principal Emergency Service shall be the agency's Controller of Operations until relieved through the agency's pre-determined process.

In certain situations, e.g. where an emergency affects an extensive area or occurs near the borders of Divisions of An Garda Síochána or areas of the Health Service Executive or of the Local Authorities, there may be response from multiple units of the Principal Response Agencies. There should be only one Controller of Operations for each of the three Principal Response Agencies and it will be necessary to determine from which unit of the Principal Response Agencies the Controller of Operations should come.

In the case of Local Authorities, which are statutorily empowered in respect of their functional areas, procedures for resolving such issues may already be set out in what are referred to as Section 85 Agreements (Local Government Act 2001). Where they are not so covered and the issue cannot be resolved quickly in discussion between the responding officers of the different units of those services, the Local Authority Controller of Operations should be the designated person from the Local Authority whose rostered senior fire officer was first to attend the incident.

6.2.1 Control of all services / sections of the Council which respond

The Controller of Operations is empowered to make all decisions relating to his/her agency's functions, but must take account of decisions of the On-Site Co-ordination Group in so doing.

6.2.1.1 Controller of Operations

The role of the Controller of Operations is set out below:

- To make such decisions as are appropriate to the role of controlling the activities of his/her agency's services at the site (Controlling in this context may mean setting priority objectives for individual services; command of each service should remain with the officers of that service.);
- To meet with the other two controllers and determine the lead agency;
- To undertake the role of On-Site Co-ordinator, where the service s/he represents is identified as the lead agency;
- To participate fully in the site co-ordination activity, including the establishment of a Site Management Plan;
- Where another service is the lead agency, to ensure that his/her agency's operations are co-ordinated with the other principal response agencies, including ensuring secure communications with all agencies responding to the major emergency at the site;
- To decide and request the attendance of such services as s/he determines are needed;
- To exercise control over such services as s/he has requested to attend;
- To operate a Holding Area to which personnel from his/her agency will report on arrival at the site of the major emergency and from which they will be deployed;
- To requisition any equipment s/he deems necessary to deal with the incident;
- To seek such advice as s/he requires;
- To maintain a log of his/her agency's activity at the incident site and decisions made;
- To contribute to and ensure information management systems operate effectively;
- To liaise with his/her Principal Response Agency's Crisis Management Team on the handling of the major emergency.

6.2.1.2 On-Site Co-ordinator

The On-Site Co-ordinator is mandated to make decisions, as set out below. Decisions should be generally be arrived at by the consensus of the On-Site Co-ordinating Group. Where consensus is not possible, the On-Site Co-ordinator should only make decisions after hearing and considering the views of the other two Controllers. Where circumstances permit, the On-Site Co-ordinator should refer decision reached without consensus to the Local Co-ordination Group.

The mandate of the On-Site Co-ordinator is set out below:

- To assume the role of On-Site Co-ordinator when the three Controllers determine the lead agency. Once appointed s/he should note the time and that the determination was made in the presence of the two other controllers on site;
- To inform all parties involved in the response that s/he has assumed the role of On-Site Co-ordinator;
- To determine which facility should be used as the On-Site Co-ordination Centre. Depending on the circumstance, this may be
    - a vehicle, or
    - a tent or other temporary structure, or
    - an appropriate space/building adjacent to the site, which can be used for co-ordination purposes;
- To ensure involvement of the three Principal Response Agencies and the Principal Emergency Services (and others, as appropriate) in the On-Site Co-ordination Group;
- To ensure that mandated co-ordination decisions are made promptly and communicated to all involved;
- To ensure that a Scene Management Plan is made, disseminated to all services and applied;
- To determine if and what public information messages are to be developed and issued;
- To ensure that media briefings are co-ordinated;
- To ensure that pre-arranged communications (technical) links are put in place and operating;

- To ensure that the information management system is operated, including the capture of data for record-purposes at regular intervals;
- To develop an auditable list of Actions (an Action Plan) and appoint an Action Management Officer where necessary;
- To ensure that the ownership of the lead agency role is reviewed, and modified as appropriate;
- To ensure that inter-service communication systems have been established and that communications from site to the Local Co-ordination Centre have been established and are functioning;
- To exercise an over-viewing role of all arrangements to mobilise additional resources to the site of the major emergency, and to track the status of mobilisation requests, and deployment of additional resources;
- To ensure that, where the resources of an individual Principal Response Agency do not appear to be sufficient to bring a situation under control, or the duration of an incident is extended, support is obtained via mutual aid arrangements with neighbouring principal response agencies;
- To determine, at an early stage, if ongoing assistance is required from community volunteers, so that An Garda Síochána cordoning arrangements can take account of this;
- To co-ordinate external assistance into the overall response action plan;
- To ensure that, where appropriate, pastoral services are mobilised to the site and facilitated by the principal response agencies in their work with casualties;
- To work with the Health Service Executive Controller to establish the likely nature, dimensions, priorities and optimum location for delivering any psycho-social support that will be required, and how this is to be delivered and integrated with the overall response effort;
- To decide to stand down the major emergency status of the incident at the site, in consultation with the Controllers of Operations and the Local Co-ordination Group;
- To ensure that all aspects of the management of the incident are dealt with before the response is stood down; and,
- To ensure that a report on the co-ordination function is prepared in respect of the major emergency after it is closed down, and circulated (first as a draft) to the other services that attended.

6.2.1.3 Local Co-ordination Group

Once the Local Co-ordination Group has been activated the mandate is as follows:

- To establish high level objectives for the situation and give strategic direction to the response;
- To determine and disseminate the overall architecture of response co-ordination;
- To anticipate issues arising;
- To provide support for the on-site response;
- To resolve issues arising from the site;
- To ensure that the information management system is operated, including the capture of data for record-purposes at regular intervals;
- To take over the task of co-ordinating the provision of information for the public as soon as it meets, and use all available channels to make concise and accurate information available;
- To decide and to take action to manage public perceptions of the risks involved, as well as managing the risks during emergencies that threaten the public;
- To co-ordinate and manage all matters relating to the media, other than on-site;
- To establish and maintain links with the Regional Co-ordination Centre (if involved);
- To establish and maintain links with the lead Government Department/National Emergency Co-ordination Centre;
- To ensure co-ordination of the response activity, other than the on-site element;
- To decide on resource and financial provision; and
- To take whatever steps are necessary to start to plan for recovery.

6.2.1.4 Crisis Management Team

The Crisis Management Team is a strategic level management group within each Principal Response Agency which is assembled during a major emergency is to:

- Manage, control and co-ordinate the agency's overall response to the situation;
- Provide support to the agency's Controller of Operations on-site and mobilise resources from within the agency or externally as required;
- Liaise with relevant Government Departments on strategic issues; and
- Ensure appropriate participation of the agency in the inter-agency co-ordination structures.

The members of Cork County Councils Crisis Management Team, who are detailed in Appendix 3, will convene at the Crisis Management Centre in County Hall when a Major Emergency is declared.

The use of Crisis Management Teams within each of the Principal Response Agencies facilitates the mobilisation of senior staff to deal with the crisis in light of the evolving situation, rather than leaving multiple roles to a small number of individuals who hold key positions. In this way, the objectives of prioritising and managing a protracted crisis can be dealt with effectively, while keeping the day-to-day business running.

The Crisis Management Team provides support to the Local Authority Representative on the Local Co-ordination Group, supports their own Controller of Operations on site and maintains the agency's normal day-to-day services.

6.2.2 Control of external organisations / agencies mobilised to assist the Council

There are a number of organisations and agencies, which may be called on to assist the Principal Response Agencies in responding to major emergencies.

At the site of an emergency, Cork County Council will exercise control over not only its own services but any additional services that Cork County Council mobilises to the site.

6.2.3 Support arrangements for the Control function

An On-site Co-ordination centre will be established at the site of a major emergency, which will be attended by a Controller of Operations from each of the Principal Response Agency's and each agency's support team.

6.3 Co-ordination Arrangements

The co-ordination of the efforts of all services is recognised as a vital element in successful response to major emergencies, so that the combined result is greater than the sum of their individual efforts (*see section 6.2.1 of this document for Co-ordination arrangements).*

6.3.1 Lead agency for co-ordination purposes

One of the three Principal Response Agencies will be designated as the lead agency for any emergency and thereby assume responsibility for leading co-ordination. Therefore, while the responsibility for co-ordination may be shared, in any given situation responsibility for leading cooperation belongs specifically to one of the three Principal Response Agencies. The lead agency has both the responsibility and mandate for the co-ordination function.

The mechanisms for determining and designating the lead agency in any situation are set out below. Two mechanisms, which should be applied in sequence by the three Controllers of Operations at the site, are envisaged to determine the lead agency for any emergency.

1. The first is by pre-nomination. (Details given in the *Appendix 17,* pre-nominated lead agencies for common incident types are presented, and this should be the primary basis for determining the lead agency)

2. The second is a default arrangement, where the categorisations in the table in Appendix 17 do not seem to apply and the lead agency is not obvious. In these situations, which should be rare, the Local Authority will be the “default” lead agency.

6.3.2 On-Site Co-ordination function, including arrangements for support teams

On-site Co-ordination is facilitated by the On-Site Co-ordinator and the On-Site Co-ordination Group. The roles of the On-site Co-ordinator and the On-Site Co-ordination Group have been outlined in *section 6.2.1 of this document.*

6.3.3 Co-ordination function at the Local / Regional Co-ordination Centres

When a major emergency has been declared and the lead agency determined, the relevant officers of the lead agency should implement a Local Co-ordination Group mobilisation procedure. The representative of the lead agency will Chair the Local Co-ordination Group, which will be located in the Local Co-ordination Centre, and will exercise the mandates associated with this position. The Local Co-ordination Group will comprise representatives of the other two Principal Response Agencies, an Information Management Officer, a Media Liaison Officer, an Action Management Officer (where considered appropriate), representatives of other agencies and specialists and support teams as appropriate.

The Chair of the Local Co-ordination Group may declare a regional level emergency and activate the Plan for Regional Level Co-ordination. The key provision in ensuring co-ordination of the extended response is the activation of a "Regional Co-ordination Group". The primary function of the Regional Co-ordination Group is to maintain co-ordination of the Principal Response Agencies involved from the extended “response region”.

Any one of the nominated Local Co-ordination Centres may be used as a Regional Coordination Centre, or a specific Regional Centre may be designated for this purpose. The choice of location will be determined in each situation by the Chair of the Local Co-ordinating Group declaring the regional level emergency and will depend on the location and nature of the emergency and any associated infrastructural damage.

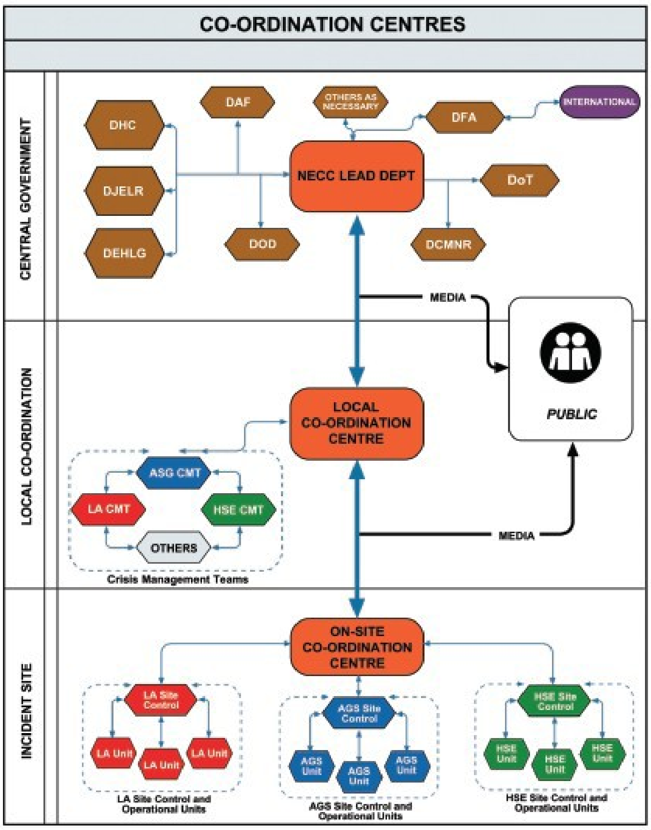

Figure 6.0 Schematic Diagram Illustrating

Command, Control and Co-ordination Levels and Information Flows

6.3.4 Mutual aid and regional level co-ordination

The Controller of Operations for Cork County Council shall ensure that, where the Council's resources do not appear to be sufficient to bring a situation under control, or the duration of an incident is extended, support is obtained via mutual aid arrangements with neighbouring Local Authorities (*See section 4.5 and 4.6 of this document).*

6.3.5 Multi-site or wide area emergencies

Multi-site or wide area emergencies may require the declaration of a regional level emergency and activate the Plan for Regional Level Co-ordination *see section 6.3.3 of this document.*

6.3.6 Links with National Emergency Plans

This Major Emergency Plan will operate will operate as an integral part of any National plans which may be activated in a National Emergency.

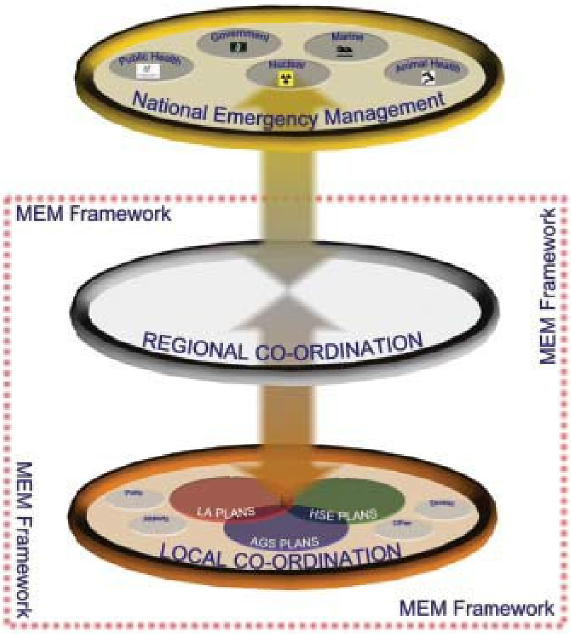

Figure 6.1: Linking Major Emergency Plans with National Plans and Other Plans

6.3.7 Links with National Government

Where assistance from Government is required, such assistance may be requested by the Regional Co-ordination Group. National resources will be available in the event of a major emergency at local or regional level.

Section 7 - The Common Elements of Response

7.0 Sub-sections setting out how the following common elements of the response to any major emergency will be implemented

Section 7.1 - Declaring a Major Emergency

7.1.1 Declaring a Major Emergency
(Refer to the COMMON PAGE Page 1)

A Major Emergency will be declared by an Authorised Officer of whichever Principal Response Agency (PRA) considers that the criteria in the definition of a 'Major Emergency' below have been satisfied.

A message declaring a Major Emergency shall follow the format in the **ACTIVATION SECTION** set out at the beginning of this plan (Pages 1-2).

Only an Authorised Officer of a Principal Response Agency can declare that a Major Emergency exists.

A Major Emergency is any event, usually with little or no warning, causes or threatens death or injury, serious disruption of essential services or damage to property, the environment of infrastructure beyond the normal capabilities of the Principal Emergency Services in the area in which the event occurs, and requires the activation of specific additional procedures and the mobilisation of additional resources to ensure an effective, co-ordinated response.

7.1.2 Activating the Major Emergency Plan

The Major Emergency Plan will immediately be activated when a Major Emergency is declared. The Plan will be activated by whichever of the following agencies first becomes aware of the declaration:-

- Health Service Executive
- Local Authority
- An Garda Síochána

The Major Emergency Plan will also be activated in other specific circumstances as follows:

- On request from a national body acting under the provisions of one of the following National Emergency Plans:
  - National Emergency Plan for Nuclear Accidents,
  - Public Health (Infectious Diseases) Emergency Plan,
  - Animal Health Plan;

- In response to a request from the Irish Coast Guard following a threatened or actual emergency in the Irish Maritime Search and Rescue Region
- In response to a request from a Minister of Government in light of an emergency/crisis situation.

7.1.3 Arrangements for activation of Major Emergency Plan by Fire Service personnel (other than Rostered Senior Fire Officers)

The Fire Service Incident Commander who makes the decision that it is necessary to activate the Major Emergency Plan will alert the appropriate Rostered Senior Officer (N&E or S&W) through the Munster Regional Communications Centre and provide details of the incident using the ETHANE Message format.

E	**EXACT LOCATION OF THE EMERGENCY**
T	**TYPE OF EMERGENCY (TRANSPORT, CHEMICAL, ETC.)**
H	**HAZARDS, PRESENT AND POTENTIAL**
A	**ACCESS/EGRESS ROUTES**
N	**NUMBER AND TYPES OF CASUALTIES**
E	**EMERGENCY SERVICES PRESENT AND REQUIRED**

Note: Any Fire Officer who is for the time being, in charge of an incident is authorised to request the activation of the Major Emergency Plan.

However, it is only the Rostered Senior Fire Officer (or other authorised officer) who can formally declare the Major Emergency using the instructions in the ‘Activation Section’ of the plan.

Section 7.2 - Initial Mobilisation

7.2.1 Major Emergency Mobilisation Procedure

The initial mobilisation of Cork County Council resources will be facilitated through the Munster Regional Communications Centre. The initial fire brigade response to the activation of the major emergency plan will be the pre-determined attendance (PDA) of:

- 3 Water Tenders,
- 1 Emergency Tender,
- 1 Control Unit
- 1 Brigade Mechanic's Van
- 1 Rostered Senior Fire Officer (RSFO) (S&W)
- 1 Rostered Senior Fire Officer (RSFO) (N&E)
- 1 Roster Senior Fire Officer for Serious Incidents

The Crisis Management Team will be notified of the activation of the major emergency plan by text alert or phone call by the Munster Regional Communications Centre.

In some situations, there may be an early warning of an impending emergency. Mobilisation within Cork County Council may include moving to a standby/alert stage for some of its services or specific individuals until the situation becomes clearer.

Section 7.3 - Command, Control and Communication Centres

7.3.1 Command, control and communication centre to be used

The Munster Regional Communications Centre located in Limerick shall be the control centre to mobilise, support and monitor the Fire Service and other services requested/required by Cork County Council. The Munster Regional Communications Centre shall notify the other Principal Response Agencies of the activation of the major emergency plan. The Munster Regional Communications Centre will also notify all other appropriate personnel in Cork County Council as required by the Rostered Senior Fire Officer.

Section 7.4 - Co-ordination Centres

7.4.1 On-Site Co-ordination

Fire Service operations will be supported by the Incident Command Unit located in Ballincollig Fire Station. On-site co-ordination is to be supported by means of the Inter-Agency On-Site Co-ordination Unit which is located in Bandon Fire Station. The Munster Regional Communications Centre will mobilise these Control Units in accordance with the Pre-determined Attendance (PDA) on the activation of the major emergency plan. It may also be possible to use a suitable building (with appropriate facilities) near the incident for On-site Co-ordination.

7.4.2 Crisis Management Team

Cork County Councils Crisis Management Team will convene at Floor 2, Extension, County Hall ready to assist the Chair of the Local Co-ordination group and the Controller of Operations.

(Please refer to Appendix 3 for details regarding the personnel nominated to form the Crisis Management Team).

7.4.3 Location of pre-determined Local Co-ordination Centre

The Local Co-ordination Group will meet at Cork County Council's Local Co-ordination Centre, Floor 2, County Hall, Carrigrohane Road, Cork or such other Local Authority facility as determined by the Local Co-ordination Group.

7.4.4 Location of the predetermined Regional Co-ordination Centre(s)

The Chair of the Local Co-ordination Group may declare a regional level emergency and activate the Plan for Regional Co-ordination if required. Any one of the nominated Local Co-ordination Centres in the region may be used as a specific Regional Co-ordination Centre, or a specific Regional Centre may be designated for this purpose. The choice of location will be determined in each situation by the Chair of the Local Co-ordinating Group and will depend on the location and nature of the emergency.

7.4.5 Information Management

Key personnel have been identified to act as information managers in the event of a Major Emergency event occurring and are listed in *Appendix 3.* Information is to be received from the On Site Co-ordinator / Controller of Operations, disseminated into key information points for the Local Co-ordinating Group and developed into key actions for the Crisis Management Team or for the On Site Co-ordinator / Controller of Operations.

Section 7.5 - Communications Facilities

7.5.1 Communications systems

Fire services communication facilities:

- Main appliance radio system (VHF)
- Handheld portable radio sets (UHF)
- Internet / Intranet facilities / Email
- Mobile Phones

Communication facilities available at Local co-ordination Centres:

- Fixed Landlines
- Fire Service base radio (VHF)
- Tetra radio
- Internet / Intranet / Email
- Mobile Phones
- Fax

7.5.2 Inter-agency communication on site, including protocols and procedures

When On-Site Co-ordination is established, hand-held portable radios will be used for communication between the Controllers of Operations. In any case, all three Controllers of Operations shall be located in close proximity to each other at the On-site Co-ordination centre.

7.5.3 Communications between Site and Co-ordination Centres

Communications between the site and co-ordination centres are to be by any/all of the following: Fire Service radio, tetra radio, fixed landlines, mobile phones, fax or amateur radio emergency network.

All communication between On-site Co-ordination Centre and the Local Co-ordination shall pass between the Controller of Operations / On-site Co-ordinator to the Local Co-Ordination group, supported by the work of trained Information Management Officers at the scene and at the co-ordination centres.

Section 7.6 - Exercising the Lead Agency's Co-ordination Roles

7.6.1 Lead Agency Concept

The Framework for Major Emergency Management provides that one of the three Principal Response Agencies will be designated as the lead agency for any major emergency and thereby assume responsibility for leading co-ordination. The lead agency has both the responsibility and mandate for the co-ordination function.

There are two mechanisms for determining and designating the lead agency, which are to be applied in sequence by the three Controllers of Operations at the Site. They are as follows:

1. Pre-nomination in accordance with the table provided in *Appendix 17.* This method pre-nominates the lead agency for various types of incident and this should be the primary method of determination for the lead agency
2. In the event that the emergency does not fall into the categorisations of the table in Appendix 17 then the lead agency by 'default' will be Cork County Council.

Rapid determination of the lead agency is essential as this in turn determines which of the three Controllers of Operations is to act as the On-Site Co-ordinator.

The Controller of Operations for the Lead Agency is to act as the On-Site Co-ordinator.

The On-Site Co-ordinator should note the time that the determination of the lead agency was made in the presence of the other two Controllers of Operations. The determination is to be communicated to all parties involved in the response.

7.6.2 Review & transfer of Lead Agency role

The lead agency role may change over time, to reflect the changing circumstances of the emergency. Ownership of the lead agency mantle should be reviewed at appropriate stages of the major emergency.

All changes in lead agency designation emanating from the site, and the timing thereof, will be by agreement of the three Controllers of Operations at the site and should be recorded and communicated as per the initial determination.

7.6.3 Cork County Councils Co-ordination function as Lead Agency

In the event of Cork County Council being assigned the Lead Agency role, it will be assigned the responsibility for the co-ordination function (in addition to its own functions) and it should lead all the co-ordination activity associated with the emergency both on-site and off-site, and make every effort to achieve a high level if co-ordination. The function of the lead agency for any emergency includes:

- ensuring involvement of the three Principal Response Agencies and the Principal Emergency Services in sharing information on the nature of the emergency situation;
- ensuring involvement of the range of organisations (other than Principal Response Agencies) who may be requested to respond in co-ordination activities and arrangements;
- ensuring that mandated co-ordination decisions are made promptly and communicated to all involved;
- ensuring that site management issues are addressed and decided;
- ensuring that public information messages and media briefings are co-ordinated and implemented;
- ensuring that pre-arranged communications (technical) links are put in place and operating;
- operating the generic information management systems;
- ensuring that the ownership of the lead agency role is reviewed, and modified as appropriate;
- ensuring that all aspects of the management of the incident are dealt with before the response is stood down;
- ensuring that a report on the co-ordination function is prepared in respect of the emergency after it is closed down, and circulated (first as a draft) to the other services which attended.

Section 7.7 - Public Information

7.7.1 Cork County Councils role in situations where early warning and special public warning arrangements are needed.

In certain situations, it may be crucial for the Principal Response Agencies to provide timely and accurate information directly to the public on an emergency situation. This is especially important where members of the public may perceive themselves and their families to be at risk and are seeking information on actions which they can take to protect themselves and their families.

The Local Co-ordination Group should take over the task of co-ordinating the provision of information to the public as soon as it meets. This activity should be co-ordinated by the Lead Agency.

The Local Co-ordination Group may establish a sub-group for this purpose and use all available channels to make concise and accurate information available. This may include the use of dedicated "help-lines", web-pages, automatic text messaging, as well as through liaison with the media.

The On-Site Co-ordinator or Local Co-ordination Group may request the media to carry ***Public Information Notices*** during a Major Emergency to disseminate important messages to the public such as:

- Hazard Warnings to the Community
- Road Traffic Control information
- Requests for Specialist Assistance

7.7.2 Provision of telephone / help line / information line contact numbers

In situations where early warning and special public warning arrangements are required the Media Liaison Officer shall make provision for contacting the appropriate media outlets contained in *Appendix 8* for the dissemination of warning(s) on behalf of the Cork County Council

The appointed Media Liaison Officer shall make arrangements to publicise the emergency telephone numbers and/or the location of public information offices. The Media Liaison Officer/Crisis Management Team shall also make provision for telephone/help-line/information line contact numbers and the handling of contacts with dedicated telephone lines. *(See Appendix 21 - Cork County Council's Contact Centre Arrangements)*

Section 7.8 - The Media

7.8.1 Arrangements for liaison with the media

The Garda Press Office will lead media liaison in the first hour(s) of the response to a Major Emergency irrespective of the nature of the incident or the lead agency.

Thereafter, whenever Cork County Council is the Lead Agency in the response to a Major Emergency, Cork County Councils Media Liaison Officer will lead media liaison. *(See Appendix 14 - Regional Media Plan for further instructions including in an initial Press Statement)*

7.8.2 Arrangements for media on-site

Each Principal Response Agency should designate a Media Liaison Officer at the site and the activities of the Media Liaison Officers on site should be co-ordinated by the Media Liaison Officer of the lead agency.

The Media Liaison Officer must keep accurate and timely information on the emergency so that:

- He/she can be the point of contact for all media enquiries.
- He/she can answer information queries from the general public.
- He/she can prepare media statements for the approval of the On-Site Co-ordination Group

All statements to the media should be cleared with the On-Site Co-ordinator or his/her Media Liaison Officer.

7.8.3 Arrangements for media at Local and / or Regional Co-ordination Centres

The Local Co-ordination Group should take the lead in terms of working with the media, away from the site, during a major emergency. As with arrangements at the site, each Principal Response Agency should designate a Media Liaison Officer at the

Local Co-ordination Centre and the activities of the Media Liaison Officers should be co-ordinated by the Media Liaison Officer of the lead agency. All statements to the media at this level should be cleared with the chair of the Local Co-ordination Group.

Media Centre

A Media Centre will be established in County Hall (if necessary). Facilities will be made available for the media in the staff library and media briefings will take place at regular intervals in the foyer or other suitable location.

Regular media briefings should be scheduled to suit television and radio broadcasts.

These briefings should also be used to promulgate help-line telephone numbers and necessary public information messages. Background information that has been compiled before the event can be used to inform holding statements for use during the early stages of the incident.

7.8.4 Arrangements for media at other locations associated with the Major Emergency

In many situations media attention will move quickly away from the site to other locations, including hospitals where casualties are being treated and mortuaries and, therefore, arrangements for the media at or adjacent to these locations will need to be provided.

Section 7.9 - Site Management Arrangements

7.9.1 Generic site management elements/arrangements

Cork County Council shall appoint a Controller of Operations at the site (or at each site) of the emergency, *see section 6.2 of this document*. The initial important task of the Controller of Operations in association with the other two Controllers is the development of a Site Management Plan. Once agreed, the resulting site plan should be implemented and disseminated to all responding groups.

The main components of a typical Site Management Plan should contain some or all of the following: *(See Appendix 15 for detailed information on Scene Management)*

- Inner, Outer and Traffic Cordons (established by An Garda Síochána after decision by and/or agreement with On-site Co-ordinator).
- A Danger Area, if appropriate
- Cordon and Danger Area Access Points
- Rendezvous Point
- Site Access Point
- Holding Areas
- Site Control Point
- On-Site Co-ordination Centre
- Casualty Clearing Station
- Ambulance Loading Area
- Body Holding Area
- Survivor Reception Centre
- Friends and Relative Reception Centre

7.9.2 Control of Access and Identification of personnel

Identification of personnel

In order to control access to a Major Emergency site cordons will be established as quickly as possible at the site of a major emergency for the following reasons;

- to facilitate the operations of the emergency services and other agencies;
- to protect the public, by preventing access to dangerous areas; and
- to protect evidence and facilitate evidence recovery at the site.

Three cordons will be established. An Inner, Outer and Traffic Cordon, along with access cordon points *see Appendix 15 for detailed information*. This will be done by An Garda Síochána after a decision by agreement with the On-site Co-Ordination Group.

A Danger Area may also be declared where there is a definite risk to rescue personnel, over and above that which would normally pertain at emergency operations.

Identification of Personnel at the Site of a Major Emergency

All uniformed personnel, responding to the site of a major emergency, should wear the prescribed uniform, including high visibility and safety clothing, issued by their agency. The service markings on this clothing should be made known in advance to the other organisations that may be involved in the response.

Senior personnel who are acting in key roles, such as the On-Site Co-ordinator and the Controllers of Operations, should wear bibs designed and coordinated as follows:

Organisation	Bib Colour	Wording
Health Service Executive	Green and White Chequer	HSE Controller
Local Authority	Red and White Chequer	Local Authority Controller
An Garda Síochána	Blue and White Chequer	Garda Controller

When the lead agency has been determined, the On-Site Co-ordinator should don a distinctive bib with the words On-Site Co-ordinator clearly visible front and back. Below is an example of how the bibs should look for each of the responding agencies.

Garda
Controller

Local Authority
Controller

H.S.E.
Controller

Non-Uniformed Personnel

Non-uniformed personnel from Cork County Council should attend the scene in high visibility jacket with the name Cork County Council and their job function clearly displayed.

All Cork County Council personnel responding to an emergency shall wear (or carry) the form of identification issued to them and shall ensure that their vehicles are adequately identified. Access beyond Cordons will not be permitted in the absence of the appropriate identification.

7.9.3 Air exclusion zones

Where the Principal Response Agencies consider it appropriate and beneficial, the On-Site Co-ordinator may request, through An Garda Síochána, that an Air Exclusion Zone be declared around the emergency site by the Irish Aviation Authority. When a restricted zone above and around the site is declared, it is promulgated by means of a "Notice to Airmen" - NOTAM - from the Irish Aviation Authority.

Contact details for the Irish Aviation Authority are provided in *Appendix 8 – Regional Contact Details.*

Section 7.10 - Mobilising Additional Resources

7.10.1 Arrangements for mobilising other organisations

The Voluntary Emergency Services sector can provide additional equipment and support in the event of a major emergency. Details of the local Voluntary Emergency Services, the resources they can provide and contact details is outlined in *Appendix 23 – Voluntary Emergency Services Guide (MEM Region South)*

Voluntary Emergency Services will link to the Principal response Agencies in accordance with the following Table below.

Principal Response Agency	**Linked Voluntary Emergency Service**
An Garda Síochána	Irish Mountain Rescue Association Irish Cave Rescue Association Search and Rescue Dogs Sub-Aqua Teams River Rescue
Health Service Executive	Irish Red Cross Order of Malta Ambulance Corps St. John's Ambulance
Cork County Council	Civil Defence

Each Principal Response Agency with a linked Voluntary Emergency Services is responsible for the mobilisation of that service and their integration into the overall response. The internal command of volunteer organisations resides with that organisation

7.10.1.1 Mobilisation of Civil Defence

Civil Defence

Contact the Civil Defence Officer for the area concerned.

Please refer to section 4.4.1 of this document, details also given in Appendix 23 – Voluntary Emergency Services Guide (MEM Region South)

7.10.1.2 Mobilisation of Defence Forces

Defence Forces

The On-Site Co-ordinator shall, in consultation with the other Controllers of Operations:

- determine the requirements to be requested, in terms of Defence Forces resources, for the site response and, once Defence Forces resources have been committed, the tasks to be requested and the procedures for the altering of such requirements or tasks as the situation requires;
- determine where and to whom the Defence Forces will report and also determine communication links for ongoing reporting on the status of the Defence Forces response;
- include for the provision to the Defence Forces commander of a communication system, to enable effective communications and the provision of reports as requested;
- provide for the Defence Forces being stood down from the site as the situation warrants; and
- include procedures for requesting operational debriefing and reporting of all activity undertaken by the Defence Forces.

Please refer to *Appendix 9 - Procedure for Requesting Assistance from Defence Forces*

Provision of Defence Forces capabilities is dependent on the exigencies of the service and within available resources at the time.

The Defence Forces - incorporating the Army, Air Corps, Naval Service and Reserve Defence Forces will operate under their own command and control structure.

7.10.1.3 Mobilisation of the Irish Red Cross

Irish Red Cross

Please refer to section 4.4.3 of this document, details also given in Appendix 23 – Voluntary Emergency Services Guide (MEM Region South)

7.10.1.4 Mobilisation of Voluntary Emergency Services

The Voluntary Emergency Services sector can provide additional equipment and support in the event of a major emergency. Details of the local Voluntary Emergency

Services, the resources they can provide and their mobilisation procedure are outlined in *Appendix 23 – Voluntary Emergency Services Guide (MEM Region South)*

7.10.1.5 Mobilisation of Utilities

Utilities are frequently involved in the response to emergencies, usually to assist the principal response agencies in making situations safe. They may also be directly involved in restoring their own services, for example, electricity supply in the aftermath of a storm. Utilities operate under their own legislative and regulatory frameworks but, during the response to an emergency, it is important that they are involved in the co-ordination arrangements. Utilities may be requested to provide representatives and/or experts to the On-Site Co-ordination Group, the Local Coordination Group and/or the Regional Co-ordination Group, as appropriate. A list of utilities and their emergency/out of hours contact arrangements are listed in *Appendix 8. Please refer to section 4.4.6 of this document for further details.*

7.10.1.6 Mobilisation of Private Sector

Private sector organisations may be involved in a major emergency through ownership of the site where the emergency has occurred or through ownership of some element involved in the emergency e.g. an aircraft, bus, factory, etc. They may also be called on to assist in the response to a major emergency, by providing specialist services and/or equipment. Private sector representatives and/or experts may be requested to support the work of the On-Site Co-ordination Group, the Local Co-ordination Group and/or the Regional Co-ordination Group, as appropriate.

7.10.2 Arrangements for identifying and mobilising additional organisations

Arrangements for identifying and mobilising additional organisations that it may be appropriate to mobilize will be determined by the on-site co-ordinator in conjunction with the Controller of Operations from the other principle response agencies.

7.10.3 Arrangements for liaison with utilities

Please refer to section 4.6 of this document, details also given in Appendix 8 – Regional Contact Details

7.10.4 Arrangements for integration of community volunteers as appropriate

Where Community Volunteers are available and deemed necessary by the On Site Co-ordination team, some form of identification in terms of arm bands etc. should be issued. Where available, orange armbands emblazoned with the word 'Volunteer' or suitable abbreviation, e.g. 'VOL', will be issued by Civil Defence. It should be noted that while initially they may be of some assistance; their usefulness will lessen due to lack of training, experience and PPE.

7.10.5 Arrangements for command, control, co-ordination and demobilisation of organisations mobilised to the site

Each Principal Response Agency with a linked Voluntary Emergency Services/Organisation is responsible for the mobilisation of that service and their integration into the overall response. The internal command of the organisations resides with that organisation.

Please refer to section 4.4.1 through 4.4.7 and section 7.10.1 of this document.

7.10.6 Mutual aid arrangements

Please refer to section 4.5 of this document.

7.10.7 Requests for out-of-region assistance

Out-of-region / International assistance will be requested through the Local Co-ordination Centre upwards through regional and national structures.

Cork County Councils Crisis Management Team shall ensure that, where the resources of the authority do not appear to be sufficient to bring a situation under control, or the duration of an incident is expected to be extended, support is obtained via mutual aid arrangements with neighbouring authorities.

Where resources that are held at a national level are required, as part of the management of the incident, requests for those resources should be directed by the lead agency to the Lead Government Department.

The decision to seek assistance from outside the state should be made by the lead agency, in association with the other Principal Response Agencies, at the Local/Regional Coordination Centre. The Local/Regional Co-ordination Group should identify and dimension the level/type of assistance likely to be required and its duration.

The European Community has established a Community Mechanism to facilitate the provision of assistance between the member states in the event of major emergencies. The chair of the Local/Regional Coordination Group should make requests for such assistance to the National Liaison Officer in the Department of the Environment, Heritage and Local Government.

7.10.8 Requests for international assistance

A Regional Co-ordination Group may also request assistance from Government. National resources will be available in the event of a major emergency at local or regional level. Requests for assistance should be developed at local or regional co-ordination level and directed by the lead agency to the lead Government Department. *Please refer to section 4.7 of this document.*

Section 7.11 - Casualty and Survivor Arrangements

7.11.1 General

The primary objective of any response to a major emergency is to provide effective arrangements for the rescue, care, treatment and rehabilitation of all of the individuals who are affected by the emergency. These individuals may be divided into two main categories as follows: Casualties, including persons who are killed or injured, and Survivors. Survivors will include all those individuals who are caught up in an emergency but not injured, such as, uninjured passengers from a transport accident or evacuees.

As well as making provision for casualties and survivors, the Principal Response Agencies should also make arrangements for the reception, facilitation and support of the friends and relatives of some or all of these individuals

7.11.1.1 Casualties and Survivors and the Council's role in this

The On-Site Co-ordinator, in association with the other Controllers, will need to make an early assessment of the casualty situation and identify if there are particular aspects which may impact on casualty management, such as, significant numbers of disabled, sick or immobile persons involved, and take action accordingly.

Individuals may be divided into two main categories as follows:

- Casualties, including persons who are killed or injured,
- Survivors. These include all those individuals who are caught up in an emergency but not injured, such as, uninjured passengers from a transport accident or evacuees.

7.11.2 Injured

At the site of a major emergency, the priorities of the Principal Emergency Services are to save life, prevent further injury, rescue those who are trapped or in danger, triage casualties, provide them with appropriate treatment and transport them to the appropriate hospital(s) where necessary.

The injured need to be rescued from the scene and cared for as quickly and safely as possible by the rescuers, who must be mindful of the requirement of the ambulance and medical teams on site. Ambulance paramedics and emergency medical technicians then need to be able to administer the appropriate pre-hospital treatment before the patients are taken to the receiving hospitals.

7.11.2.1 Arrangements for triage

Once injured casualties have been rescued or found, they should be assessed or triaged as quickly as possible. Casualties are often found some distance from the primary site and search teams, co-ordinated by An Garda Síochána, should be established where it is considered that this may be necessary.

Triage is a dynamic process of assessing casualties and deciding the priority of their treatment, using a two-stage process of triage sieve and triage sort. Following initial triage, casualties will normally be labelled, using Triage Cards, and moved to a Casualty Clearing Station. The purpose of this labelling is to indicate the triage category of the casualty, to facilitate the changing of that category, if required, and to record any treatment, procedure or medication administered. A standard card with Red (Immediate), Yellow (Urgent), Green (Delayed) and White (Dead) sections is normally used for this purpose.

7.11.2.2 Arrangements for transporting lightly injured and uninjured persons from the site, and the Council's role in this

It should be noted that while some casualties will be transported to the receiving Hospital(s) by the Ambulance Service, some casualties may leave the site by other means and may arrive at the designated receiving Hospital(s), or other hospitals, in cars, buses, etc.

In circumstances where lightly injured or uninjured persons are to be transported from the site, the Civil Defence may be requested to aid in this task.

7.11.2.3 Arrangements for a Casualty Clearing Station and Ambulance Loading Point

The **Casualty Clearing Station** is established at the site by the Ambulance Service, in consultation with the Health Service Executive Controller and the Site Medical Officer. Here, casualties are collected, further triaged, treated, as necessary, and prepared for transport to hospital. The H.S.E. Controller will, in consultation with the Site Medical Officer and the designated receiving hospitals, decide on the hospital destination of casualties.

7.11.3 Fatalities

The bodies of casualties, which have been triaged as dead, should not be moved from the incident site unless this is necessary to effect the rescue of other casualties. The only other circumstance where bodies should be moved, before the Garda evidence collection process is complete, is if they are likely to be lost or damaged due to their location or the nature of the incident.

Bodies to be moved should be photographed first and their original position clearly marked and recorded. The recovery of the dead and human remains is part of an evidence recovery process and, as such, is the responsibility of An Garda Síochána acting as agents of the Coroner. Cork County Councils may assist An Garda Síochána in this function.

When a doctor has pronounced an individual dead, arrangements in respect of the body are the responsibility of the local Coroner's Office, in conjunction with An Garda Síochána.

7.11.3.1 Coroners role

The Coroner is an independent judicial officer, who has responsibility for investigating all sudden, unexplained, violent or unnatural deaths. It is the task of the Coroner to establish the 'who, when, where and how' of unexplained death. All such deaths in Ireland are investigated under the Coroners' Act, 1962. There are three Coroner districts in County Cork:

- Cork North
- Cork South
- Cork West

The Coroners' Act, 1962

S 17.—Subject to the provisions of this Act, where a coroner is informed that the body of a deceased person is lying within his district, it shall be the duty of the coroner to hold an inquest in relation to the death of that person if he is of opinion that the death may have occurred in a violent or unnatural manner, or suddenly and from unknown causes or in a place or in circumstances which, under provisions in that behalf contained in any other enactment, require that an inquest should be held.

The Coroner has overall responsibility for the identification of bodies and remains ands/he is entitled to exclusive possession and control of a deceased person until the facts about their death have been established. A full post-mortem and forensic examination will be carried out on every body from a major emergency and each death will be subject of an Inquest. The post-mortem is carried out by a Pathologist, who acts as the 'Coroners Agent' for this purpose.

7.11.3.2 Arrangements for dealing with fatalities, both on and off-site, including Body Holding Areas and Temporary Mortuaries, and the Council's role in this

The On-Site Co-ordinator, in association with the other Controllers, will decide if it is necessary to establish a Body Holding Area at the site. The Body Holding Area, if established, should be situated close to the Casualty Clearing Station. Members of An Garda Síochána will staff this area and they will maintain the necessary logs to ensure the continuity of evidence.

It should be noted that the Body Holding Area is not the appropriate place for the prolonged storage of the dead and appropriate arrangements should be made to ensure minimal delay in moving bodies to a mortuary (temporary or otherwise).

Further information and procedures for the deployment of the Inter-agency Body Storage Support Unit is contained *Appendix 16 - Multiple Fatalities Guide (MEM Region South)*

Temporary Mortuaries

The Local Co-ordination Group in consultation with the Coroner is mandated to request the activation of the National Mass Fatality Plan (working draft). It is the responsibility of the Local Authority to provide arrangements to support the operation of any Temporary Mortuary established in support of the national plan.

The likely commissioning time for a Temporary Mortuary is of the order of twenty-four hours, and this may extend to forty-eight hours when victim numbers are extensive. It should be noted that a Temporary Mortuary might be required to operate for weeks or months after an incident.

Full information on procedures for dealing with multiple fatalities is set out in the *Working Draft Mass Fatality Plan* available on the Councils MEM SharePoint Site.

7.11.3.3 Arrangements for identification of the deceased, and the Council's role in this

The Coroner, with the assistance of An Garda Síochána, has overall responsibility for the identification of bodies and remains and s/he is entitled to exclusive possession and control of a deceased person until the facts about their death have been established. A full post-mortem and forensic examination will be carried out on every body from a major emergency and each death will be the subject of an Inquest. The post-mortem is carried out by a Pathologist, who acts as the 'Coroners Agent' for this purpose.

7.11.4 Survivors

A Survivor Reception Centre shall be designated and established at the earliest possible opportunity if necessary. Transport from the Survivor Reception Centre to home/meet relatives/safe place will be arranged as soon as it is practicable. This responsibility will lie with the Local Authority.

7.11.4.1 Arrangements for dealing with uninjured survivors who require support, including the designation and operation of Survivor Reception Centres

The On-Site Co-ordinator, in conjunction with the other Controllers, shall determine if a Survivor Reception Centre is to be established, and its location in the site management plan. It will be the responsibility of the Local Authority to establish and run this centre.

Cork County Councils has identified the following as suitable buildings for setting up a survivor centre;

- Hotels
- Recreation Centres
- Parish Halls
- Local Schools
- Any other building that is large enough to accommodate large amounts of people.

Further details are included in Appendix 20 – Evacuation Guide (MEM Region South)

All those who have survived the incident uninjured can be directed to the Survivor Centre, where their details will be documented and collated by An Garda Síochána. Provision should be made at this centre for the immediate physical and psychosocial needs of survivors (e.g. hot drinks, food, blankets, telephones, first aid for minor injuries, etc.).

The assistance of the voluntary ambulance services may be required to provide a variety of services at the Survivor Reception Centre. The Survivor Reception Centre should be secure from any unauthorised access and provide the maximum possible privacy for survivors.

7.11.5 Casualty Information

Gathering of casualty information will be the responsibility of An Garda Síochána

7.11.5.1 Casualty Bureau

In the event of a major emergency involving significant numbers of casualties, An Garda Síochána will establish a Casualty Bureau to collect and collate the details (including condition and location) of all casualties and survivors. To facilitate this process, a liaison/casualty officer will normally be sent by An Garda Síochána to each hospital where casualties are being treated.

All other services should ensure that any information collected on any casualty is transferred via A Garda Síochána to the Casualty Bureau.

The Casualty Bureau is the central contact point for the matching of information available on casualties with requests from all those seeking or providing information about persons involved in the incident. The media will be asked to promulgate the contact numbers for the Bureau so that the public can make enquiries and provide information.

7.11.5.2 Assistance by Cork County Councils to An Garda Síochána in the collection and collation of casualty information

Cork County Councils may assist in the collection and collation of casualty data. Any information collected on any casualty is transferred via An Garda Síochána to the Casualty Bureau, who will generally set up an information hot line, in order that concerned family and friend may inquire about 'loved ones'.

7.11.6 Friends and Relatives Reception Centres

Some incidents may warrant the establishment of Friends' and Relatives' Reception Centres at appropriate locations associated with the emergency, in addition to those provided at the hospitals where the injured are being treated.

The Local Co-ordination Group should determine the need for and arrange for the designation and operation/staffing of such centres.

The purpose of a reception centre is to provide a comfortable area where friends and relatives of those involved in the incident (primarily the casualties and survivors) can be directed for information. A building used as a Friends and Relatives' Reception Centre should be secure from media intrusion and contain sufficient room to afford privacy to families receiving information about relatives.

There will also be a need for a reliable process to establish the credentials of friends and relatives.

7.11.7 Foreign National Casualties

In some incidents an emergency may involve significant numbers of casualties from other jurisdictions. In such circumstances the Local Co-ordination Centre should notify the relevant embassy if the nationality of the victims is known. The Department of Justice should be approached if assistance is required in obtaining interpreters from private sector providers. The Department of Foreign Affairs (which operates an out of hours Duty Officer System) should also be approached for appropriate assistance and liaison purposes.

7.11.7.1 Foreign language communication resources

Advice may be sought from An Garda Síochána as to the use of interpreters. Generally the local Garda Station will have a list of approved interpreters which may be call upon in the event of an emergency. Advice may also be sought from the Department of Foreign Affairs. *See Appendix 8 – Regional Contact Details*

7.11.8 Pastoral and Psycho-social Care

The On-Site Co-ordinator needs to ensure that, where appropriate, pastoral services are mobilised to the site and facilitated by the Principal Response Agencies in their work with casualties and survivors. Similarly, individual services should make arrangements for necessary pastoral services at any other locations associated with the emergency, such as hospitals.

Pastoral and psycho-social support arrangements for casualties and other affected members of the public are the responsibility of the Health Service Executive.

Section 7.12 - Emergencies involving Hazardous Materials

7.12.1 Arrangements for dealing with major Hazardous Materials incidents

The Local Authority is designated lead agency for the response to hazardous materials incidents with the exception of those involving biological agents. The Fire Service will respond to incidents involving hazardous materials in accordance with Standard Operational Guidance (SOG's). Site arrangements shall generally be in accordance with Figure 7.12 below.

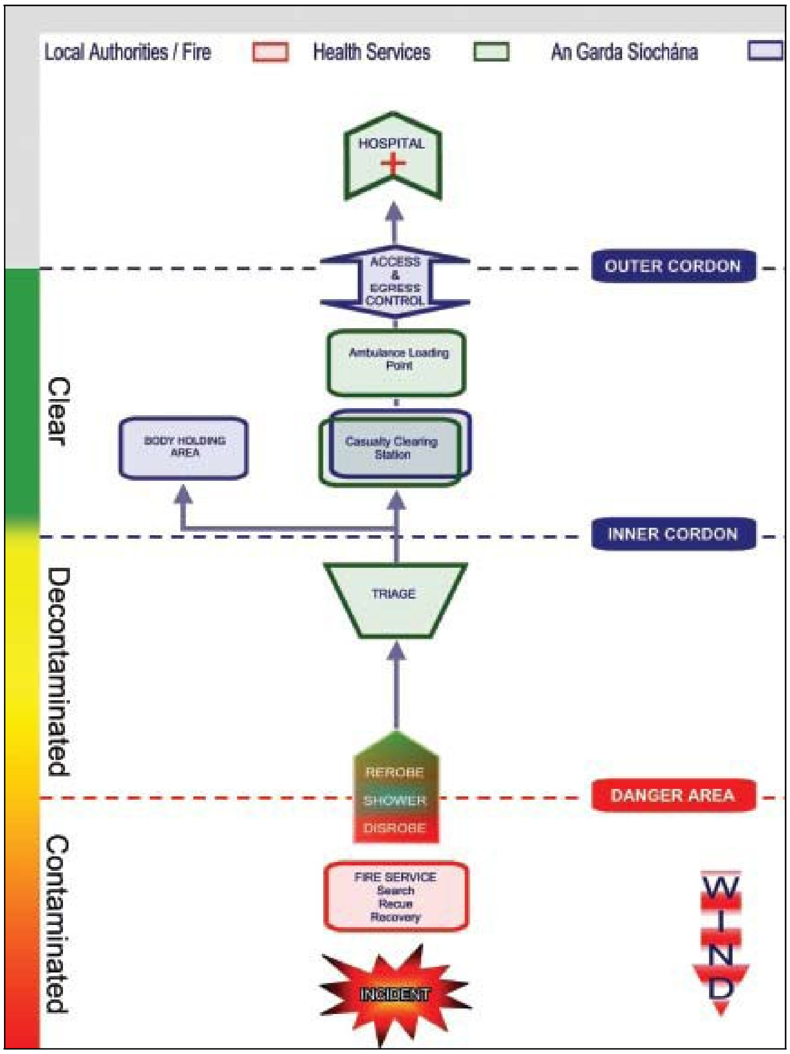

Figure 7.12

7.12.2 Arrangements for dealing with CBRN incidents and the Council s role in this

CBRN is an acronym meaning incidents involving; C - chemical substances; B - biological agents; R - radiological and N - nuclear material. Where terrorist involvement is suspected, An Garda Síochána will act as the lead agency. The Defence Forces, when requested, will assist An Garda Síochána in an Aid to the Civil Power role with Explosive Ordnance Disposal teams.

Further guidance is outlined in the *Protocol for responding to a malign CBRN incident* published by the Office of Emergency Planning

7.12.3 Biological incidents

The HSE has been identified as the lead agency in any biological incidents. Details of the specific actions to be taken in the event of a Biological incident are detailed in the *Protocol for responding to a malign CBRN incident* published by the Office of Emergency Planning.

7.12.4 National Public Health (Infectious diseases) Plan

Details of specific actions to be taken in the event of an activation of the National Public Health (Infectious Diseases) Plan are detailed in the Public Health Emergency Plan published by the Department of Health.

7.12.5 National Emergency Plan for Nuclear Accidents

The National Emergency Plan for Nuclear Accidents has been prepared in accordance with Article 37 of SI 125 of 2000, Radiological Protection Act, 1991 (Ionising Radiation) Order under which the Department of the Environment, Heritage and Local Government has the lead responsibility for coordinating the emergency response arrangements among other Government Departments and Agencies. The National Plan for Nuclear Accidents is available to download from http://www.environ.ie/en/Environment/EnvironmentalRadiation/PublicationsDocuments/FileDownLoad,1323,en.pdf

7.12.6 Arrangements for clinical, personnel and mass decontamination and the Council s role in each

The On-Site Co-ordinator, in association with the other Controllers of Operations, will establish the need for decontamination. The Health Service Executive has responsibility for providing clinical decontamination and medical treatment to casualties affected by hazardous materials. The fire services have responsibility for providing other forms of physical decontamination of persons at the site. The Health Service Executive will be responsible for decontamination where required to protect health service facilities, such as hospitals, from secondary contamination.

Where emergency decontamination of the public is required, the fire service may use its fire-fighter decontamination facilities, or improvised equipment may be used prior to the arrival of dedicated equipment. Where it is decided that persons should undergo this practice, it should be carried out under the guidance of medical personnel. It should be noted that emergency contamination carries risks for vulnerable groups, such as the elderly and the injured. It may be more appropriate in certain circumstances for outer clothing to be removed and blankets provided as a temporary measure to alleviate potential harm through surface contact with contaminants.

Section 7.13 - Protecting Threatened Populations

7.13.1 Threatened Populations

There are circumstances when it may be necessary to protect members the public who are in the vicinity of an emergency event. This protection is usually achieved by moving people temporarily to a safe area, by evacuation where appropriate or feasible, or by advising affected individuals to take shelter in an appropriate place.
The On-Site Co-ordinator will take the decision on how best to protect a threatened population, after consultation with the other Controllers of Operations.
In some situations, it can be anticipated that there will be a level of self evacuation, and this may need to be considered as part of the emergency management considerations.

7.13.2 Evacuation arrangements including evacuee reception centres, accommodation and welfare arrangements, and the Council s

Evacuation is usually undertaken on the advice of the Fire Service or Health Service Executive. Where decided upon, the process of evacuation will be undertaken by An Garda Síochána, with the assistance of the other services. In some circumstances, personnel from all services may have to assist in carrying it out. A suitable evacuation assembly point will need to be established at/near the site of the emergency and the Local Authority will provide transportation from assembly points to Rest Centres near the site.
Personnel from Cork County Councils and from voluntary agencies will staff the Rest Centre(s). The centres will provide security, welfare, communication, catering and medical facilities. Evacuees should be documented and basic details passed to the casualty bureau. Cork County Councils will assist in this role.
Please see Appendix 20 – Evacuation Guide (MEM Region South) and Sections 7.11.4.1 and 7.17.3 for further details.

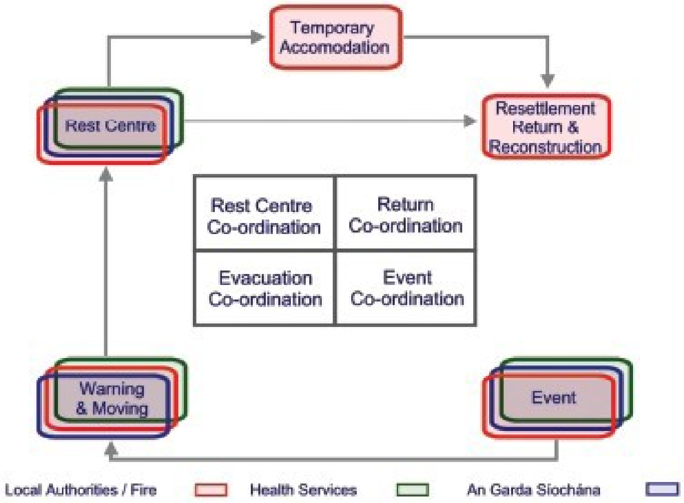

Figure 7.2: Structure of Evacuation

7.13.3 Arrangements for the involvement of The Public Health Service

Where an emergency results in a real or perceived threat to public health by, for example, the release of chemical, radioactive or biological agents, the contamination of water or food supplies, or the spread of contaminated flood water, it can be anticipated that there will be considerable concern among both the persons immediately affected and the wider public. In such situations, the HSE Controller of Operations shall ensure that the local public health services are informed of the situation as soon as possible so that they can become involved in the response at the earliest possible stage.

Section 7.14 - Early and Public Warning Systems

7.14.1 Monitoring potentially hazardous situations

Met Éireann operates a Public Service Severe Weather Warning service for dissemination of weather warnings to Local Authorities and other agencies. Met Éireann also provides a 24-hour service, which may be consulted for general or specific weather forecasts. *Please refer to Section 11.1 of this document.*

Upper Tier SEVESO establishments have arrangements in place for warning the public in the immediate vicinity of their sites of major accidents (usually by community siren*)*. The Site Operators have informed the public (within a specified area agreed with the HSA) of the actions to take in the event of an alert. *See Appendix 7 for further details.*

7.14.2 Specify how warnings are to be disseminated

Warnings to the public will primarily be disseminated by the Principal Response Agencies through the media (TV, National & Local Radio).

However, warnings may also be issued to the public by use of some or all of the following:

- Door to Door
- Leaflet drop
- Local helpline / information line
- Web services and internet services
- Automated Text services
- Site specific warning systems

Section 7.15 - Emergencies arising on Inland Waterways

7.15.1 Arrangements for liaison with the Irish Coast Guard

Cork County Councils can provide assistance in the form of the Civil Defence for water rescue / recovery on Inland Waterways. *Please refer to Appendix 8 – Regional Contact Details.*

7.15.2 Responsibility of The Irish Coastguard

The Irish Coast Guard has responsibility for receiving 112/999 calls and the mobilising of resources to Inland Waterway emergencies. An Garda Síochána shall be designated as the ‘lead agency’ to undertake initial co-ordination at inland waterway emergencies. After the initial response, this role may be re-assigned, following consultation between the Irish Coast Guard and An Garda Síochána.

Section 7.16 - Safety, Health and Welfare Considerations

7.16.1 Safety, health and welfare of staff

Cork County Council (and other responding agencies) are responsible for the Safety, Health and Welfare of its staff responding to emergencies and shall operate its own safety (including personal protective equipment) and welfare management procedures.

7.16.2 Safety of Cork County Councils rescue personnel

When working in the environment of a Major Emergency the On-Site Co-ordinator will apply normal incident and safety management arrangements. A 'Safety Officer' will generally be appointed having responsibility for the oversight and management of the safety of the Council's rescue personnel. All other relevant officers will continue to exercise command over their own personnel working in the area.

7.16.3 Working within the Danger Area

A 'Danger Area' may be declared at the site where there is a definite risk to rescue personnel over and above that which would normally pertain at emergency operations. The activities of all agencies within the "Danger Area" shall be under the overall control and direction of the senior fire officer at the incident.
However, the persons in charge of the activities of these agencies shall, subject to the above, continue to exercise operational control over their agencies activities and shall ensure that all necessary safety and welfare measures and procedures are implemented.

7.16.4 Evacuation signal for the Danger Area

Where a situation deteriorates to a point where the officer in charge of the Danger Area decides that it is necessary to withdraw response personnel from a Danger Area, a signal, comprising repeated sounding of a siren for ten seconds on, ten seconds off, will be given. All personnel should withdraw on hearing this signal to a pre-determined safe zone.

7.16.5 Physical welfare of responders (food, shelter, toilets)

Cork County Councils Controller of Operations shall ensure that appropriate rest and refreshment facilities are provided for response personnel at the site, as well as for survivors.

These facilities may include the provision of food and drink, rest facilities and sanitary facilities.

Please refer to section 7.17.3 of this document.

7.16.6 Psycho-social support for its own personnel

Critical Incident Stress Management services will be provided to staff through the arrangements in place in Cork County Council.

Section 7.17 - Logistical Issues/ Protracted Incidents

7.17.1 Arrangements for rotation of front line rescue / field staff

Front line rescue / field staff will be relieved at protracted incidents in accordance with agreements for rest and recuperation. Crews from neighbouring authorities in the region may be called upon to assist and support the emergency.

7.17.2 Arrangements for re-organising normal emergency and other services cover in areas depleted by commitments to the

The re-organisation of fire service cover will be undertaken by the Rostered Senior Fire Officer. The Crisis Management Team will ensure all other services of the Council are re-organised to ensure that essential services of the Council continue during the emergency. However, it may not be possible for Cork County Council to deliver the full range of services to the public during the course of the major emergency. The public will be kept informed of any temporary disruption to services via the media, website or direct by phone to Cork County Council offices.

7.17.3 Arrangements for initial and ongoing welfare for field staff

Cork County Councils Controller of Operations shall ensure that appropriate rest and refreshment facilities are provided for response personnel at the site, as well as for survivors. Staff welfare will be considered at all times. Civil Defence may be called upon to provide or aid in the administration of such needs. Welfare facilities such as toilets etc. may also be required and shall be supplied by Cork County Council if necessary. Food and hot drinks shall be provided at all meal times to field staff or every 4/5 hours during an incident.

Section 7.18 - Investigations

7.18.1 Investigations arising from the emergency

An Garda Síochána will retain control of the site and lead the investigations arising from the emergency. It may be necessary for Cork County Councils staff to provide statements to the investigative agencies on their involvement in the major emergency response.

7.18.2 Minimise disruption of evidence

An Garda Síochána will need to obtain evidence of the highest possible standard and will require that all evidence is left in situ, unless a threat to life or health prevents this.

Cork County Council will have some role to play in the site clearance, demolition, clean-up operations, removal and disposal of debris and such activity is only to be done following consultation with and approval of An Garda Síochána (or other investigative body) to avoid the possible unnecessary destruction of evidence.

7.18.3 Other parties with statutory investigation roles

Depending on the nature of the Major Emergency, agencies other than An Garda Síochána may require access to the site for the purposes of carrying out an investigation. These agencies include the Health and Safety Authority (HSA), the Air Accident Investigation Unit (AAIU) and the Environmental Protection Agency (EPA). An Garda Síochána is responsible for carrying out criminal investigations.

If there is reason to believe that a criminal act was a contributory factor to a major emergency, An Garda Síochána will begin an investigation, in parallel with the emergency response.

The preservation of the site of a major emergency, which results from criminal action, is of paramount importance and should receive a priority rating from the outset. The first member(s) of An Garda Síochána to arrive at the site of a major emergency where a suspected crime has been committed automatically incurs the responsibility of preserving the site.

Note: The priority of the response remains the protection of life.

Any agency with an investigative mandate should liaise in the first instance with the On-Site Co-ordinator, who will direct them to the Garda Controller of Operations. One of Cork County Councils functions is to provide support for An Garda Síochána forensic work. This should also extend to investigations carried out by other agencies as appropriate.

Section 7.19 - Community / VIPs / Observers

7.19.1 Communities affected by an emergency

Links will be established with the communities affected through their community centres, local community organisations and ethnic organisations. This will be co-ordinated by the Local Co-Ordination / Crisis Management Team and the Key personnel located at the Survivor and Friends & Relatives Reception Centres.

7.19.2 Arrangements for receiving VIPs who wish to visit

Public representatives and other dignitaries may wish to attend the site of the emergency, as well as associated facilities, such as hospitals, to express sympathy on behalf of the public to the injured and bereaved, and to support the emergency response workers.

Visits by dignitaries will usually require security arrangements and liaison with the media. It is important that the organisation of such visits does not distract from the response effort.

All requests for visits to the site or facilities associated with it are to be referred to the Local Co-ordination Group.

Requests for visits to agency specific locations are to be referred to that agency's management. As a general rule, VIPs are to be advised not to visit sites where dangers still exist or where ongoing rescues are in progress.

7.19.3 Arrangements for national / international observers

National and international observers may request to attend the incident. The presence of experts from other regions or jurisdictions, who wish to act as observers at an incident, can greatly enhance the operational debriefings and facilitate the process of learning lessons from the emergency. The Local Co-ordination Group should make arrangements for any such observers.

Section 7.20 - Standing-Down the Major Emergency

7.20.1 Standing down the Major Emergency

A decision to stand down the major emergency status of the incident at the site shall be taken by the On-Site Co-ordinator, in consultation with the other Controllers of Operations at the site and the Local Co-ordination Group. Where organisations other than the Principal Response Agencies have responded, they should be informed of the decision to stand them down by the Controller of Operations of the agency which mobilised them.

A great deal of activity may continue at locations other than the site (such as the hospitals, temporary mortuary, etc.) after the major emergency is stood down at the site. The Local, Regional or National Co-ordination Groups may need to continue their work after activities at the site have ceased.

7.20.2 Operational debriefing and reporting

Following the stand down of the Major Emergency the Local Authority is to carry out an operational debriefing of its involvement in the response and document this debriefing in a report.

A multi-agency debrief will then be held and lessons learned will be incorporated into this Plan. This review should be hosted by the lead agency and involve all services which were part of the response.

Multi-agency debriefs should consider the contribution provided by other, non-emergency service agencies to expand the knowledge and learning process that debriefs should collate. This is notwithstanding the potential conflict of interest that may result in later investigations. This aspect should be considered when inviting agencies other than emergency services to the debrief.

The purpose of the review should be to formulate the lessons learned from the incident in relation to co-ordination and to document these.

A composite report, based on appropriate input from each Principal Response Agency's internal report and the report on co-ordination, on every declared major emergency is to be compiled by the principal response agency which was the initial lead agency for submission within a reasonable timescale to the relevant Regional Steering Group and the National Steering Group.

Section 8 - Agency Specific Elements and Sub-Plans

Cork County Council has prepared a number of specific Sub-Plans of the Major Emergency Plan and these plans can be activated whether a major emergency has occurred or not. *See Appendices 4, 5, 6 & 25*

The existing sub-plans include:

- Severe Weather Plan (other than flooding)
- Flood Emergency Response Plan
- Drinking Water Incident Response Plan
- Oil and Hazardous & Noxious Substances Spill Contingency Plan

Section 9 - Plan for Regional Level Co-ordination

9.1 Introduction

In some situations where a major emergency has been declared and the Major Emergency Plans of the Principal Response Agencies have been activated, it may be appropriate to consider scaling up from a local response to a regional level response. This may occur when:

- the resources available in the local area where the incident has happened do not appear to be sufficient to bring the situation under control in an expeditious and efficient manner; or
- the consequences of the emergency are likely to impact significantly outside of the local area; or
- the incident(s) is spread across more than one Local Authority or Division of An Garda Síochána; or
- the incident occurs at or close to a boundary of several of the principal response agencies.

9.2 Decision to Scale up to a Regional Level response

The decision to scale up from a local to a regional level response will be taken by the chair of the Local Co-ordination Group, in consultation with the chair of the On-Site Co-ordinating Group and the other members of the Local Co-ordination Group. This consultation may occur at a meeting of the Local Co-ordination Group, where such a group is in session or, alternatively, by means of a telephone conference call.

This decision will, by definition, involve specifying those extra principal response agencies which are to be involved in the regional response.

Note: In many Major Emergency situations, neighbouring Garda Divisions, HSE Areas and Local Authorities will provide support and resources to the Garda Division, HSE Area and Local Authority, which are primarily involved in the response. Such support is not equivalent to the activation of the Plan for Regional Level Co-ordination and, in fact, will often precede the activation of the regional plan.

9.3 Response Region

The areas covered by the Principal Response Agencies which are activated under the Plan for Regional Level Co-ordination will constitute the response region for the emergency.

Note: The response region for a regional level major emergency need not coincide (and in many cases will not coincide) with one of the predetermined Major Emergency Management Regions set out in Appendix F4 of the Framework.

9.4 Activation

Once the decision has been taken, the chair of the Local Co-ordination Group will declare that a regional level emergency exists and will activate the Plan for Regional Level Co-ordination by:

- notifying each of the principal response agencies involved that the Plan for Regional Level Co-ordination has been activated;
- requesting that each of the principal response agencies, which has not already activated its Major Emergency Plan, should do so;
- delivering an information message to each principal response agency using the mnemonic METHANE; and
- providing each of the Principal Response Agencies involved with a list of the agencies which are being activated to form the regional response

9.5 Command, Control and Co-ordination of Response

The command and control arrangements at the site(s) of a regional major emergency will be the same as those for a standard major emergency including:

- three Controllers of Operation[1];
- a lead agency determined in accordance with the Framework; and
- an On-Site Co-ordinating Group
- an On-Site Co-ordinator

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[1] In situations where more than one principal response agency from a particular service is represented at the site, there will be only one Controller of Operations from that service and the unit from which the Controller of Operations will come should be determined in accordance with the guidance provided in Appendix F7 of A Framework for Major Emergency Management

9.6 The Regional Co-ordination Group

The mobilisation and operation of the Regional Co-ordination Group will be as per the arrangement for Local Co-ordination Groups set out in *Appendix 2.*

Regional Co-ordination Group arrangements for the following issues will be as for a Local Co-ordination Group.

- the mobilisation of other organisations/agencies;
- requesting mutual aid from neighbours;
- requesting national/international assistance where required;
- dealing with multi site or wide area emergencies;
- linkage to national emergency plans;
- links with Government;
- support for chairs by Information Managers, etc; and
- communication arrangements with the site and with other groups

9.7 Wide Area Emergencies

Some major emergency events (e.g. severe storms, extensive flooding and/or blizzards) may impact over a wide area and, in such a situation, a number of Local Co-ordination Groups may be activated. Where the chair of a Local Co-ordination Group, which has been activated in response to a major emergency, becomes aware that one or more other Local Co-ordination Groups have also been activated, contact should be made with the other chair(s) with a view to considering the establishment of a Regional Co-ordination Centre.

Such a Regional Co-ordination Centre will normally be located at the Local Co-ordination Centre which, in the view of the chairs, is best positioned (in terms of resources, communications and geography) to co-ordinate the activity of the different Local Co-ordination Groups which are active. In such a situation, these Local Co-ordination Groups will continue to act as per standard arrangements and will communicate with the Regional Co-ordination Centre through their chairs.

Note: During a wide area major emergency, each Local Co-ordination Group will be in contact with the lead Government Department (in accordance with Section 5.4.5.5 of the Framework) and, in such a situation, the decision on whether the activities of a number of Local Co-ordination Groups should be co-ordinated via a Regional Co-ordination Centre or via the lead Government Department will be taken in light of the prevailing circumstances.

The Chair of the Local Co-ordination Group may declare a regional level emergency and activate the Plan for Regional Level Co-ordination. The key provision in ensuring co-ordination of the extended response is the activation of a "Regional Co-ordination Group". The primary function of the Regional Co-ordination Group is to maintain co- ordination of the principal response agencies involved from the extended “response region”.

(Please refer to section 6 of this document for a more in-depth look at a Regional Level Major Emergency Response)

Section 10 - Links with National Emergency Plans

10.1 Activation of Major Emergency Plan on request from a body acting under the provisions of one of the following National Emergency Plans:

National Emergency Plan for Nuclear Accidents National Public Health (Infectious

Each Principal Response Agency should provide for working with appropriate national bodies and responding to and activating appropriate aspects of their Major Emergency Plan following requests arising from national emergency situations. *Please refer to section 6.3.4.4/ 6.3.4.5 of this document for further details.*

10.1.1 National Emergency Plan for Nuclear Accidents

Details of specific actions to be taken in the event of a radiological or nuclear emergency are contained in the National Emergency Plan for Nuclear Accidents and the Protocol for Multi-Agency Response to Radiological/ Nuclear Emergencies (Draft).

10.1.2 National Public Health (Infectious Diseases) Plan

Details of specific actions to be taken in the event of an activation of the National Public Health (Infectious Diseases) Plan are detailed in the Dept. of Health Public Health Emergency Plan.

10.1.3 Animal Health Plan

The Department of Agriculture and Food has an emergency plan designed to contain outbreaks of avian influenza in poultry or Foot and Mouth disease should an outbreak occur in this country. Cork County Council will provide assistance under the direction of the lead government department.

10.1.4 Activation on request from Irish Coast Guard

The Major Emergency Plans of the principal response agencies may be activated in response to a request from the Irish Coastguard.

10.1.5 Activation on request from a Minister of Government

The Major Emergency Plans of the principal response agencies will be activated in response to a request from a Minister of Government in light of an emergency/crisis situation.

Section 11 - Severe Weather Plans

11.1 Sub-Plan for responding to:
Flood Emergency Response Plan
Severe Weather Conditions (excluding Flooding Emergencies)

Severe weather emergencies may involve significant threats to infrastructure and support may be required for vulnerable sections of the community. It has been pre-determined the Local Authority will be the lead agency for co-ordinating the response to severe weather events within its functional area.

Arrangements have also been put in place by Met Éireann to issue public service severe weather warnings to the Local Authorities. The target time for the issuing of a warning is 24 hours before the start of the event, but a warning may be issued up to 48 hours in advance when confidence is high. On Fridays before a holiday period it may be appropriate to issue a preliminary warning or weather watch to Local Authorities.

Cork County Council will ensure that effective arrangements are in place to receive and respond promptly to public service severe weather warnings issued by Met Éireann.

The Local and/or Regional Co-ordination Centres for Major Emergency Management may be activated to manage the response to a severe weather event, whether a major emergency is declared or not.

11.1.1 Flooding Emergencies

See Appendix 5 – Flooding Emergency Response Plan

11.1.2 Severe Weather Conditions (Excluding Flooding Emergencies)

See Appendix 4 – Severe Weather Plan (excluding flooding)

Section 12 - Site and Event Specific Arrangements and Plans

12.1 Site and Event Specific Emergency Plans

There are both legislative and procedural arrangements, which require that emergency plans be prepared for specific sites or events (e.g. SEVESO sites, airports, ports, major sports events, etc.). Arising from the risk assessment process described in *Section 3*, Cork County Councils Major Emergency Plan has identified sites/events where specific plans/ arrangements exist for responding to emergencies. These include the following;

- Inter-Agency Emergency Plan for Cork Airport
- Inter-Agency Emergency Plan for the Jack Lynch Tunnel
- Port of Cork Company Emergency Plan
- Bantry Bay Port Emergency plan

The generic response arrangements set out in the *Section 7*, will govern the Principal Response Agencies response to such sites/events and whether a major emergency is declared or not.

12.2 Seveso (COMAH) Sites

The Principal Response Agencies are required to prepare External Emergency plans for upper tier SEVESO establishments under the European Communities (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2006.

In total, there are currently eleven upper tier sites in County Cork. External Emergency Plans are in place for ten upper tier establishments and one is in currently in development for a recently notified site.

Upper Tier SEVESO Sites

No	Company Name	Address
1	Zenith Energy Bantry Bay Terminals Ltd.	Bantry, Co. Cork
2	Calor Gas (Whitegate) Ltd.	Whitegate. Co. Cork
3	Irving Oil (formerly Phillips66) Whitegate Refinery Ltd.	Whitegate. Co. Cork.
4	MarinoChem Ireland Ltd.	Marino Point, Cobh. Co. Cork
5	Eli Lily	Dunderrow, Kinsale. Co. Cork
6	Irish Distillers Ltd.	Midleton. Co. Cork
7	GlaxoSmithKline	Currabinny, Carrigaline. Co. Cork
8	Pfizer Ireland Pharmaceuticals	Ringaskiddy, Co. Cork
9	Novartis Ringaskiddy Ltd.	Ringaskiddy Co. Cork
10	BASF Ireland Ltd.	Little Island. Co. Cork
11	Irish Distillers Ltd.	Dungourney, Co. Cork

There are a total of three upper tier sites located in Cork City Council's function area. These sites are located close to the boundary with Cork County Councils functional area and have the potential to impact on people and property in County Cork

Upper Tier Seveso sites located within Cork City's functional area but with a potential impact on Cork County Council's functional area

No	Company Name	Address
1	Calor Gas (Tivoli) Ltd.	Tivoli Industrial Estate
2	Flogas Plc	Tivoli Industrial Estate.
3	Grassland Agro	Carrigrohane Road, Cork

Lower Tier SEVESO Sites

There are a total of 9 Lower Tier sites in Cork County Councils area. There is no requirement for an External Emergency Plan for lower tier installations. However, the operator is required to have an internal emergency plan in place.

No	Company Name	Address
1	BOC Gases Ireland Ltd.	Little Island. Co. Cork
2	LPGas Filling Services Ltd.	Quarterstown, Industrial Estate, Mallow, Co. Cork
3	ESB Aghada Power Station	Whitegate, Aghada, Midleton, Co. Cork
4	Irish Oxygen Co. Ltd.,	Waterfall, Co. Cork
5	Pfizer Ireland Pharmaceuticals	Little Island, Co. Cork
6	Hovione	Loughbeg, Ringaskiddy, Co. Cork
7	Tervas Ltd.,	Knockburden, Co. Cork
8	Merck Millipore Ireland Ltd.	Carrigtwohill, Co. Cork
9	Janssen Pharmaceutical	Little Island, Cork
10	Carbon Group	Ringaskiddy, Co. Cork

Section 13 - The Recovery Phase

13.1 Support for Individuals and Communities

Although the emergency response stage may have passed, the recovery stage is also important and includes consideration of many strategic issues, which need to be addressed, at both individual principal response agency and inter-agency level, during this phase. The recovery phase can typically include:

- Assisting the physical and emotional recovery of victims;
- Providing support and services to persons affected by the emergency;
- Clean-up of damaged areas;
- Restoration of infrastructure and public services;
- Supporting the recovery of affected communities;
- Planning and managing community events related to the emergency;
- Investigations/inquiries into the events and/or the response;
- Restoring normal functioning to the principal response agencies; and
- Managing economic consequences.

A structured transition from response to recovery is critical for agencies, both collectively and individually. The recovery stage may be as demanding on Cork County Councils resources and staff as the emergency itself, as work may extend for a considerable time after the incident.

13.1.1 Support for individuals and communities during the Recovery Phase

Following an emergency incident, assistance will be required by the victims of the emergency – not only those directly affected, but also family and friends, who may suffer bereavement or anxiety. A major emergency will have a serious effect on a community. The recovery phase should provide support and long term care for individuals involved in the incident and the communities affected by the incident.

It is imperative that Cork County Council restores its services to a pre-emergency state as quickly and efficiently as possible.

The services and staff that Cork County Council can provide are based upon a wide range of skills and resources drawn from its day-to-day operations such as;

- Technical and engineering support
- Building control
- Road & Water services
- Public health and environmental issues
- Provision of reception centres
- Re-housing and accommodation needs
- Transport
- Social services
- Psychosocial support
- Help lines
- Welfare and financial needs

There are specific requirements for each agency in the recovery process. These requirements are:

Local Authority

- Clean-up;
- Rebuilding the community and infrastructure;
- Responding to community welfare needs (e.g. housing); and
- Restoration of services.

An Garda Síochána

- Identification of fatalities;
- Preservation and gathering of evidence;
- Investigation and criminal issues;
- Dealing with survivors;
- Dealing with relatives of the deceased and survivors; and
- Provision of an appropriate response to the immediate public need.

Health Service Executive

- Provision of health care and support for casualties and survivors;
- Support for relatives of casualties and survivors;
- Responding to community welfare needs; and
- Restoration of health services.

13.1.2 Managing of public appeals and external aid

There is a need for the co-ordination of emerging recovery issues, such as managing public appeals and external aid, from the earliest stages of the response phase. For this reason, the arrangements for co-ordination of response should continue to operate during the transition from response stage to recovery stage. At a point when the issues on the agendas of Co-ordination Groups are largely recovery focussed, it may be appropriate to re-title the group as the Local, Regional or National Recovery Co-ordination Group. From the earliest stage, it may be appropriate also for the Local, Regional or National Co-ordination Group to appoint a Recovery Working Group to plan ahead.

Cork County Councils Crisis Management Team will continue to function until the issues arising in the recovery phase are more appropriately dealt with by the agency's normal management processes.

13.2 Clean-Up

In the aftermath of an emergency the clean-up operation in public areas will be the responsibility of Cork County Council (and Site Operator / Landowner if relevant). The removal of debris and contaminated waste is one of the principal concerns for Cork County Council. In consultation with the site operator and the EPA, Cork County Council will commence clean up of a site as soon as possible but without hindering the investigation process. Careful consideration must be provided for the removal of decontaminated debris to locations that will not affect communities.

13.3 Restoration of Infrastructure and Services.

Cork County Council will ensure that its critical services are restored as quickly as possible after a Major Emergency.

13.3.1 Procedures and arrangements for monitoring the situation

At a point when the issues on the agendas of Co-ordination Groups are largely recovery focused, it may be appropriate to re-title the group as the Local, Regional or National Recovery Co-ordination Group. From the earliest stage, it may be appropriate also for the Local, Regional or National Co-ordination Group to appoint a Recovery Working Group to plan ahead. These groups will be responsible for the co-ordination of the recovery phase, managing resources and monitoring the situation until the issues arising are more appropriately dealt with by the normal management processes.

13.3.2 Procedure for liaison with utilities

The utility companies may need to be mobilised in the recovery phase in order to provide essential services such as gas, water and electrical supplies and communications facilities.

13.3.3 How the order of priorities are to be determined

It is the responsibility of the Local, Regional or National Recovery Co-ordination Group together with the Recovery Working Group to priorities events during the recovery phase.

It should be noted that staff welfare arrangements need to be given priority in the recovery stage of an incident, so that the needs of all staff, both emergency response teams and general staff (including management), are catered for. In addition, the needs of staff that are not directly involved in responding to the incident should also be considered.

Section 14 - Review of the Major Emergency Plan

14.1 Internal review process

An internal review of the Major Emergency Plan will be undertaken by Cork County Council on an annual basis, the review should be held every September or on the annual date of implementing the plan. The review should include;

- Updating the roles of individuals that hold key positions in the Major Emergency plan
- Updating the risk holders within the functional area of Cork County Council
- Update names and numbers of utility companies, private companies etc
- Review current risk assessments and update as required.
- Plan exercises

14.2 External Review process

Cork County Councils appraisal will be reviewed and validated by the Regional Steering Group on Major Emergency Management. This appraisal will also be reviewed and validated by the Department of the Environment, Community and Local Government. Any issues arising from the review should be referred back to Cork County Council for appropriate action. In cases of disagreement between Cork County Council and the Regional Steering Group, the National Steering Group should be consulted and should decide on the issue.

The regional level report will also be reviewed and validated by the National Steering Group. Any issues arising from the review should be referred back to the Regional Steering Group on Major Emergency Management for appropriate action.

14.2.1 Review by the Department of Housing, Planning, Community & Local Government

In addition to Cork County Councils Major Emergency Plan being reviewed locally and regionally on an annual basis it must also be reviewed and validated by the Department of Housing, Planning, Community & Local Government. Any issues arising from the review should be referred back to Cork County Council for appropriate action.

14.3 After every activation, the Major Emergency Plan should be reviewed and reported upon

Once the Major Emergency Plan has been stood down, each of the services and agencies involved in the incident will hold a series of operational hot-debriefs. Initially these will be confined to each particular service, but later a multi-agency cold-debrief will be held (Multi-agency debriefs should consider the contribution provided by other, non-emergency service) and lessons learned will be incorporated into future planning preparedness.

14.3.1 How Cork County Councils performance of its functions will be reviewed and reported upon internally

In addition to the review process outlined in the sections above, which takes place annually on a local, regional and national level, the Major Emergency Plan for Cork County Council and the performance of the Cork County Council as a Principal Response Agency will also be reviewed following a major incident within the county/ region or even national, when there is learning to be gained. Should any new risks become apparent in the County, the plan will be reviewed to reflect this.

14.3.2 How the co-ordination function will be reviewed and reported upon externally and jointly with other principal response agencies

Multi-agency debriefs should consider the contribution provided by not only each other but also other, non-emergency service agencies. This is notwithstanding the potential conflict of interest that may result in later investigations. This aspect should be considered when inviting agencies other than emergency services to the 'debrief'.
Multi agency reviews must also be conducted on an annual basis between the principle response agencies on both a local and regional level basis. This will include reviewing and reporting on the co-ordination function of the agencies.

Section 15 - Appendices

Appendix 1: Major Emergency Mobilisation Procedure

Appendix 2: Local Co-ordination Group Representative Mobilisation Procedure

Appendix 3: Confidential Contact Details

- (i) Cork County Council personnel & designation of key roles
- (ii) Regional Steering Group Contact List
- (iii) Regional Working Group Contact List
- (iv) Local Co-ordination Centre & Crisis Management Team Centre Phone-lines

Appendix 4: Severe Weather Plan (other than Flooding)
Appendix 5: Flood Emergency Response Plan
Appendix 6: Drinking Water Incident Response Plan
Appendix 7: External Emergency Plans for Upper Tier Seveso Establishments

- (i) Zenith Energy Bantry Bay Terminals Ltd., Bantry, Co. Cork
- (ii) Calor Gas (Whitegate) Ltd., Whitegate. Co. Cork
- (iii) Irving Oil (formerly Phillips66) Whitegate Refinery Ltd., Whitegate. Co. Cork
- (iv) MarinoChem, Ireland Ltd., Marino Point, Cobh. Co. Cork
- (v) Eli Lily., Dunderrow, Kinsale. Co. Cork
- (vi) Irish Distillers Ltd., Midleton. Co. Cork
- (vii) GlaxoSmithKline, Currabinny, Carrigaline.
- (viii) Pfizer Ireland Pharmaceuticals, Ringaskiddy Drug Substance Plant, Ringaskiddy,
- (ix) Novartis Ringaskiddy Ltd., Ringaskiddy Co. Cork
- (x) BASF Ireland Ltd., Little Island. Co. Cork
- (xi) Calor Tivoli, Tivoli, Cork
- (xii) FloGas Tivoli, Tivoli, Cork
- (xiii) Grassland Agro, Carrigrohane, Cork

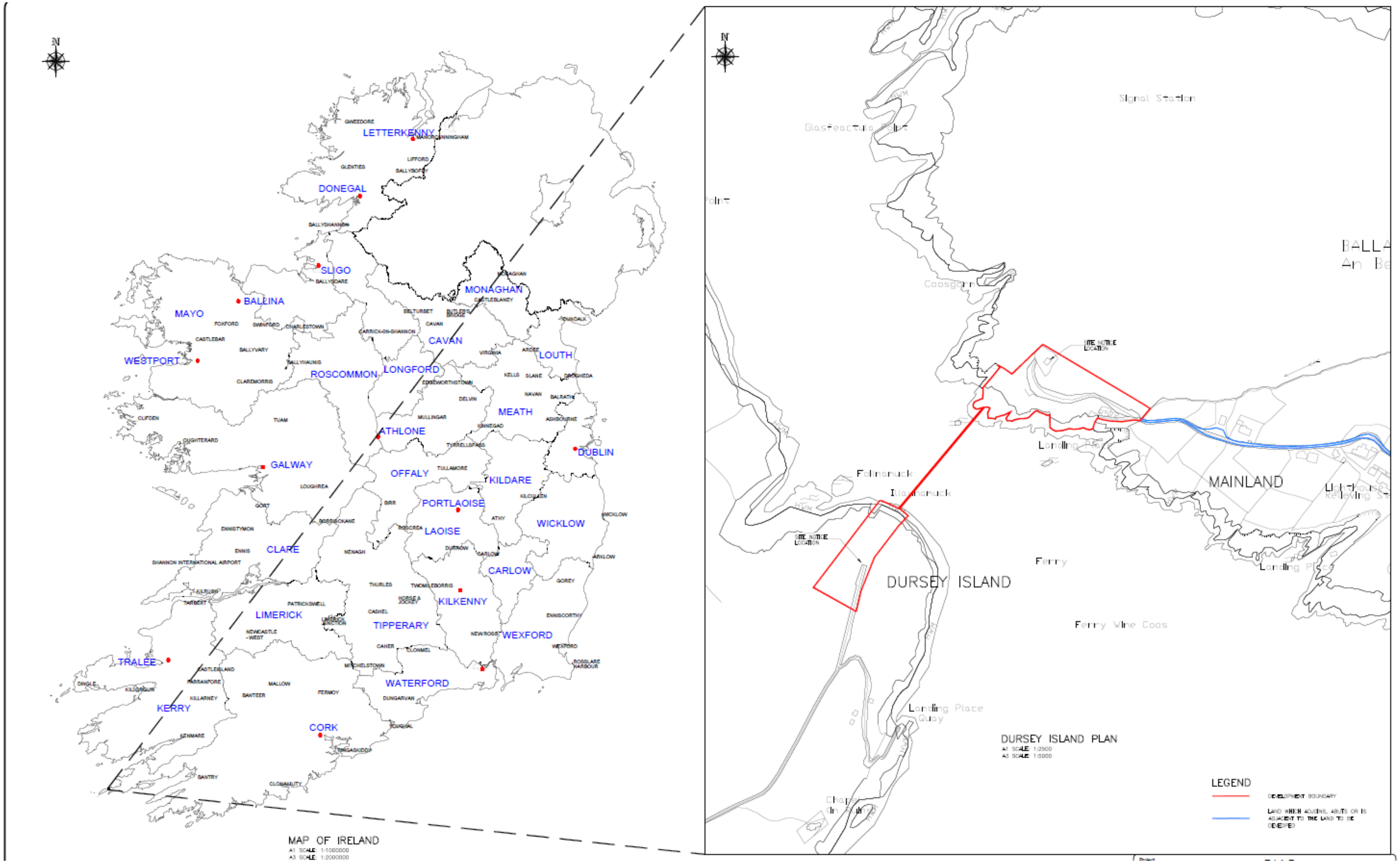
Appendix 8: Regional Contact Details

Appendix 9: Procedure for requesting assistance from the Defence Forces

Appendix 10: Inter-Agency Emergency Plan for Cork Airport

Appendix 11: Port of Cork Emergency Plan
Appendix 12: Bantry Bay Port Emergency Plan
Appendix 13: Glossary of Terms and Abbreviations
Appendix 14: Regional Media Plan
Appendix 15: Site Management Arrangements
Appendix 16: Multiple Fatalities Guide (MEM Region South)
Appendix 17: Pre-nominated Lead Agencies for different Categories of Emergency
Appendix 18: List of Authorised Persons to activate Major Emergency Plan
Appendix 19: Format for Notifying DHPCLG of Declaration of a Major Emergency
Appendix 20: Evacuation Guide (MEM Region South)
Appendix 21: Cork County Council's Contact Centre Arrangements)
Appendix 22: Memorandum of Understanding between NDFEM & EPA
Appendix 23: Voluntary Emergency Services Guide (MEM Region South)
Appendix 24 – Inter-Agency Emergency Plan for the Jack Lynch Tunnel
Appendix 25 – Oil and Hazardous & Noxious Substances Spill Contingency Plan

APPENDIX 4.1A - B
Figure 1 Location Plan


N
LETTERKENNY
DONEGAL
SLIGO
BALLINA
MAYO
WESTPORT
MONAGHAN
CAVAN
LOUTH
LONGFORD
ROSCOMMON
MEATH
ATHLONE
DUBLIN
GALWAY
OFFALY
KILDARE
PORTLAOISE
LAOISE
WICKLOW
CLARE
CARLOW
KILKENNY
LIMERICK
TIPPERARY
WEXFORD
TRALEE
WATERFORD
KERRY
CORK
MAP OF IRELAND
A1 SCALE: 1:1000000
A3 SCALE: 1:2000000
N
Signal Station
SITE NOTICE LOCATION
Landing Place
Foilnanuck
MAINLAND
Ferry
DURSEY ISLAND
Ferry Wire Coos
Landing Place Quay
DURSEY ISLAND PLAN
A1 SCALE: 1:2500
A3 SCALE: 1:5000
LEGEND
DEVELOPMENT BOUNDARY
LAND WHICH ADJOINS, ABUTS OR IS ADJACENT TO THE LAND TO BE DEVELOPED

Prepared By

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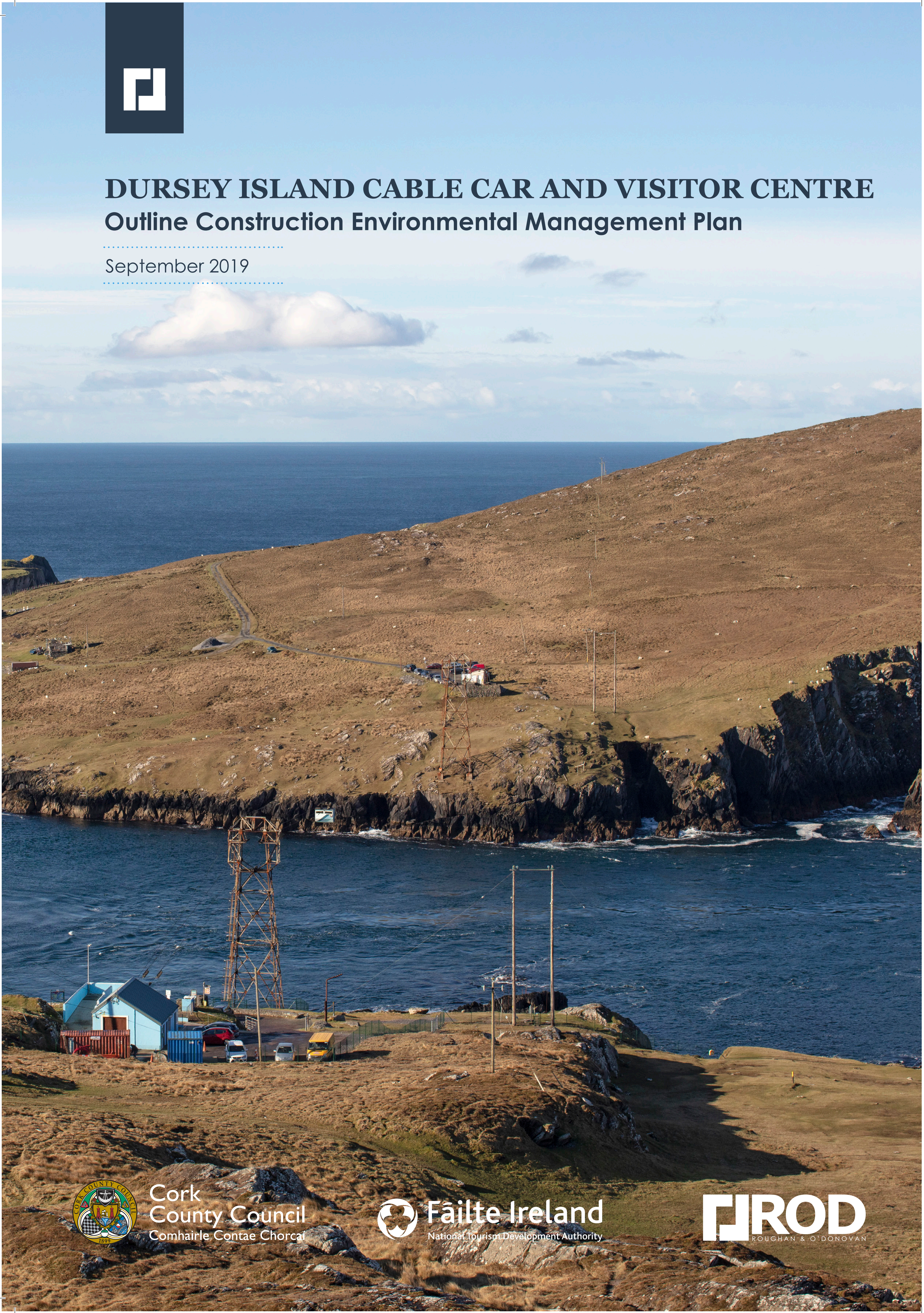
Appendix 4.1B Outline Construction Environmental Management Plan

Cork
County Council
Comhairle Contae Chorcaí

Fáilte Ireland
National Tourism Development Authority

ROD
ROUGHAN & O'DONOVAN



DURSEY ISLAND CABLE CAR AND VISITOR CENTRE
Outline Construction Environmental Management Plan

September 2019

Cork
County Council
Comhairle Contae Chorcaí

Fáilte Ireland
National Tourism Development Authority

ROD
ROUGHAN & O'DONOVAN

Dursey Island Cable Car and Visitor Centre

Outline Construction Environmental Management Plan

TABLE OF CONTENTS

1. INTRODUCTION

This document sets out the Outline Construction Environmental Management Plan (CEMP) for the construction of the Dursey Island Cable Car and Visitor Centre Project on behalf of Cork County Council.

This OCEMP applies to all works associated with the construction of the proposed civil works, including the pre-construction site clearance works.

As a contractor has not yet been appointed, the CEMP has not been formally adopted and further development and commitment to the Outline CEMP will be undertaken following selection of the Contractor and before commencement of site works.

The Outline CEMP provides the environmental management framework for the appointed Contractors and Sub Contractors as they incorporate the mitigating principles to ensure that the work is carried out with minimal impact on the environment. The construction management staff as well as Contractors and Sub Contractors staff must comply with the requirements and constraints set forth in the Outline CEMP in developing their CEMP. The key environmental aspects associated with the construction of the Dursey Island Cable Car and Visitor Centre and the appropriate mitigation and monitoring controls are identified in this Outline CEMP and its supporting documentation.

The implementation of the requirements of the Outline CEMP will ensure that the construction phase of the project is carried out in accordance with the commitments made by Cork County Council in the planning application process for the development, and as required under the conditions of the planning approval. Once commenced, the CEMP is considered a living document that will be updated according to changing circumstances on the project and to reflect current construction activities. The CEMP will be reviewed on an ongoing basis during the construction process and will include information on the review procedures.

1.1 Roles and Responsibilities

The Contractor is responsible to ensure that all members of the Project Team, including sub-contractors, comply with the procedures set out in the CEMP. The Contractor will ensure that all persons working on site are provided with sufficient training, supervision and instruction to fulfil this requirement.

The Contractor will ensure that all persons allocated specific environmental responsibilities are notified of their appointment and confirm that their responsibilities are clearly understood. The principal environmental responsibilities for key staff can be identified as follows:

1.1.1 Site Manager

The Site Manager’s environmental management responsibilities include but are not limited to:

- preparation and implementation of the CEMP;
- close liaison with the Site Environmental Manager (SEM) to ensure adequate resources are made available for implementation of the CEMP;
- ensuring that the risk assessments for control of noise and environmental risk are prepared and effectively monitored, reviewed and communicated on site; and

- managing the preparation and implementation of method statements; and
- ensuring that the SEM reviews all method statements and that relevant environmental protocols are incorporated and appended.

1.1.2 Site Environmental Manager (SEM)

The responsibilities of the SEM include, but are not limited to:

- Maintaining environmental records;
- Providing guidance for the site team in dealing with environmental matters, including legal and statutory requirements affecting the works;
- Reviewing environmental management content of method statements;
- Reporting environmental performance to the Site Manager;
- Liaison with statutory and non-statutory bodies and third parties with an environmental interest in the scheme; and
- Collection and collation of CEEQUAL (Civil Engineering Environmental Quality Assessment and Award Scheme) evidence.

1.1.3 Engineering Staff

The engineering staffs' environmental management responsibilities include but are not limited to:

- Reporting any operations and conditions that deviate from the CEMP to the Site Manager;
- Taking an active part in site safety and environmental meetings; and
- Ensuring awareness of the contents of method statements, plans, supervisors' meetings or any other meetings that concern the environmental management of the site.

1.1.4 Supervisors

The supervisors' environmental management responsibilities include but are not limited to:

- Ensuring all personnel affected by a method statement are briefed and fully understand its content. Monitor operatives for compliance, including sub-contract operatives;
- Implementation of environmental management activities required by the CEMP and works method statements; and
- Ensuring that all inspections are carried out as prescribed in the CEMP.

1.2 Training and Induction

1.2.1 Site Induction

All personnel involved in the proposed development will receive environmental awareness training. The environmental training and awareness procedure will ensure that staff are familiar with the principles of the CEMP, the environmental aspects and impacts associated with their activities, the procedures in place to control these impacts and the consequences of departure from these procedures.

1.2.2 Specific Training and Awareness Raising

A project specific training plan that identifies the competency requirements for all personnel allocated with environmental responsibilities will be produced by the Contractor. Training will be provided by the Contractor to ensure that all persons working on site have a practical understanding of environmental issues and management requirements prior to commencing activities. A register of completed training is to be kept by the SEM. The Site Manager will ensure that environmental emergency plans are drawn up and the SEM will conduct the necessary training/inductions.

2. DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.1 Project Description

The proposed development comprises the construction of a new cableway connecting the easternmost tip of Dursey Island with the townland of Ballaghboy, on the western end of the Beara Peninsula in west County Cork. The development of associated structures, including a visitor interpretive centre and café on the mainland as well as the decommissioning of the existing Dursey island cableway will also take place. The proposed cableway will run parallel to the existing alignment offset by approximately 14m to the north, with the end-to-end length of 375m.

The proposed development will include the construction/completion of the following elements at the site of the existing Dursey Island cableway:

- Erection of a two-car desynchronised reversible ropeway cableway ('cableway' hereafter)[1] with a capacity of 200-300 passengers per hour in each direction;
- Erection of two supporting line structures ('pylons' hereafter) - one on the mainland and one on the island;
- Construction of a mainland-side drive station ('mainland station' hereafter) including all necessary operating machinery, facilities for operating staff, and a platform for embarking/disembarking;
- Construction of an island-side return station ('island station' hereafter) including all necessary operating machinery, platform for embarking/disembarking, a sheltered waiting area and welfare facilities;
- Construction of a mainland-side interpretive exhibition centre with a gift shop ('Visitor Centre' hereafter);
- Construction of a mainland-side café with seating for 40 indoors, an additional 44 seats on an outdoor terrace/balcony overlooking the Dursey Sound, and welfare facilities;
- Construction of a mainland-side visitor car park with approx. 100 no. parking spaces and 1 no. bus bay;
- Retention of the existing residents' car park on Dursey Island;
- Upgrades of associated utilities infrastructure (including mainland water supply and telecommunications connectivity and mainland and island wastewater treatment systems);
- Completion of road improvement works (construction of 10 no. passing bays, 1 no. visibility splay at Bealbarnish gap (hereafter referred to as '11 no. passing bays') and completion of a number of local improvements to improve visibility) on an 8km stretch of the mainland-side approach road R572 (between the R572-R575 junction at Bealbarnish Gap and the mainland side of the cable car site);

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[1] The term 'Cable Car' refers to the carrier cabin which conveys passengers to and from the island via the cableway.

- Demolition/removal of some elements of the existing cableway infrastructure (ropeway, island-side pylon), mainland-side visitor car park and island and mainland station buildings;
- Erection of interpretive/informative signage at strategic locations;
- Erection of 4 no. Variable Message Signs (VMS) at four locations along the approach roads to the site:
    1. Bealbarnish Gap;
    2. R572 at Castletownbere;
    3. R575 at Eyeries Cross; and
    4. N71 at Glengarriff;
- Retention of the cable car, mainland pylon and a section of the mainland-side hauling machinery of the existing cableway in order to facilitate ongoing appreciation of their industrial architectural and cultural heritage value;
- Soft and hard landscaping; and
- All other ancillary works.

2.2 Pre-Construction

Site Preparation

Elements of the site preparation works may be conducted through an advance works contract to be completed before construction commences on site. Prior to any work commencing on the mainland or island sites, boundary security will be required to be established around the site to prevent unauthorised access. The boundary will be laid out so as to maintain safe access to the existing cableway, to maintain the aforementioned public right of way, and to maintain a portion of the existing parking facilities, where possible. Appropriate environmental protection measures will be put in place on both sites. These are expected to include measures to prevent run-off from the site entering the sound. Site clearance works will be carried out on the mainland site, island site and at the location of all proposed passing bays along the R572 approach road, over the extents indicated on the drawings. Existing overhead lines will be diverted or maintained and protected throughout the works as required by the contract. It is not expected that there will be any interruptions to local utility services as a result of any diversions carried out.

Sourcing of Materials

There are several registered/authorised quarries near the proposed development which may be utilised in the sourcing of the required imported granular fill material. Only those quarries that conform to all necessary statutory consents will be used in the construction phase.

2.3 Construction Stage

The main construction elements and activities of the development are as follows:

- Site preparation including establishment of boundary security, site clearance, and diversion, removal or protection of existing services as necessary;
- Approach road improvement works;
- Earthworks (cutting and filling);
- Construction of cableway infrastructure – 2 no. stations, 2 no. pylons and installation of cableway machinery, ropes and cable cars;
- Buildings and associated services and civil works:

  - Visitor Centre / gift shop;
  - Café with toilet block;
  - Mainland station building (drive station) with staff facilities, workshop and storage;
  - Energy Centre;
  - Island station building (return station) with welfare facilities;
- Pavement, drainage and wastewater treatment installations;
- Landscaping and finishes

Approach Road Improvement Works and VMS

These works will include a combination of the following at each location:

1. Temporary traffic management;
2. Site clearance (including demolition of 1 no. disused building);
3. Minor earthworks;
4. Pavement widening works;
5. Signage and road markings; and,
6. Boundary treatment – reinstatement of fencing and walls.

It is also proposed to install 4 no. VMS at the following locations:

1. Castletownbere town;
2. R575 and R571 junction south of Eyeries;
3. R572-575 junction at Bealbarnish Gap;
4. Glengarriff village.

These works will include site clearance, minor excavations for foundations, casting of concrete foundations and installation of VMS posts and displays. There is an existing electricity connection available at each of the proposed sites. The signs will be connected into the existing supply, which will necessitate the laying of a short length of new ducting and the installation of new mini-pillars.

Reinforced Concrete Retaining Wall along Southern Boundary of Mainland Site

The rock excavated from the site will be used as back-fill to the proposed retaining wall, which will run along the southern boundary of the site. Therefore, it is likely that the Contractor will construct the wall in advance of any rock-breaking so that the excavated material can be processed and deposited immediately, in order to avoid the need to stockpile the material for a period of time. Construction of the wall will include the following activities:

1. Earthworks carried out to provide a flat formation level.
2. Steel fixing put in place to form reinforcement cages for higher sections of the wall. It is likely that the Contractor will assemble the cages at ground level and crane them into position.
3. Shuttering and pumping of concrete is carried out.
4. Formwork is removed, and waterproofing and back-of-wall drainage is installed.
5. Backfilling of walls using material won on site and/or imported fill material is carried out. Backfill material will be placed and compacted in layers, as required by the contract specification.

Earthworks

Cutting will be required to the rear (north-east) of the existing mainland car park in order to provide space for the proposed upper tier of parking. Backfilling will also be required to level the site along the seaward edge of the existing car park to accommodate the proposed buildings. The cutting will predominantly consist of rock-breaking. With careful planning it will be possible to balance the cut and fill volumes to some extent. It is highly likely that the excavated rock will form an acceptable fill material for levelling the site and for capping/pavement purposes. Topsoil will be stripped and reused, where possible. Relatively minor earthworks will be required on the island and at some of the proposed passing bay locations along the R572. On the mainland, an approximation of the proposed volume of cut material is 6,500m^3, while the requirement for fill to the required formation levels is 8,600m^3. However, when the volume of the retaining walls is taken into account and bulking of the excavated material is allowed for (crushed rock has a greater volume than solid rock), the cut and fill volumes will approximately balance.

Cableway works

Initially, reinforced concrete pad foundations will be constructed for the cableway pylons and stations. The stations will require relatively large concrete pads measuring approximately 9 x 9 m in plan by 1.2 m deep. The pylon foundations will measure approximately 5 x 5 m in plan by 0.6 m deep. All pads will bear directly on the existing bedrock which is at high level throughout the site. Construction of the pads will include the following construction activities:

1. Earthworks will be required to excavate down to formation level, as the pad foundations will be buried.
2. Steel fixing will be put in place to form reinforcement cages.
3. Shuttering and pumping of concrete will be carried out. It is anticipated that ready-mix concrete will be delivered to site for the mainland works. On-site mixing will likely be necessary for the island site concreting works.
4. Striking of formworks and application of waterproofing system will be carried out.
5. Pad foundations will be backfilled.

Each pylon foundation will also include a raised concrete plinth which will be cast as one with the pad. The plinths will not be buried and, as such, the durability of these components poses a significant concern. Given the severity of exposure conditions at the proposed pylon locations, stainless steel reinforcement is proposed for the pylon plinths. The holding-down anchors for the pylons will be cast into the plinths.

The mainland and island pylons will be of tubular steel construction and will be 33.5 m and 21.7 m high, respectively. Sections of the tubular steel pylons and the cableway machinery will be transported to site by road (and by ferry for island works), craned into position using a mobile crane and bolted and/or welded together on site. In order to get a suitable crane sufficiently close to the lifting site, it may be necessary to construct a temporary access road branching off the existing road to the proposed pylon locations at both the mainland and island sites. Once the pylons have been erected and the cableway mechanical and electrical equipment installed on both the mainland and island sites, the cableway ropes will be hung and tensioned. As per normal practice, it is assumed that the cableway ropes will be airlifted into position using a helicopter. Finally, the cable cars will be raised onto the ropes. Rigorous testing will be carried out at various stages throughout the process as well as prior to commissioning.

Buildings

The following buildings will be constructed as part of the proposed development:

Mainland site:

- Visitor Centre (including gift shop);
- Café (including toilet block);
- Mainland station building (drive station) with staff facilities, workshop and storage area to rear; and,
- Energy Centre.

Island site:

- Island station building (return station) with welfare facilities; and,
- Sheltered waiting area.

All buildings are single storey structures and will include the following construction activities:

1. Development of site services, surface water drainage, foul drainage and water supply. The most significant works relate to the installation of the mainland wastewater treatment system. This will include the installation of large pre-cast concrete tanks and importing material to form a polishing filter/percolation area.
2. Development of building substructures – excavation for foundations and pouring of concrete will be required.
3. Construction of building superstructures – this will include the following works:
    - Construction of reinforced concrete floor slabs and walls;
    - Laying of concrete blockwork;
    - Cranage and installation of structural steelwork; and,
    - Installation of roofing systems.
4. The plant and workshop building to the rear of the mainland station will be constructed last to maintain access to the existing mainland station building for as long as possible.
5. Installation of glazing and fixing of cladding systems will be carried out.
6. Fit-out of all buildings and connection of services will be carried out.

Careful sequencing of the building works will be required to ensure the existing cableway can remain operational throughout the construction works (insofar as possible). Construction equipment and machinery such as a tower crane may be installed on a temporary platform erected in the sloped area in front of the existing car park, minimising disruption and interference with the main access road.

Cark Park and Landscaping

The following works are considered to be main construction activities for the car park and landscaping element of the development:

1. Construction of the reinforced concrete wall, faced in stone, separating upper and lower tiers of visitor car park and construction of access steps: the activities required for these works are the same as those described above for the southern boundary wall works.
2. Pavement works for car parks and other paved areas (mainland and island) will be carried out. Paving machinery and asphalt compacters/rollers will be

required to lay the bituminous surfacing on the roadway running through the car park. Permeable grasscrete will be employed for parking spaces. The grasscrete elements will be put in place by pouring concrete onto pre-placed patterned formers and mesh, and levelled to the top of the formers. The formers will then be melted away using a flame gun. The patterned voids left behind are then top soiled and seeded.

3. Decommissioning of the existing cableway and demolition of those existing components to be removed.
4. Landscaping finishes and interpretive elements are completed. These works will include planting, grass seeding, and the installation and connection of low-level lighting bollards.

Project Programme

It is expected that the construction work will commence in October 2021 and that the duration of the construction period will be approximately 18 months (see Table 2.1). Since visitor numbers to the site are especially high during the summer months, and since it will be necessary to maintain the operation of the existing cableway throughout the construction phase (insofar as possible), earthworks will be carried out during the off-season (October – April), where possible.

The following is an envisaged indicative construction programme, assuming that each construction phase will follow on from the previous. This proposed phasing is an outline as to how the site is envisaged to be developed. The order of works, however, may be subject to change as development commences on site. Provided the construction programme unfolds accordingly, the envisaged first year of operation of the proposed development is 2023.

Table 2.1 Envisaged construction programme for the proposed development

Element of works:	Duration (months)	Expected Completion Date
Approach Road Improvement Works	3	Jan 2022
Earthworks and Retaining Walls	4	April 2022
Cableway Works (mainland & Island)	2	June 2022
Buildings (mainland & Island)	12	April 2023
Car park and Landscaping	2	April 2023
Decommissioning of existing Cableway & Final Landscaping	1	April 2023

2.4 Construction Procurement

The estimated cost of the Dursey Island Cable Car and Visitor Centre Development is in the region of €9 – 10 million, exceeding the current €5,225,000 threshold for public works contracts. Therefore, it is proposed that this works contract will be advertised on eTenders and in the OJEU.

The procurement approach to be used will be decided by CCC. The pre-selection criteria will be related and proportionate to the subject matter of the contract. The criteria will be geared towards selecting competent Contractor(s) with experience and appropriate technical and professional ability in building construction and fit-out of specialist equipment. The criteria will also be targeted towards selecting Contractor(s) with experience of working in environmentally sensitive locations.

It is proposed that the form of contract for the main building and civil works will be Employer-designed with the possibility of identifying the cableway supplier as a novated specialist, requiring further consideration.

Working Close to European Designated Sites
Consultation has taken place with the National Parks and Wildlife Services (NPWS) and their comments/observations with regard to preventing impacts on protected bird species and measures and controls for water quality protection have been adopted within this plan.

3. OUTLINE CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

The CEMP will be developed by the contractor to meet the requirements of ISO 14001 and all site works will be undertaken in compliance with the CEMP. The CEMP shall include details of the topics listed below, further information on which is given in the following section.

- Environmental Policy;
- Environmental Aspects Register;
- Project Organisation and Responsibilities;
- Project Communication and Co-ordination;
- Training;
- Operational Control;
- Checking and Corrective Action;
- Environmental Control Measures; and
- Complaints Procedure.

The Construction Environmental Management Plan (CEMP) details all the environmental aspects and impacts associated with this contract such as waste management, pollution prevention and protection of flora and fauna with particular emphasis on the Special Area of Conservation (SAC), Special Protection Area (SPA), proposed Natural Heritage Area (pNHA) and Water Quality in the watercourses. The Register of Impacts provides the framework for identifying the potential environmental impacts generated by construction and the associated works. The Environmental Operational Control Procedures and activity specific method statements will detail the working methods necessary for managing and mitigating these impacts, whether it is by prevention or mitigation. Prior to the commencement of construction activities, the Environmental Operational Control Procedures and activity specific method statements will be completed so as to conform to precise site-specific requirements at the location of the proposed development.

3.1 Environmental Policy

The contractor will complete an Environmental Policy with consideration for impacts on the natural and built environment. All project personnel will be accountable for the environmental performance of the project and will be made aware of the Environmental Policy at induction. The environmental policy will consider and make commitments with regard to the protection of Natura 2000, pNHA and NHA sites, emissions to the atmosphere, maintenance of water quality, resource usage energy consumption and waste management.

3.2 Environmental Aspect Register

Once appointed, the Contractor will prepare a register of all sensitive environmental features which have the potential to be affected by the construction works, together with details of commitments and agreements made within the Environmental Impact Statement, the Contract Documentation, Planning conditions imposed by the local authority, and conditions identified by Statutory Authorities with regards mitigation of potential impacts.

The Environmental Aspects Register provides the relevant information for the preparation of construction method statements and will be regularly updated during the works.

The Environmental Aspects Register will consider sensitive environmental features as listed below (please note this list is not exhaustive and will be amended and expanded upon as required by the contractor).

The Environmental Aspects Register will consider sensitive environmental features as listed below (please note this list is not exhaustive and will be amended and expanded upon as required by the contractor).

- Identification off all waterways for the protection against ingress of suspended solids or any pollutant;
- Air emissions;
- Noise and Vibration emissions;
- Light emissions;
- Waste generation;
- Use hazardous materials;
- Energy usage;
- Water usage;
- Discharge of wastewater;
- Traffic generation;
- Biodiversity;
- Landscape and Visual impacts;
- Hydrogeology; and
- Archaeology and Cultural Heritage.

3.3 Project Organisation and Responsibilities

The CEMP will define the roles and responsibilities of the project team. The overall responsibility lies with the Project Manager whose responsibility it will be to approve key personnel required for employment on the project. He/She will liaise with the SEM.

The Project Manager will lead the works on site. He/She will be responsible for the management and control of the activities and will have overall responsibility for the implementation of the CEMP. He/She will be assisted by the Site Environmental Manager who will act as his/her deputy.

The Site Environmental Manager will prepare and implement all aspects of the CEMP.

Project Manager

The Project Managers main duties and responsibilities in relation to the CEMP include liaising with the Project Team in assigning duties and responsibilities in relation to the CEMP to individual members of the main contractor's project staff.

Site Environmental Manager (SEM)

The main duties and responsibilities of the SEM include and are not limited to the following:

- Have regard to all legislation and guidance in relation to protection of the environment with particular focus on the habitats and species of the European protected sites;
- Liaise with the Construction Manager during the finalisation of the CEMP to assign individual duties and responsibilities bearing in mind the overall organisational structure, the nature of the Environmental Commitments and Requirements and the proposed development specific characteristics;
- Ensuring that the CEMP is finalised, implemented and maintained;
- Liaising with Cork County Council’s (CCC’s) Environmental Manager on all Method Statements, any alternations to live documents and any other works to ensure protection of water quality
- Being familiar with the information in the pre-construction surveys, construction Requirements, An Bord Pleanála and Planning Service decision and all relevant Method Statements;
- Being familiar with the contents, environmental commitments and requirements continued within the reference documentation listed in this CEMP;
- Being familiar with the baseline data collated during the compilation of the EIAR;
- Assisting Management in liaising with the Engineers and WCCC and the provision of information on environmental management during the construction of the Project;
- Liaising with the Project Team in assigning duties and responsibilities in relation to the CEMP, to individual members of the main contractor's project staff;
- Overseeing, ensuring coordination and playing a lead role in third party consultations required statutorily, contractually and in order to fulfil best practice requirements;
- Liaising with Management in agreeing site specific Method Statements with Third Parties;
- Ensuring that all relevant woks are undertaken in accordance with the relevant legislation in the Republic of Ireland;
- Bring any legal constraints that may occur during certain tasks to the attention of management;
- Hold copies of all permits and licenses provided by waste contractors;

- Ensuring that any operations or activities that require certificates of registration, waste collection permits, waste permits, waste licences, etc have appropriate authorization;
- Gathering and holding documentation with respect to waste disposal;
- Keeping up to date with changes in environmental practices and legislation and advising staff of such changes and incorporating them into the CEMP;
- Liaising with contactors and consultants prior to works;
- Procuring the services of specialist environmental contactors when required;
- Ensuring that all specialist environmental contactors are legally accredited and proven to be competent;
- Coordinating all the activities of the specialist environmental contractors;
- Ensuring that Environmental Induction Training is carried out on all personnel on site and ensuring that tool box talks include aspects of Environmental Awareness and Training;
- Respond to all environmental incidents in accordance with legislation, the CEMP and company policy/procedures;
- The SEM is responsible for notifying the relevant statutory authority when environmental incidents occur and producing the relevant reports as required;
- Ensuring that all relevant works have (and are being carried out in accordance with) the required permits, licenses, certificates and planning permissions;
- Liaising with the designated licence holders and specific agent defined in the licence with respect to licences granted pursuant to the European Commission (EC) (Natural Habitats) Regulations 1997;
- Carrying out regular documented inspections of the site to ensure that work is being carried out in accordance with the Environmental Control Measures and relevant site-specific Method Statements;
- The SEM should prepare and be in readiness to implement at all times the Emergency Incident Response Plan;
- Responsible for reviewing all environmental monitoring data and ensuring that they all comply with stated guidelines and requirements; and
- Liaising with management in preparing and inspection of site-specific method statements for activities where there is a risk of pollution or adverse effects on the environment.

Design Manager

The main duties and responsibilities of the Design Manger having regard to the implementation of the Construction Environmental Management Plan (CEMP):

- Be familiar with the CEMP and relevant documentation referred to within;
- Participate in Third Party Consultations and liaising with third Parties through the SEM;

Section Managers and Agents

The Section Managers and Agents are responsible for the following:

- Ensuring Forepersons under his/her control adhere to the relevant Environmental Control measures and relevant site-specific Method Statements, etc.

- Ensuring that the procedures agreed during third party consultations are followed;
- Reporting immediately to the Site Environmental Manager any incidents where there has been a breach of agreed environmental management procedures, where there has been a spillage of a potentially environmentally harmful substance, where there has been an unauthorised discharge to ground, water or air, damage to habitat, etc.
- Attending Environmental review Meeting and preparing any relevant documentation as required by Management.

Forepersons

The forepersons on site are responsible for the following:

- Ensuring personnel under his/her control adhere to the relevant environmental control measures and relevant site-specific Method Statements;
- Reporting immediately to the site agents and SEM any incidents where there has been a breach of agreed procedures e.g. spillages and discharges.

All Project Personnel

All project personnel have the following responsibilities:

- Attend environmental training as required;
- Reporting immediately to the Forepersons/Agents or Site Environmental Manager any spillage incidents or observations regarding adverse effects to the Environment.

3.4 Project Communication and Co-ordination

Environmental issues and performance aspects will be communicated to the workforce on a regular basis. Weekly project meetings, which follow a set agenda incorporating Environment, will be held alongside overall management meetings.

All staff and sub-contractors involved in all phases of the project will be encouraged to report environmental issues.

3.5 Training

All employees and subcontractors involved on site will be given a comprehensive induction prior to commencement of the works. This environmental training can be run concurrently with safety awareness training.

Training will include:

- Overview of the Environmental Policy and Environmental Management Plan, goals and objectives;
- Awareness in relation to risk, consequence and methods of avoiding environmental risks as identified within the Register of Aspects and with the planning conditions;
- Awareness of roles and individual environmental responsibilities and environmental constrains to specific jobs;
- Location of and sensitivity of Special Area of Conservations, Special Protection Areas, protected monuments, structures etc.
- Location of habitats and species to be protected during construction, how activities may affect them and methods necessary to avoid impacts.

A record will be kept of a signed register on the project files of all attendee of the environmental induction.

Toolbox talks based on specific activities being carried out will be given to personnel by the nominated project representative. These will be based on specific activities being carried out and will include environmental issues particular to the Project, including the impact on bird populations and water quality namely:

- Oil/Diesel spill prevention and safe refuelling practice;
- Storage of materials including oil/diesels and cement;
- Emergency response processes used to deal with spills;
- Minimising disturbance to wildlife;
- Emergency response to include water pollution hotline to the EPA/CCC for regulator response. Identification of registered / accredited spill cleanup company for oil etc.; and
- Consideration of importance of containment of vehicle washing, containments of concrete /cement / grout washout etc, bank protection using hessian to prevent excessive scour and mobilisation of suspended solids, maintenance of vegetation corridors etc.

3.6 Operational Control

Site works will be checked against the CEMP requirements. Any mitigation measures that have been agreed with the Statutory Authorities, or are part of planning conditions, will be put into place prior to the undertaking of the works for which they are required and all relevant staff will be briefed accordingly.

Method statements that are prepared for the works will be reviewed / approved by the Client Project Manager and were necessary the relevant Environmental Specialist. All method statements for works in, near or liable to impact on a waterway must have prior agreement with IFI and NPWS.

A Quality Management System (QMS) will also be put into operation for the project. Document control will be in accordance with this QMS and copies of all audits, consents, licences, etc will be marinated by the Site Environmental Manager and his team and kept on site for review at any time.

3.7 Checking and Corrective Action

Daily inspections of the site and the works will be undertaken to minimise the risk of environmental damage and to ensure compliance with the CEMP. Any environmental incidents are to be reported immediately to the Site Foreman. The Site Environmental Manager will undertake periodic inspections and complete an assessment of the project’s environmental performance with regard to the relevant standards/legislation and the contents of the CEMP. Following these inspections, the Site Environmental Manager will produce a report detailing the findings which will be provided to the Client Project Manager and reviewed at the monthly project meeting.

3.8 Environmental Control Measures

Licensing requirements will be in place and Specific procedures to manage the key environmental aspects of the project will be developed by the contractor prior to work commencing.

3.9 Complaints Procedure

A liaison officer will be available to allow for member of the pubic or interested parties to make complaints about the construction works. The CEMP will contain details of the complaints procedures and a monitoring system will be implemented to ensure that any complaints are addressed, and satisfactory outcome is achieved for all parties

3.10 Compliance with Project Consents

If planning permission is granted for the proposed development, the entire contents of the planning consent as well as the foreshore licence/lease, and other consents and conditions, shall be appended as received.

4. Environmental Commitments

Project environmental mitigation has been set out in the application documentation, in the EIAR and NIS in particular and will be detailed in the final CEMP in accordance with this outline CEMP. The final CEMP will provide a framework for compliance auditing and inspection to ensure that these construction practices and mitigation measures as set out in the EIAR and NIS and the conditions in the planning approval are adhered to. It should be noted that Section 4.1 details the key mitigation measures which are outlined in the NIS, while Appendix A details the mitigation measures which are outlined in the EIAR.

4.1 Mitigation Measures – Natura Impact Statement

4.1.1 Visitor Management

Red – billed Chough

Current visitor numbers (2017/18) to Dursey Island are approximately 20 424 per year (Table 4.3). Visitor numbers are highly seasonal, with between 140 and 313 visitors per month during the winter months (November to February, inclusive; 2017/18) and 4954 and 4943 per month during the peak months of July and August, respectively, when the cable car operates continuously and at capacity from 9:30 a.m. to 7:30 p.m. seven days a week[2] (Table 4.3). Thus, over the two peak months of the year, Dursey receives approximately 50% of its annual visitor numbers. If it were not for the limited capacity and turnover of the cable car, it is highly likely that more people would travel to the island during these peak months.

The proposed development will increase the capacity and turnover of the Dursey Island cable car substantially, allowing a greater number of visitors to the island. At the commencement of the Design Stage, Cork County Council decided that the proposed development should be designed to accommodate no more than 100 000 visitors annually, with no more than 80 000 of these being permitted to make the cable car journey to Dursey Island, in spite of the fact that the cableway infrastructure could potentially accommodate many more[3]. Assuming the monthly profile of visitor numbers (Plate 4.1) were to remain the same, there would be a fourfold increase in visitor numbers during each month of the year (including during the chough breeding and fledging season). However, it is unlikely that this increase in visitor numbers would be distributed proportionately across the year. Rather, it is most likely that

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[2] From 9:30 a.m. to 9:30 p.m. on 5th-7th July and 2nd-5th August.

[3] Each carrier cabin in the proposed cableway will accommodate c. 15 persons. Depending on the velocity of the cabins and the cabin layout, the cableway will be able to convey between 170 and 330 persons per hour in each direction, and there are two carrier cabins in the proposed design. Given typical operating hours (10 hours per day), the cableway could transport between 3,400 and 6,600 persons to the island each day.

demand would continue to be concentrated during the summer months of July and August. Thus, without control measures in place, the number of visitors on the island during July and August (when choughs are breeding, nesting and fledging) could be over four times greater than it is at present.

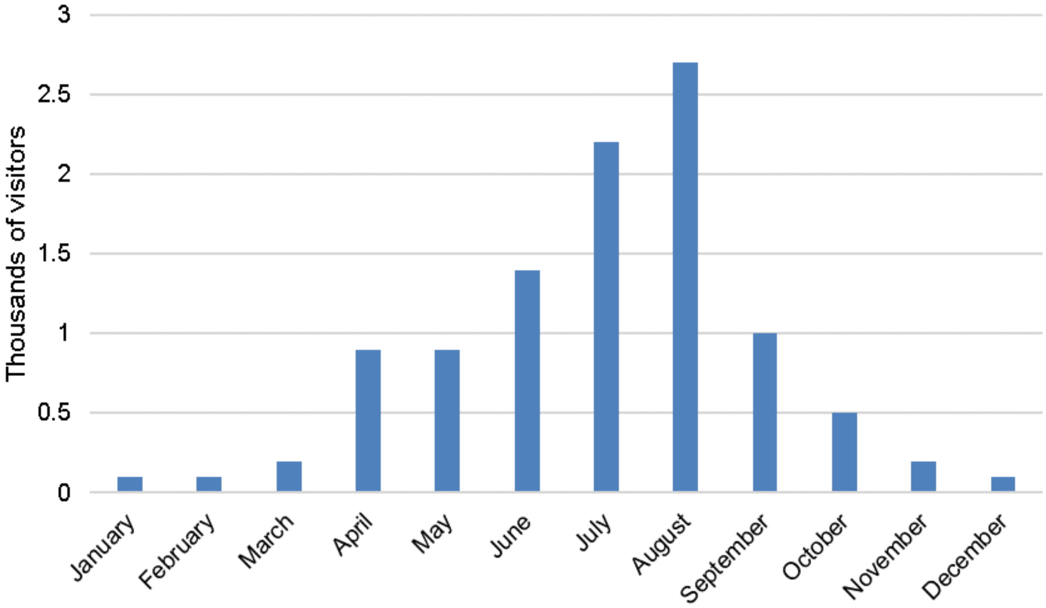


Plate 4.1 Monthly visitor numbers to Dursey Island. Source: Numbers of cable car tickets sold in 2017.

In their longitudinal study of the chough population of Ouessant Island, France, Keribiou et al. (2009) estimated a numerical carrying capacity for the island in terms of human disturbance of choughs. They did so by developing a numerical model based on data for chough breeding success and visitor numbers over a number of years. The study concluded that in order to sustain a viable chough population on Ouessant, the number of visitors to the island should not exceed 16 500 persons in August, the most sensitive period for the population in question.

The type and volume of data employed by Keribiou et al. (2009) to calculate a carrying capacity for Ouessant is not available for Dursey. Thus, the same methodology cannot be applied to calculate a carrying capacity for Dursey Island. It is possible, however, to extrapolate a carrying capacity based on one key variable, i.e. the area of chough foraging habitat (km^2). Dursey Island has an area of 5.98 km^2. The habitats on the island have been mapped and it is considered that, with the exception of roads, paths and artificial structures (which have a negligible area), the vast majority of land on the island constitutes suitable foraging habitat (although certain areas are somewhat less suitable than others). Ouessant Island is approximately 2.6 times the size of Dursey, with an area of 15.4 km^2. However, on Ouessant, suitable chough foraging habitat is restricted to 7.7 km^2 of coastal habitat (Keribiou et al., 2009, S1; Keribiou, pers. comm., 2019). Thus, Ouessant Island has about 1.3 times the area of chough foraging habitat as Dursey. Extrapolating accordingly, it is concluded that Dursey should accommodate no more than 12 835 visitors per month. A breakdown of the calculations are presented in Tables 4.1 and 4.2 below.

Table 4.1 Information used to calculate the numerical carrying capacity of Dursey in terms of human disturbance to Red-billed Chough.

Information available	Quantum	Source
Carrying capacity of Ouessant for the month of August	16 500 persons	Keribiou et al. (2009)
Area of Ouessant	1541 ha = 15.41 km^2	Keribiou et al. (2009)
Area of chough foraging habitat on Ouessant	7.6875 km^2	Keribiou et al. (2009)
Area of Dursey	5.98 km^2	Google Maps (2019)
Area of chough foraging habitat on Dursey	~ 5.98 km^2	Habitat mapping of Dursey (2019)

Table 4.2 Extrapolation of the numerical carrying capacity of Dursey in terms of human disturbance to Red-billed Chough, following Keribiou et al. (2009).

Calculations
$\frac{\text{Area of chough forage on Ouessant}}{\text{Area of chough forage on Dursey}} = \frac{7.6875}{5.98} = 1.2855351171$ → Ouessant has 1.2855351171 times the area of chough foraging habitat of Dursey. $\frac{\text{Carrying capacity of Ouessant}}{\text{Ouessant:Dursey chough forage}} = \frac{16\,500}{1.2855351171} = 12\,835.121950788$ → The carrying capacity of Dursey for August = 12 835 persons.

It is considered that this carrying capacity is a very conservative (precautionary) figure, owing to the fact that Ouessant differs substantially from Dursey in a number of respects which have adverse implications in terms of human disturbance of chough, including the following:

- Unlike on Dursey, the chough population on Ouessant is effectively restricted to the island and this isolation means that the birds are reliant on habitats on the island for their entire life cycle. Dursey lies c. 200 m from the mainland and baseline studies (2003/04) conducted on the Beara Peninsula indicated that there is movement between Dursey and the mainland, especially during the post-fledging period in July and August, when large post-fledgling flocks were recorded foraging on Western Gorse (*Ulex gallii*)-dominated dry heaths of the interior spine of the peninsula. During the 2019 breeding season survey, choughs were observed to fly back-and-forth between island and mainland. Ouessant, in contrast, is located 20 km from the French coastline and this distance combined with the absence of a chough population on the adjacent mainland means the Ouessant choughs are effectively isolated to the island.
- The existing network of paths/roads on Ouessant (Plate 4.2) is much more extensive than that on Dursey. On Dursey, walking routes used by visitors are largely situated inland, along the high elevation spine of the island, while on Ouessant, there are cliff-side walking trails along the entire coastline. As such, a much greater proportion of chough foraging habitat is affected by human disturbance on Ouessant (up to 97% (Keribiou et al., 2009) than on Dursey

(22%). However, it should be noted that, while the current walking routes on the island are geographically fairly restricted, it cannot be guaranteed that visitors to Dursey Island will not forge new paths on the island in future.

- Ouessant has much more developed transport infrastructure than Dursey. The island has an airport and an extensive network of roads. Noise generated by cars and airplanes may cause some degree of disturbance of the Ouessant choughs. On Dursey, there is only one public road, which is restricted to the inland high elevation spine of the island and used only by residents and one private bus which operates seasonally.
- Results from breeding bird surveys indicate that the average flush distance of choughs on Dursey Island during the breeding season is less than that of choughs on Ouessant (147 m ± 23 m for flocks with juveniles and 75 m ± 9 m for flocks without juveniles), suggesting that the Dursey choughs may be more tolerant of or habituated to the presence of humans.

Plate 4.2 **Satellite image of Ouessant, showing the extent of roads and paths on the island. Source: Google Maps (2019).**

Thus, it is considered that, if visitors numbers to Dursey Island are capped at 12 835 per month, the viability of the resident chough population will not be threatened by human disturbance. This is assuming that (i) mitigation measures are implemented to minimise human disturbance (particularly to keep visitors on waymarked walking routes), and (ii) the existing grazing regime is maintained. It should be noted that, as previously discussed, there has been a decline in the number of breeding pairs recorded on Dursey Island between the previous surveys in 1992 and 2002/03. The cause of this decline is ultimately unknown. However, the potential impact of human disturbance as a result of increased visitor numbers cannot be ruled out as a contributing factor. For this reason, the importance of implementing a dedicated chough monitoring scheme should be emphasised.

Assuming the current annual visitor number growth rate (24.67%; Plate 4.3) is maintained and that this growth rate is distributed evenly throughout the year, with the exception of months when the capacity is limited by (a) the capacity of the existing cable car or (b) the proposed monthly carrying capacity, visitor numbers in the first and second year of operation would be c. 51 825 and 58 803, respectively (Table 4.3). Since it is anticipated that the proposed development will generate fresh interest in the site, and because enhanced facilities at the proposed development (e.g. toilets, shelter, café) are expected to broaden the peak of the current visitor profile (i.e. there will likely be more visitors outside of the traditional peak months of July and August), it is possible that annual growth will exceed 25% in the first few years of the operation of the proposed development. Resultant growth, however, is inestimable. Either way, visitor numbers can be restricted to 12 835 per month in each month of the year and (on Dursey Island) will not be allowed to exceed 80,000 in any one year, a level at which, as explained above, human disturbance will not jeopardise the viability of the chough population.

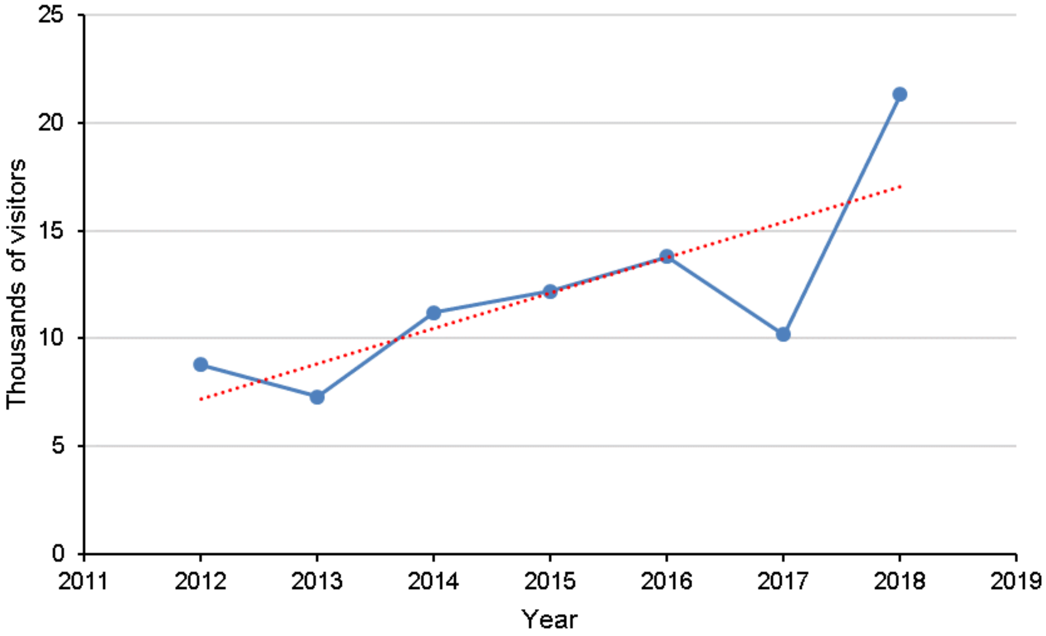


Plate 4.3 **Annual number of trips made on the Dursey cable car from 2012 to 2018.**

Since the cable car constitutes the only feasible means for visitors to access Dursey and a web-based ticketing system will be employed, constraining visitor numbers will be straightforward.

Table 4.3 **Current and projected visitor numbers to Dursey Island, with the proposed monthly carrying capacity imposed during the operation of the proposed development, assuming annual growth of 24.67% distributed evenly across months. * = numbers constrained by existing cable car capacity and would otherwise be higher; ** = numbers constrained by imposed carrying capacity and would otherwise be higher.**

Month	Year of operation (existing cable car)					Year of operation (proposed cable car)	
	2017/18	2019 projection	2020 projection	2021 projection	2022 projection	2023 projection [first year of operation]	2024 projection [second year of operation]
January	172	214	267	333	416	518	646
February	313	390	486	606	756	943	1175
March	613	764	953	1188	1481	1846	2302
April	1366	1703	2123	2647	3300	4114	5129
May	2844	3546	4420	4954*	4954*	6176	7700
June	2960	3690	4601	4954*	4954*	6176	7700
July	4954*	4954*	4954*	4954*	4954*	12 835**	12 835**
August	4943	4954*	4954*	4954*	4954*	12 835**	12 835**
September	1271	1585	1975	2463	3070	3828	4772
October	589	734	915	1141	1423	1774	2212
November	259	323	403	502	626	780	972
December	140	175	218	271	338	422	526
Total	**20 424**	**23 032**	**26 270**	**28 968**	**31 225**	**51 825**	**58 803**

Full suite of mitigation measures

In order to minimise (i) the degradation terrestrial foraging habitat and (ii) disturbance of Red-billed Chough as a result of visitors walking on open grassland habitat, the following mitigation measures shall be implemented:

- Three looped, waymarked walking routes shall be established on Dursey Island (illustrated in Plate 4.4 below). The establishment of these walks shall involve:
    - The placement of suitably spaced colour-coded way marker posts at appropriate locations along the trails (to be carried out in agreement with all affected landowners); and,
    - The erection of a sign at the outset of the routes (i.e. on Cork County Council lands near the island-side cable car station) displaying a map of the routes with approximate length (km), duration (hours/minutes) and a conservative estimate of difficulty level (i.e. easy/moderate/challenging).
- A fourth way-marked walking route shall be established on Crow Head, using appropriately placed way marker posts. However, no sign (or other indicator which might draw attention to the walk) should be erected. Responses to the visitor survey indicate that this is not a very popular walk and no undue attention should be drawn to it. Instead, efforts should be made to control the movements of those few walkers who do venture onto the headland.
- An education campaign shall be launched to inform visitors of the sensitivity of (a) choughs and ground-nesting birds to human disturbance and (b) habitats to degradation as a result of visitor footfall. The objective of the campaign is to discourage visitors from wandering off the established walking routes on the island, particularly at sensitive locations for chough (i.e. at the western end of the island and at Foilnamuck). The campaign shall have the following characteristics:
    - It shall be three-tiered in that it will be featured in (1) exhibition materials in the Visitor Centre, (2) an audio-visual presentation in the out-bound journey on the cable car and (3) signage on Dursey Island.
    - The educational materials used shall be aesthetically pleasing and emotionally engaging to encourage buy-in from visitors.
    - All outdoor signage should be designed for the exposed and corrosive nature of the site.
- Not including island residents/farmers, no more than 12 835 persons shall be permitted to travel to Dursey Island in any month of the year during the operation of the proposed development. This numerical carrying capacity shall be implemented using an appropriately designed ticketing system.
- Not including pets/sheepdogs of island residents/farmers, dogs shall be prohibited from travelling to Dursey Island.
- In order to ensure the continued efficacy of these mitigation measures and facilitate adaptive management with respect to habitat destruction and/or disturbance of wildlife as a result of visitors walking in areas of open habitat:
    - Trail counters shall be installed at suitable locations on walking trails on Dursey Island, on the Garinish Loop walk and on the walk at Crow Head. On Dursey Island, a trail counter should be placed at an appropriate location on the western end of the island, so as to record approximately how many visitors leave the established trail and wander onto this key area for Red-billed Chough.

  - A visitor survey shall be carried out on an annual basis to establish approximately what proportion of visitors remain on established trails and vice versa.

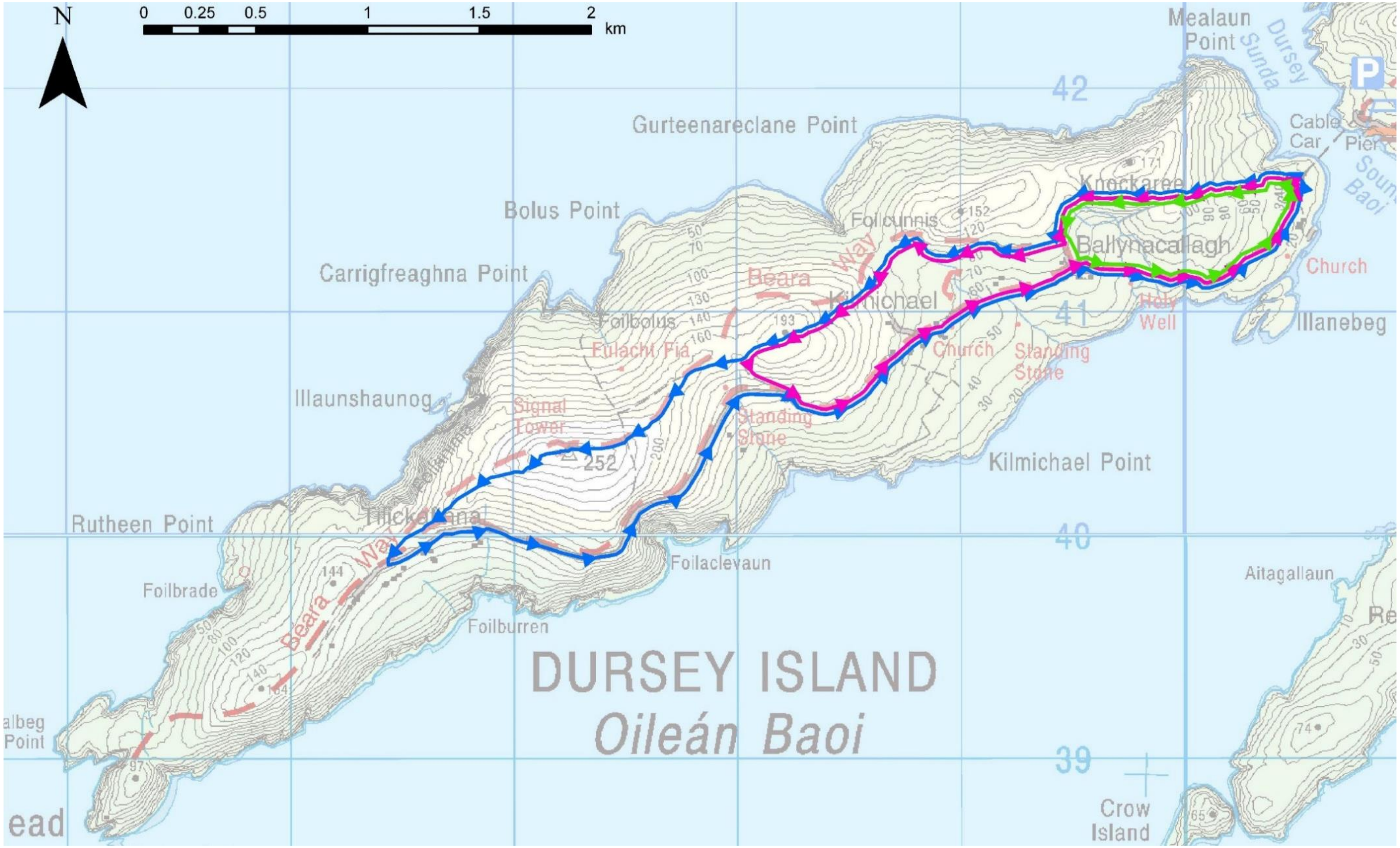


Plate 4.4 **Three proposed way-marked loop walks on Dursey Island. Ballynacallagh Loop (green) = 2.7 km; Kilmichael Loop (pink) = 6 km; Tillickafinna/Signal Tower Loop (blue) = 10 km.**

Terrestrial Habitats

The mitigation measures prescribed above in relation to Red-billed Chough, i.e. those measures aimed at managing visitor numbers and behaviour during the operation of the proposed development, will provide more than adequate mitigation for the effects of increased visitor numbers on the Annex I habitats “Vegetated sea cliffs of the Atlantic and Baltic coasts” and “European dry heaths” set out in Sections 4.2.5 and 4.2.6 of the NIS.

4.1.2 Water Quality

Construction

The following measures shall apply to all site works carried out in connection with the construction of the proposed development.

General Measures

- All site works shall be limited to the minimum extent necessary to construct the proposed development.
- As far as practicable, works shall take place within predetermined construction areas (to be determined by the Contractor) on a phased basis.
- Surface water flowing onto the construction area shall be minimised through the provision of berms, diversion channels or cut-off ditches.
- All discharge from the works site shall be treated such that it will not significantly alter water quality in the receiving environment.
- Foul drainage from all site offices and construction facilities will be contained and disposed of in an appropriate manner to prevent pollution.

Sedimentation and Surface Water Run-off

The measures prescribed above will minimise the risk of input of sediment-laden run-off into the marine environment during construction. However, the following measures shall also apply:

- Excess material stockpiles shall be managed so as to minimise the release of sediment to surface waters, e.g. by allowing the establishment of vegetation on exposed soil or by diverting run-off from stockpiles to settlement ponds.
- Any works within 10 m of the cliff top or rocky shore shall require measures to ensure that silt-laden or contaminated run-off from the compound does not discharge directly to surface waters.
- Riparian vegetation (if present) along the minor watercourse will be fenced off at a distance of 3 m either side of the proposed crossing point to provide a buffer zone for its protection.
- Protection of surface waters (both the sea and the minor watercourse along the development site boundary) from sedimentation shall be achieved by the use of timber fencing with silt fences or earthen berms to provide adequate treatment of surface water run-off.
- Settlement ponds, silt traps and bunds shall be used to contain surface water run-off. Where pumping of water is to be carried out, filters shall be used at intake points and discharge shall be through a sediment trap.
- The site compound and on-site storage facilities shall be fenced off not less than 10m from the cliff top or rocky shore.

Cementitious Materials

The measures prescribed above will minimise the risk of input of cementitious material into the marine environment during construction. However, the following measures shall also apply:

- Hydrophilic grout and quick-setting mixes or rapid hardener additives shall be used to promote the early set of concrete surfaces exposed to water.
- When working in or near surface waters and the application of in-situ materials cannot be avoided, the use of alternative materials such as biodegradable shutter oils shall be used.
- Any plant operating close to the water shall require special consideration on the transport of concrete from the point of discharge from the mixer to final discharge into the delivery pipe (tremie). Care shall be exercised when slewing concrete skips or mobile concrete pumps over or near surface waters.
- Any and all placing of concrete near watercourses shall be supervised by the Ecological Clerk of Works.
- There shall be no hosing into surface water drains of spills of concrete, cement, grout or similar materials. Such spills shall be contained immediately and run-off prevented from entering the watercourse.
- Concrete waste and wash-down water shall be contained and managed on site to prevent pollution of all surface waters.
- On-site concrete batching and mixing activities shall only be permitted within the identified construction compound areas.
- Wash-out from concrete lorries, with the exception of the chute, shall not be permitted on site and shall only take place at the construction compound (or other appropriate facility designated by the manufacturer).
- Chute wash-out shall be carried out at designated locations only. These locations shall be signposted. The concrete plant and all delivery drivers shall be informed of their location with the order information and on arrival to site.
- Chute wash-out locations shall be provided with an appropriately designated, contained, impermeable area and treatment facilities including adequately sized settlement tanks. The clear water from the settlement tanks shall be pH corrected prior to discharge (which shall be by means of one of the construction stage settlement facilities) or alternatively disposed of as waste in accordance with the Contractor's Construction & Demolition Waste Management Plan.

Hydrocarbons and Other Chemicals

The measures prescribed above will minimise the risk of input of hydrocarbons or other chemicals into the marine environment during the construction. However, the following measures shall also apply:

- Protection measures shall be put in place to ensure that all hydrocarbons used during the construction phase are appropriately handled, stored and disposed of in accordance with the NRA/TII's *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*.
- All chemical and refuelling locations shall be contained within bunded areas and set back a minimum of 20 m from surface waters.

Operation

The following measures shall apply to the design of the proposed development and the management of the development during the operational phase.

Run-off from Hardstanding Areas

The proposed surface water drainage system will comprise predominantly sustainable drainage systems (SuDS) features which will attenuate and treat surface water run-off from the site prior to discharge to sea. Permeable paving will allow infiltration to the underlying subsoils. Treatment of run-off will be provided within the pavement layers through the processes of filtration, biodegradation, adsorption of pollutants and the settlement and retention of solids within the pavement layers.

Failure of Foul Water Pumping Station

As stated in Section 4.3.1 in the NIS, any discharge of untreated foul water into Dursey Sound due to a pump failure in the WWTS would likely lead to significant water quality impacts. In order to minimise this risk and thereby prevent adverse effects on the marine environment, the pumping station shall provide 24-hour effluent storage in case of failure. Standby pumps shall also be provided.

Discharge of Pollutants in Storm Drainage

The SuDS features will attenuate and treat surface water run-off from the site prior to discharge to sea by percolation into the subsoil. The incorporation of a SuDS-based approach will ensure that discharge will be controlled, and treatment of run-off will take place within the SuDS components.

The proposed retaining wall drainage will incorporate a hydrocarbon separator prior to discharging to the minor watercourse. Physio-chemical water quality monitoring will be undertaken at the outfall location prior to and post-construction, as detailed in Section 4.2.4 below.

4.1.3 Biosecurity

Construction

In order to minimise the potential for adverse effects as a result of the introduction or spread of terrestrial invasive alien species during construction, all land-based construction works shall be executed in accordance with the National Roads Authority's *Guidelines on the Management of Noxious Weeds and Non-native* Invasive *Plant Species on National Roads* (TII, 2010). In particular, a strict biosecurity protocol shall be observed to ensure that all plant/equipment (including PPE) is free of invasive alien species or propagules of such.

As per Sections 4.3.1 and 4.3.2 in the NIS, the use of a barge during the construction of the proposed development poses the risk of the introduction of invasive alien species to the marine environment in the vicinity of the construction works. This has the potential to adversely affect the integrity of the Kenmare River SAC, in view of its Conservation Objectives for the Annex I habitats "Large shallow inlets and bays" and "Reefs".

In order to minimise the risk of either the introduction or spread of marine invasive alien species and thereby prevent, beyond reasonable scientific doubt, any adverse effects on the marine habitats in the vicinity of the proposed development, the owner/operator of the barge shall:

- Provide documentary evidence (in the form of a completed and signed Marine Institute "*Cleaning and Disinfection Declaration Form*") that the vessel was fully defouled within the six months immediately preceding its proposed engagement in the construction of the proposed development;

- Submit travel records relating to the vessel's movements during at least the six months immediately preceding its proposed engagement in the construction of the proposed development; and,
- Ensure that no bilge water or ballast water is discharged from the vessel within 5 km of the Kenmare River SAC.

In order to ensure full compliance with the above, authorisation to move the vessel to the construction area shall only be granted once the Ecological Clerk of Works has satisfied him/herself that the vessel does not pose a significant risk of importing marine invasive alien species to the Kenmare River SAC. He/she shall do so by:

- Boarding the vessel;
- Speaking with the skipper;
- Inspecting the relevant documents; and,
- Carrying out a final inspection of the vessel.

In addition, prior to commencement of any works on site, the Contractor shall prepare a detailed Biosecurity Statement describing his/her proposed approach to ensuring that invasive alien species are not imported or spread during the construction of the proposed development. The Contractor's Biosecurity Statement shall be in accordance with NRA/TII's *Guidelines on the Management of Noxious Weeds on National Roads* and subject to approval by the Ecological Clerk of Works prior to its acceptance and implementation.

Operation

The only biosecurity risk during the operation of the proposed development arises from the increased visitor numbers to the walking trails within the likely zone of impact. The measures prescribed in relation to visitor management in Section 4.2.1 above will mitigate for the risk to biosecurity during the operation of the proposed development.

Furthermore, an Invasive Alien Species Management Plan has been developed for the operation of the proposed development (see Appendix D of the NIS). This plan has the objectives of, (i) where possible, eradicating invasive alien species (especially on Dursey Island), (ii) preventing the introduction of new invasive alien species to the area (especially Dursey Island), and (iii) in all other instances, managing existing occurrences of invasive alien species with a view to preventing their spread.

Landscaping of the proposed development shall use native species of plants only and, insofar as possible, soil reused from on-site excavations.

4.1.4 Monitoring

Red-billed Chough

While the mitigation measures proposed in relation to Red-billed Chough (see Section 4.2.1 above) are sufficient to conclude beyond reasonable scientific doubt that the proposed development will not adversely affect this species, in view of its Conservation Objective in the Beara Peninsula SPA, it is proposed to monitor the conservation status of the chough population on Dursey Island on an annual basis (during the breeding season) during the operation of the proposed development.

This monitoring is proposed not with a view to mitigating any adverse effects, but rather to inform future management of visitors and educational materials for the NPWS and Fáilte Ireland, and to provide further scientific evidence for related or similar projects in the future.

The monitoring programme shall be developed in agreement with the NPWS and shall involve, at a minimum, the determination (by a suitably qualified ecologist) of the following parameters:

- Number of breeding pairs (confirmed, probable and possible);
- Locations of nest sites; and,
- Productivity of the population.

Water Quality

Surface Water

It is envisaged that surface water sampling and chemical testing will be undertaken immediately downstream of the proposed outfall location in the minor watercourse. Surface water samples will be tested for physical and chemical parameters to assess water quality and indicate possible contamination at the site. The water samples will be tested for the following parameters:

- Biological oxygen demand (BOD);
- Chemical oxygen demand (COD);
- pH value;
- Suspended solids;
- Total coliforms;
- Ammonia (NH_3);
- Nitrates (NO_3^-);
- Nitrites (NO_2^-);
- Orthophosphates (PO_4^{3-}); and,
- Hydrocarbons.

The surface water monitoring regime will be undertaken prior to, during and after completion of the proposed works. Samples will be taken at fortnightly intervals from the minor watercourse, with a minimum of four samples taken prior to the works and six samples taken after completion of the works.

Groundwater

Groundwater sampling will also be undertaken prior to, during and after completion of the proposed works from the existing and proposed groundwater wells. Samples will be taken at fortnightly intervals from each well with a minimum of four samples taken prior to the works and six samples taken after completion. The groundwater samples will be tested for a range of physical and chemical parameters listed above in order to assess water quality and indicate any possible contamination at the site.

Terrestrial Habitats

The conservation status of the habitats on Dursey Island and Crow Head shall be monitored on an annual basis during the operation of the proposed development. The monitoring programme shall be developed in agreement with the NPWS and shall involve, at a minimum, the determination (by a suitably qualified ecologist) of the following parameters:

- Visitor numbers and movements on Dursey Island and Crow Head;
- Identification of areas where soil erosion/de-vegetation is occurring as a result of visitor movement activities;
- Identification of areas where new paths are being forged by visitors;
- Identification of areas where the integrity of habitats is adversely affected by land use (especially grazing regime), visitor activities, invasive alien species or other pressures/threats.

4.2 References

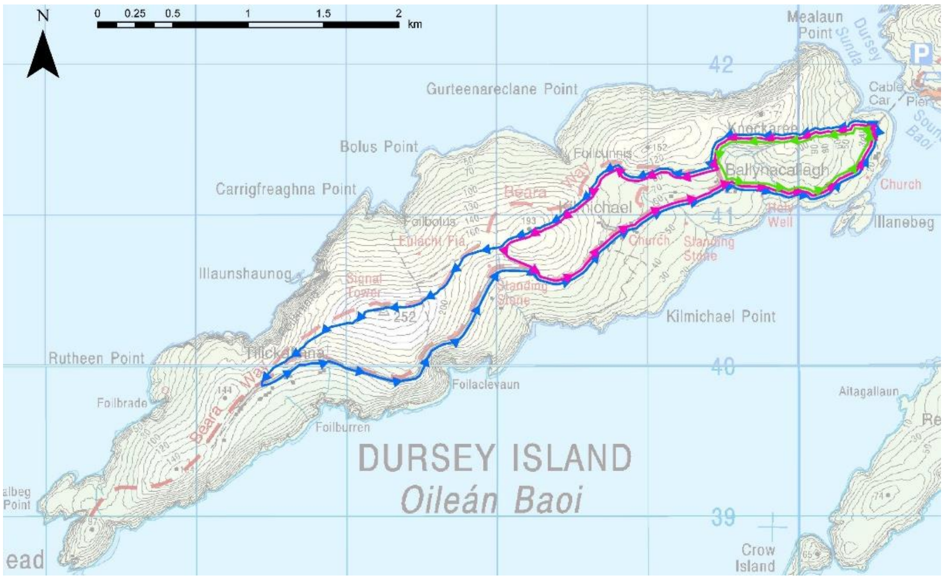
Keribiou, C., Le Viol, I., Robert, A., Porcher, E., Gourmelon, F. and Julliard, R. (2009) Tourism in protected areas can threaten wild populations: from individual response to population viability of the chough *Pyrrhocorax pyrrhocorax*. *Journal of Applied Ecology* 46:657-665.

TII (2010) *Guidelines on Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads*. Transport Infrastructure Ireland, Dublin.

APPENDIX 4.1B – A
EIAR Chapter 18 Mitigation Measures

No.	Description
1	It is proposed to carry out the most disruptive (i.e. noisy) elements of the construction works during the winter months. This will minimise associated disturbance on resident or regularly occurring breeding populations of wildlife.
2	The lighting plan has been designed to minimise impacts on biodiversity and nature-related recreation. Low level bollard lighting has been selected for outdoor areas. No roadside lighting has been included in the design. Lighting design of the proposed development has been executed in accordance with *'Guidance Notes For The Reduction Of Obtrusive Light'* (Institution of Lighting Engineers, 2011) and '*Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations*' (Pollard *et al*., 2017). Use of low level lighting will minimise potential adverse effects on bats and prevent any potential light pollution or visual intrusion at the nearby Kerry Dark Sky Reserve, an important site for star-gazing.
3	The drainage and wastewater treatment system has been designed to provide a high level of attenuation and water quality controls. The surface water drainage system is comprised predominantly of Sustainable Drainage Systems (SuDS) technology. The proposed drainage system of the retaining wall includes a hydrocarbon interceptor. After passing through these elements, run-off will percolate through soil before being discharged to sea or to the mouth of a minor watercourse (and thereafter to sea) at the eastern boundary of the Cork County Council lands on the mainland.
4	Of the design options considered for the proposed development at Options Stage, the smallest scale design has been chosen so as to minimise the area of natural habitat destroyed. Any areas of natural habitat degraded or destroyed as a result of the construction phase, that are not within the immediate curtilage of the proposed buildings/structural elements, will be restored to grassland/heathland.
5	A Construction Environmental Management Plan (CEMP) shall be developed by the Contractor prior to the commencement of works. This document serves to ensure that the construction of the proposed development does not lead to any unanticipated negative impacts on the environment. It shall be developed in accordance with the description of the CEMP set out in Chapter 4 of this EIAR – Description of the Proposed Development – and based on the Outline CEMP which has been included in Appendix 4.1 of this EIAR.
6	An Environmental Operating Plan (EOP) shall be developed by the Contractor prior to the commencement of works. This document sets out the protocol for addressing environmental issues which may arise during the construction phase. This document shall be developed in accordance with the TII (n.d.; formerly NRA) guidelines, '*Guidelines for the Creation and Maintenance of an Environmental Operating Plan*' and based on the Outline EOP which has been included in Appendix 4.2 of this EIAR.
7	The Contractor will appoint a Site Environmental Manager prior to the commencement of works. This person shall be responsible for carrying out environmental monitoring and ensuring that the mitigation measures proposed in this EIAR (as well as the CEMP and EOP) are adhered to.
8	An Ecological Clerk of Works (ECoW) shall be appointed by CCC prior to the commencement of works. It shall be their responsibility to supervise and provide recommendations on the execution of any and all works which have the potential to give rise to negative effects on biodiversity/ecological integrity.
9	An IAS Management Plan [Appendix 7.1] has been developed and shall be implemented, as required, during the construction of the proposed development.
10	Landscaping of the proposed development shall use native species of plants of national provenance only and, insofar as possible, soil reused from on-site excavations. If soil/substrate needs to be imported to the site for the purposes of the proposed development, the Contractor shall ensure that the imported soil/substrate is free from IAS.
11	All land-based construction works shall be executed in accordance with the TII guidelines, '*Guidelines on the Management of Noxious Weeds and Non-native Invasive Plant Species*

No.	Description
	on National Roads' (2010). The Contractor shall ensure that the hull of the vessel(s) used during proposed works is not fouled with any IAS prior to its arrival at the site. Efforts shall also be made to ensure that any plant/equipment (including PPE equipment) is not carrying seeds or plant materials from IAS. The Contractor shall refer to the Invasive Species Ireland '*Marina Operators Code of Conduct*' (Kelly & Maguire, 2009).
12	CCC shall commit to undertaking treatment by a competent professional, in accordance with the recommended physical treatment set out in Appendix 7.1, with a view to eradicating the occurrence of hottentot-fig on Dursey Island prior to the commencement of operation of the proposed development (subject to agreement with the landowner). Monitoring shall be carried out by a competent professional for five years to ensure no re-growth occurs.
13	An IAS Management Plan [Appendix 7.1] has been developed and shall be implemented during the operation of the proposed development, with the objectives of, (i) where possible, eradicating IAS (especially on Dursey Island), (ii) preventing the introduction of new IAS to the area (especially Dursey Island), and (iii) in all other instances, managing existing occurrences of IAS with a view to preventing their spread.
14	Three looped, waymarked walking trails (as set out in Plate 7.17) shall be established on Dursey Island prior to the commencement of the operation of the proposed development. According to the National Trails Office (NTO) '*Guide to Planning and Developing Recreational Trails in Ireland*', (2012, p.4), "*Developing recreational trails is a very effective way of managing recreational activity in the outdoors and protecting the natural environment*". Indeed, research indicates that walkers tend to stick to established paths, even when they have the 'right to roam' (Keirle & Stephens, 2004). Establishment of these trails shall involve: 1. Placement of suitably spaced colour-coded waymarker posts of recycled plastic, featuring directional arrows, at appropriate locations along the trails set out in Plate 7.17; 2. Erection of a mapboard at a clearly visible location at the trailhead (i.e. on Cork County Council lands near the island-side cable car station) displaying a map of the routes with: i. approximate length (km), ii. duration (hours/minutes), iii. a conservative estimate of difficulty level from 'Easy' to 'Moderate' to 'Strenuous' to 'Very Difficult' (according to the NTO guidelines, '*Classification and Grading for Recreational Trails*' (2008)), and iv. a message instructing walkers to stay on the established paths (according to the recommendations set out in Appendix 7.2, '*Design of Outdoor Signage*').; 3. Erection of 'minimum impact behaviour' (MIB) signage at key sensitive locations for chough and/or habitat conservation along trails. At a minimum, this MIB signage shall include: i. a note on the trailhead mapboard instructing visitors to stay on the trails; and ii. a sign at the western end of the Tillickafinna/Signal Tower Loop instructing walkers not to venture any further westward onto the chough 'hotspot'. The design of this signage shall be in accordance with the recommendations set out in Appendix 7.2, '*Design of Outdoor Signage*'. Research conducted on Bear Island, Maryland, U.S.A. (Hockett *et al*., 2010), found that principle reasons for visitors to leave the established trail were: i. to view and/or photograph a scenic vista; ii. to pass other walkers on the trail; iii. to avoid challenging trail conditions; and also iv. because of poor waymarking. Accordingly, trails should offer opportunities for scenic vistas/photos, should be well marked and should not be too challenging. The direction of all three looped trails shall be anticlockwise, with walkers travelling along the established off-road trails on the outbound

No.	Description
	journey, and returning to the trailhead via the public road. Travelling in this direction, walkers undertaking the Tillickafinna/Signal Tower Loop will have had plenty of 'photo opportunities', and will have completed the most strenuous portion of the trail (the 'high route') by the time they reach Tillickafinna and, for these reasons, may feel less inclined to venture further westward. Establishment of these trails shall not involve the creation of any new paths but rather, will serve to encourage walkers to stay on existing, established paths, and provide options for walkers of varying abilities. Provision of complete (and conservative) information on the nature and duration of routes, coupled with the provision of two shorter options, may discourage certain walkers from attempting the full loop and travelling to the western end of the island. Any existing signage which contradicts these trails shall be removed, as required. Cork County Council shall be responsible for the maintenance of these trails and any associated structures for the duration of the operation of the proposed development. An existing informal walking trail on Crow Head shall be more clearly marked using recycled plastic waymarkers. However, no sign (or other indicator which might draw attention to the walk) should be erected. Responses to the visitor survey indicate that this is not a very popular walk and no undue attention should be drawn to it. Instead, efforts should be made to control the movements of those few walkers who do venture onto the headland. Cork County Council shall be responsible for the maintenance of this trail.  **Plate 18.1 Three looped walks for Dursey Island**
15	An education campaign shall be launched to inform visitors of the sensitivity of (i) species (i.e. choughs and ground-nesting bird species) to human disturbance and (ii) habitats to degradation as a result of visitor footfall. The objective of the campaign is to discourage visitors from wandering off the established walking routes on the island, particularly at sensitive locations for chough (i.e. at the western end of the island and potential roost sites). The campaign shall have the following characteristics: 1. It shall be three-tiered in that it will be featured in: i. Exhibition materials in the Visitor Centre; ii. An audiovisual presentation in the outbound journey of the Cable Car; and iii. Outdoor signage on Dursey Island. 2. The educational materials used shall be aesthetically pleasing and emotionally engaging to encourage buy-in from visitors. The design of outdoor signage shall be in accordance with the recommendations set out in Appendix 7.2 All outdoor signage shall be designed for the exposed and corrosive nature of the site.
16	Not including island residents/farmers, no more than 12,835 persons shall be permitted to travel to Dursey Island in any month of the year during the operation of the proposed

No.	Description
	development (see Appendix 7.2). This numerical carrying capacity shall be implemented using a strictly enforced ticketing system.
17	Not including pets and/or working dogs of island residents and farmers, dogs shall be prohibited from travelling to Dursey Island. This restriction will be clearly displayed on the Cable Car website and promotional materials.
18	Not including bicycles for the personal use of island residents/farmers, visitors shall be prohibited from bringing bicycles to the island in the Cable Car. This restriction will be clearly displayed on the Cable Car website and promotional materials.
19	In order to ensure the continued efficacy of these mitigation measures and facilitate adaptive management with respect to habitat degradation and/or disturbance of wildlife as a result of visitors walking in areas of open habitat: • Trail counters shall be installed at suitable locations on walking trails on Dursey Island, on the Garinish Loop walk and on the walk at Crow Head. On Dursey Island, a trail counter shall be placed at an appropriate location on the western end of the island, so as to record approximately how many visitors leave the established trail (disregarding the MIB sign) to wander onto this key area for chough. CCC shall be responsible for the maintenance of these counters. • A visitor survey shall be carried out on an annual basis to establish approximately how visitors respond to MIB signage, what proportion of visitors follow each of the three looped trails, and what proportion of visitors remain on established trails and vice versa.
20	The conservation status of the Dursey Island chough population shall be monitored on an annual basis (during the breeding season) for the duration of the operation of the proposed development. The monitoring programme in question shall be developed in agreement with NPWS but shall, at a minimum, involve the measurement (by a suitably qualified ecologist) of the following parameters: • Number of breeding pairs (confirmed, probable and possible); • Locations of nest sites; and • Productivity of population.
21	Once 5 years of data have been collected from the aforementioned chough monitoring scheme, a specific, original, monthly carrying capacity for Dursey Island shall be calculated according to the methodology in Keribiou *et al*. (2009). This carrying capacity shall be implemented using a strictly enforced ticketing system.
22	The conservation status of the habitats on Dursey Island shall be monitored on an annual basis for the duration of the operation of the proposed development. The monitoring programme in question shall be developed in agreement with NPWS but shall, at a minimum, involve the measurement (by a suitably qualified ecologist) of the following parameters: • Visitor numbers and movements on Dursey Island; • Identification of areas where soil erosion/de-vegetation occurring as a result of visitor movement activities; • Identification of areas where new paths are being forged by visitors; • Identification of areas where ecological integrity of habitats is being negatively affected by land use (especially grazing regime), visitor activities, IAS or other potential pressures/threats.
23	The data gathered as a result of all monitoring undertaken (i.e. related to visitors and the conservation status of choughs and habitats) shall be shared with Fáilte Ireland so that it can feed into their WAW Environmental Surveying and Monitoring Programme, and can inform the development and management of similar/related developments, plans and projects.
24	Insofar as is possible in view of safety requirements, lighting shall be turned off at the closure of the proposed development each night (i.e. once all visitors have left).

No.	Description
25	Demolition of existing buildings at the site of the proposed development shall be completed either during the autumn or spring months in order to minimise the risk of disturbance of roosting bats. Care shall be taken during the removal of rooves. If bats are identified in structures during demolition works, the local NPWS Conservation Ranger shall be contacted to facilitate safe translocation.
26	Bulbs used in outdoor lighting shall be of a type which does not emit ultraviolet (UV) light. No spotlights shall be used.
27	Bat boxes shall be erected in association with buildings/structures on the mainland side of the site of the proposed development. These shall be of a design and placement that is in accordance with the Bat Conservation Ireland guidelines, '*Bat Boxes: Guidance Notes for: Agri-environmental Schemes*' (Bat Conservation Ireland, 2015) and the NRA guidelines, '*Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*' (TII, n.d.). Bat boxes shall be inspected, maintained and relocated (if required) in accordance with the TII guidelines. Boxes shall be incorporated into or onto external walls away from artificial lighting. Recommended units (all available at nhbs.com) are as follows: • 8 no. 2FE Schwegler Wall-mounted Bat Shelter (to be hung on external walls), or • 6 no. 1FE Schwegler Bat Access Panel (with back plate) (to be hung on external walls), or • 4 no. 2FR Schwegler Bat Tube (to be built into external walls), or • 4 no. 1FQ Schwegler Bat Roost (to be hung on external walls).
28	In order to prevent any potential destruction of betony (*Betonica officinalis*) as a result of the construction of the proposed development, if individual plants or clusters of plants of betony (*Betonica officinalis*) (in addition to those already identified and translocated) are identified at vulnerable location(s) (i.e. where plants are at risk of destruction) in the footprint of the proposed development during the construction phase, they shall be translocated to suitable sites by an appropriately qualified and licenced professional. If necessary, works at the location(s) in question shall be suspended until such time that it is considered ecologically appropriate (by the ECoW) to carry out translocations.
29	In order to prevent pollution of the marine environment and surface-groundwater during the construction and operation of the proposed development, which could potentially give rise to adverse effects on biodiversity in marine and freshwater aquatic habitats, all of the mitigation measures outlined in Chapters 8, 9 and10 of this EIAR – Soils & Geology, Hydrogeology and Hydrology, respectively – shall be implemented.
30	In order to minimise the volume of litter being discarded on Dursey Island and in the vicinity of the proposed development on the mainland, segregated waste bins (at a minimum, separate recycling and residual waste bins but preferably also a separate organic waste bin) shall be provided in the mainland-side Visitor Centre and at the island cable car station. To prevent overflow, these bins shall be emptied regularly. An appropriate waste collection service shall be arranged.

APPENDIX 4.1B – B
Planning Approval

To be added by Contractor subject to planning approval

APPENDIX 4.1B – C
Schedule of Commitments

To be added by Contractor subject to planning approval

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Appendix 4.1C Outline Construction and Demolition Waste Management Plan

Cork County Council
Comhairle Contae Chorcaí

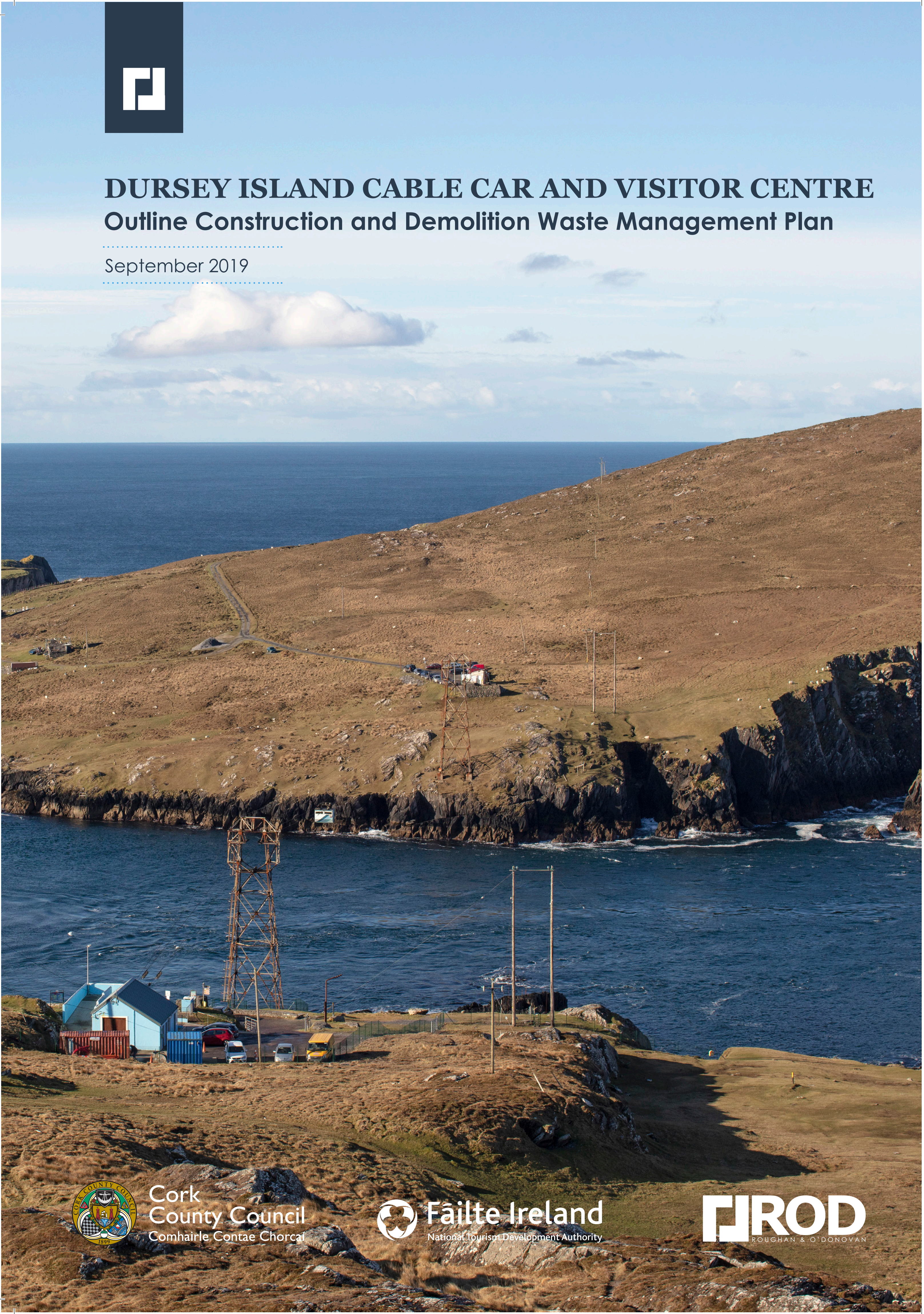
Fáilte Ireland
National Tourism Development Authority

ROD
ROUGHAN & O'DONOVAN

DURSEY ISLAND CABLE CAR AND VISITOR CENTRE

Outline Construction and Demolition Waste Management Plan

September 2019



Cork
County Council
Comhairle Contae Chorcaí

Fáilte Ireland
National Tourism Development Authority

ROD
ROUGHAN & O'DONOVAN

Dursey Island Cable Car and Visitor Centre

Outline Construction and Demolition Waste Management Plan

TABLE OF CONTENTS

1.0 INTRODUCTION

This outline Construction and Demolition Waste Management Plan (CDWMP) has been developed to ensure that waste arising on-site during the construction and demolition phase of the Dursey Island Cable Car and Visitor Centre will be managed and disposed of in a way that ensures the provisions of the Waste Management Acts, 1996-2011 and associated Regulations (1996-2011) are complied with and to ensure that optimum levels of reduction, re-use and recycling are achieved.

This outline CDWMP has been prepared for the provision of waste management for the construction phase of the Dursey Island Cable Car and Visitor Centre, taking into account the many guidance documents on the management and minimisation of construction and demolition waste, including:

- DEHLG (2006) *Best Practice Guidelines on the Preparation of Waste Management Plans for construction and Demolition Projects*. Department of Environment, Heritage and Local Government, Dublin;
- Provisions of the Waste Management Acts, 1996-2011 and associated Regulations;
- Construction Industry Research and Information Association (CIRIA) document 133 Waste Minimisation in Construction;
- TII (2014) *Guidelines for the Management of Waste from National Road Construction Projects*. Transport Infrastructure Ireland, Dublin; and,
- National Construction & Demolition Waste Council (NCDWC) 2006 *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects.*

This plan is intended to be a working document and has been prepared to inform the Construction and Demolition Waste Management Plan which, in turn, will form an integral part of the Environmental Operating Plan (EOP) for the proposed development.

This document is preliminary in nature as it has been prepared at a stage when quantities are based on the design developed to a sufficient level of detail to inform the environmental impacts to be assessed in the Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS). However, changes may occur during detailed design stages which may alter the volumes of waste.

All materials used during construction will be imported. Moderate quantities of soils will be excavated during construction.

Prior to the commencement of construction works, a Waste Management Co-ordinator (WMC) (who may also be the Site Environmental Manager (SEM)) will be appointed by the Contractor to assume responsibility for the further development of the CDWMP and the management and treatment of all waste materials created during the construction of the Dursey Island Cable Car and Visitor Centre.

The Contractor's CDWMP must contain (but not be limited to) the following measures:

- Details of waste storage (e.g. skips, bins, containers) to be provided for different waste and collection times;
- Details of where and how materials are to be disposed of, i.e. landfill or other appropriately licensed waste management facility;

- Details of storage areas for waste materials and containers;
- Details of how unsuitable excess materials will be disposed of, where necessary;
- Details of how and where hazardous wastes such as oils, diesel and other hydrocarbon or other chemical waste are to be stored and disposed of in a suitable manner; and
- Details of locations.

Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects were published in 2006 by the National Construction & Demolition Waste Council (NCDWC). These Guidelines outline the issues that need to be addressed at the pre-planning stage of a development all the way through to its completion. These Guidelines have been followed in the preparation of this report.

2.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.1 Project Description

The proposed development comprises the construction of a new cableway and associated structures, including a visitor interpretive centre and café on the mainland. The construction works will involve decommissioning of the existing Dursey island cableway which connects the easternmost tip of Dursey Island with the townland of Ballaghboy, on the western end of the Beara Peninsula in west County Cork. The proposed cableway will run parallel to the existing alignment, offset by approximately 14m to the north, with the end-to-end length of 375m. The majority of the proposed works will be carried out on lands currently owned by Cork County Council, with the exception of the island station, island pylon and improvement works to the R572 approach road which will necessitate the compulsory purchase order (CPO) of private land in these areas.

2.2 Construction Stage

It is expected that the construction work will commence in October 2021 and that the duration of the construction period will be approximately 18 months. Since visitor numbers to the site are especially high during the summer months, and since it will be necessary to maintain the operation of the existing cableway throughout the construction phase (insofar as possible), earthworks will be carried out during the off-season (October – April), where possible.

2.3 Construction Procurement

The estimated cost of the Dursey Island Cable Car and Visitor Centre Development is in the region of €9 – 10 million, exceeding the current €5,225,000 threshold for public works contracts. Therefore, it is proposed that this works contract will be advertised on eTenders and in the OJEU.

The procurement approach to be used will be decided by CCC. The pre-selection criteria will be related and proportionate to the subject matter of the contract. The criteria will be geared towards selecting competent Contractor(s) with experience and appropriate technical and professional ability in building construction and fit-out of specialist equipment. The criteria will also be targeted towards selecting Contractor(s) with experience of working in environmentally sensitive locations.

It is proposed that the form of contract for the main building and civil works will be Employer-designed with the possibility of identifying the cableway supplier as a novated specialist, requiring further consideration.

3.0 WASTE MANAGEMENT STRAGETY

3.1 Scope

The Contractor will develop a CDWMP that will detail:

- Licensing of Waste Disposal;
- Site clearance;
- Excavations and disposal of materials;
- Measures to protect water quality;
- Importation, stockpiling and placing of fill;
- Management of drainage works to ensure no pollution of Dursey Sound or any nearby watercourse;
- Construction vehicle management; and,
- Dust and noise abatement measures.

3.2 Waste and Recycling Management

The management of construction and demolition waste will reflect the waste management hierarchy, with waste prevention and minimisation being the first priority, followed by reuse and recycling. During site clearance and construction works, there are numerous opportunities for the beneficial reuse and recycling of materials. The subsequent use of recycled materials in reconstruction works also reduces the quantities of waste which ultimately needs to be consigned to landfill sites.

The Contractor will develop and implement a plan and manage all waste with a goal of achieving the waste hierarchy in accordance with the relevant statutory provisions as shown in Figure 3.1.

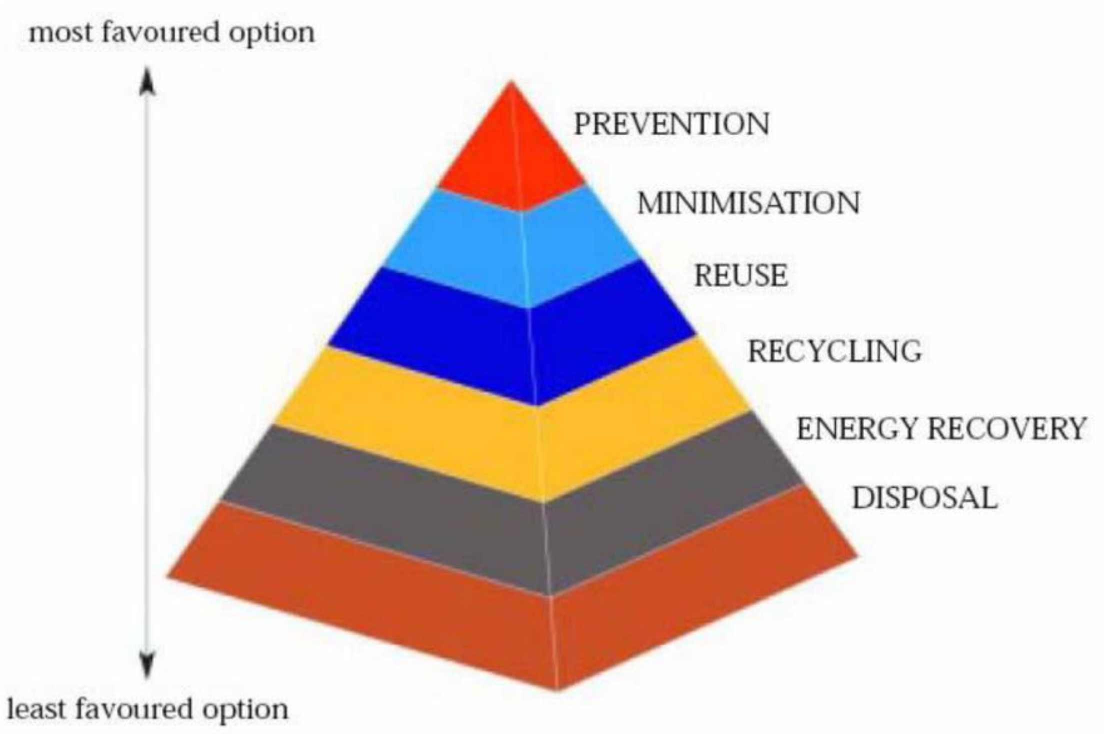


Figure 3.1 **The Waste Management Hierarchy [DEHLG (1998) *Changing Our Ways*. Department of the Environment, Heritage and Local Government, Dublin]**

Source Segregation

Wastes generated on the construction site will be identified and segregated according to their respective categories, as described by the European Waste Catalogue (EWC). Where possible, metal, timber, glass and other recyclable material will be segregated and removed off-site to a permitted/licensed facility for recycling.

In order to achieve this, designated waste storage areas will be created at the construction compound or other suitable locations for the storage of segregated wastes prior to transport for recovery/disposal at suitably licensed/permitted facilities. Suitably sized containers for each waste stream will be provided within the waste storage area and will be supervised by the WMC, who will be appointed by the Contractor. This will be the person responsible for the management of waste during the construction of the Dursey Island Cable Car and Visitor Centre. The number and sizing of containers will be agreed with Waste Contractors in advance of construction works commencing. Source segregation of waste will result in cost savings to the project as well as providing an environmentally sound route for the management of all construction and demolition wastes.

Re-use

Possibilities for re-use of clean, non-hazardous excavation material as fill on the site or in landscaping works will be considered following appropriate testing to ensure material is suitable for its proposed end use. During Ground Investigations (GI), samples were taken from exploratory holes and were tested by Priority Geotechnical Limited between the 4th and 18th of April 2019. All samples have been classified as falling within either the non-hazardous or inert limits. The results of ground investigation revealed no areas of contaminated land. Where excavated material is not to be reused within the works, the Contractor will endeavour to send material for recovery or recycling so far as is reasonably practicable. The Contractor will ensure that, if required, any off-site interim storage facilities for excavated material have the appropriate waste licences or waste facility permits in place.

Material Management

In order to prevent and minimise the generation of waste, the Contractor will be required to ensure that raw materials are ordered so that the timing of delivery, the quantity delivered, and the storage is not conducive to the creation of unnecessary waste. The Contractor, in conjunction with the material suppliers, will be required to develop a programme showing the estimated delivery dates and quantities for each specific material associated with each element of construction and demolition works. Following a "just-in-time" approach improves cash flow, better utilises storage space, reduces risk of environmental pollution events and reduces potential loss to theft and accidental damage as well as making the site safer.

It is essential that the planning, construction and demolition works are undertaken in close collaboration with waste management contractors, in order to determine the best techniques for managing waste and to ensure a high level of recovery of materials for recycling. The Contractor will be required to continuously seek to improve the waste management process on-site during all stages of construction and maximise opportunities for re-use and recycling where they exist. For example, in relation to waste packaging, the Contractor will seek to negotiate take-back of as much packaging waste as possible at source to ensure maximum recycling. The CDWMP will be included as an agenda item at the weekly construction meetings. In addition, the plan will be communicated to the whole team (including the Client) at the monthly meetings. This will include any updates to earlier versions of the document.

Waste Auditing

The Contractor will record the quantity (in tonnes) and types of waste and materials leaving the site during the construction phase. The name, address and authorisation details of all facilities and locations to which waste and materials from the construction phase are delivered will be recorded along with the quantity of waste (in tonnes) delivered to each facility. Records will show all material recovered and disposed of.

The waste management strategy for the project will follow the accepted waste hierarchy and the Contract will implement the following types of measures to reduce waste and maximize opportunities for recycling:

- Wherever possible, materials for construction activities will be ordered as to require the minimum possible storage time;
- Materials will be ordered, where possible, in sizes to prevent wastage;
- Appointment of a WMC, who will be responsible for handling, storage and delivery of materials to the proposed development;
- Ensure that stored material is protected from damage from plant and environmental factors such as rain and wind;
- Secure storage areas to prevent unauthorised access;
- Establish a waste management compound to handle incoming waste from construction activities – this should facilitate the segregation of key waste streams to maximise the opportunity to re-use, recycle and return wastes generated on-site;

- Provide a separate secured area for dealing with hazardous waste; and,
- Provide separate facilities for the storage of fuels and chemicals.

3.3 Waste and Recycling Targets

The Contractor's CDWMP, waste handling and proposed construction methods should endeavour to achieve the following targets

- The re-use of all earthworks materials on site where possible;
- 100% recycling of surplus reinforcement and other metals, where possible; and
- No contamination of skips.

3.4 Waste and Recycling Opportunities

The Contractor will seek opportunities, wherever possible, to reduce the amount of waste generated on site and maximize the potential for recycling materials in accordance with the waste hierarchy through the following:

- Storing materials in designated areas and separate from wastes to minimise damage;
- Returning packaging to the producer where possible;
- Segregating construction and demolition wastes into reusable, recyclable and non-recyclable materials;
- Reusing and recycling materials on site during construction where practicable;
- Recycling other recyclable materials through appropriately permitted/licensed contractors and facilities; and
- Disposing of non-recyclable wastes to licensed landfills.

4.0 WASTE DISPOSAL LICENSING

4.1 Licensing Requirements

Under the Waste Management (Collection Permit) (amended) Regulations, 2016, a waste collection permit for appropriate EWC Code(s) and designations is required by a waste haulier to transport waste from one site to another. Compliance with the Waste Management (Shipments of Hazardous Waste in Ireland exclusively) Regulation, 2011 is also required for the transportation of hazardous waste by road. The export of waste from Ireland is subject to the requirements of the Waste Management (Shipment of Waste) Regulations, 2007. The Contractor will ensure that the transport and movement of all waste is carried out in compliance with these requirements.

Waste may only be treated or disposed of at facilities that are licensed to carry out that specific activity, *e.g*. chemical treatment, landfill or incineration, for a specific waste type. Records of all waste movements and associated documentation will also be held on-site. Generally, operators of waste management sites will facilitate a site visit and inspection of documentation if deemed necessary. Prior to any on-site recovery process, including the operation of mobile plant, an operator must apply to the governing local authority for a waste facility permit under the Waste Management (Facility Permit and Registration) Regulations, 2007. It is planned that waste activities at the site will comprise of source segregation, storage and collection and, therefore, it is highly unlikely that any waste licensable or waste permissible activity will be undertaken.

4.2 Exclusion from Legislation

The Directive on Waste contains a number of exclusions which make clear that certain materials are not subject to its requirements. A key exclusion affecting construction projects such as this development is set down in Article 2(1)(c). This states that the requirements of the EU legislation do not apply to:

"uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated"

This provision is repeated in the Waste Management Acts, as amended by the European Communities (Waste Directive) Regulations, 2011 (SI No. 126/2011). Should materials generated by construction activities fall within this provision, they are not then subject to the other requirements of the EU or national waste legislation. This means that, for example, such materials are not defined as "waste", do not need to be handled by duly authorised waste collectors and do not need to pass to disposal or recovery facilities that are subject to waste licences or other equivalent form of statutory authorisation. In addition, the requirements of the Waste Hierarchy do not apply.

5.0 PROPOSED CONSTRUCTION METHODOLOGY AND MATERIAL USAGE

5.1 Site Preparation

Elements of the site preparation works may be conducted through an advance works contract to be completed before construction commences on site. Prior to any work commencing on the mainland or island sites, boundary security will be required to be established around the site to prevent unauthorised access.

The boundary will be laid out so as to maintain safe access to the existing cableway, to maintain the aforementioned public right of way, and to maintain a portion of the existing parking facilities, where possible.

Appropriate environmental protection measures will be put in place on both sites. These are expected to include measures to prevent run-off from the site entering the sound.

Site clearance works will be carried out on the mainland site, island site and at the location of all proposed passing bays along the R572 approach road, over the extents indicated on the drawings.

Existing overhead lines will be diverted or maintained and protected throughout the works as required by the contract. It is not expected that there will be any interruptions to local utility services as a result of any diversions carried out.

5.2 Site Offices, Construction Compounds and Security

A site construction compound will be required during the construction phase and will be situated completely within the mainland site. Initially it will be located adjacent to the existing cableway in the widest section of the existing carpark. The compound will be established at the commencement of the contract and remain in place throughout the construction period. However, as earthworks progress it will be required to be moved within this confined site, at all times staying within the red line boundary of the site. The Contractor will also require a smaller set down area/storage compound on the island which will be located within the red line boundary. Suitable site security measures will be implemented on both the mainland and island sites for the duration of the construction phase.

Potential impacts that need to be guarded against include:

- Accidental spillage of pollutants into surrounding water bodies; and,
- Dirt, mud and other materials being dropped from lorries and plant or spread onto approaching roads and carparking areas by traffic travelling to and from the site.

The exact location and mode of operation of the site compound will ultimately be chosen by the Contractor in agreement with CCC. The location will have to comply with all of the requirements/underlying measures contained in this EIAR and the NIS, as well as any An Bord Pleanála conditions. There will be early consideration given to locations for material stockpiles, which will be covered with geo-textile (or similar) to prevent mobilisation of suspended solids.

The compound will include stores, offices, material storage areas, plant storage and parking for site and staff vehicles. This site is proposed to remain in place for the duration of the contract but may be scaled up or down during particular activities on site.

The anticipated site compound/storage facilities will be fenced off at a minimum distance of 10m from the top of the edge of the sea/cliff edge. Any works within the 10m buffer zone will require measures to be implemented to ensure that silt laden or contaminated surface water runoff from the compound does not discharge directly to the sea/watercourse. All fuel storage areas will be bunded to 110% of storage capacity to prevent spills and provide sufficient additional capacity in the event of rainfall occurring simultaneously. The compounds will also have appropriate levels of security to limit potential vandalism, theft and unauthorised access within the compounds.

Following completion of construction, the compound will be cleared, landscaped and paved. Temporary buildings and containers, parking areas and waste material such as rubble, aggregates and unused construction materials will not be permitted to remain exposed on these sites and will need to be removed and disposed of appropriately.

5.3 Material Quantities

Cutting will be required to the rear (north-east) of the existing mainland car park in order to provide space for the proposed upper tier of parking. Backfilling will also be required to level the site along the seaward edge of the existing car park to accommodate the proposed buildings. The cutting will predominantly consist of rock-breaking. With careful planning it will be possible to balance the cut and fill volumes to some extent. It is highly likely that the excavated rock will form an acceptable fill material for levelling the site and for capping/pavement purposes. Topsoil will be stripped and reused, where possible. Relatively minor earthworks will be required on the island and at some of the proposed passing bay locations along the R572. On the mainland, an approximation of the proposed volume of cut material is 6,500m^3, while the requirement for fill to the required formation levels is 8,600m^3. However, when the volume of the retaining walls is taken into account, and bulking of the excavated material is allowed for (crushed rock has a greater volume than solid rock), the cut and fill volumes will approximately balance

5.4 General Construction and Demolition Works

Quantities of general construction and demolition wastes are made up of waste such as wood, packaging, metals, plastics, bricks, blocks, canteen waste, some hazardous waste, *e.g*. oils, paints and adhesives. Site clearance and residual waste will be generated during the construction phase, primarily from the construction of the proposed development. The estimated of waste types likely to be generated for the Dursey Island Cable Car and Visitor Centre and are displayed in Table 5.2 below.

Table 5.2: Waste Materials Generated on the Construction Site of Dursey Island Cable Car and Visitor Centre

Nature of material	Volume (m^3)
Concrete	25
Stone and rubble	20
Excavated material (including surfacing)	10

An overview of the methods to manage the primary waste streams expected is presented below. The main types of construction waste produced will be:

Excavated material

Where short-term temporary storage is unavoidable, the method of storage of material will be key to its potential use as certain types of materials such as mud are likely to degrade if left uncovered in wet weather due to its low plasticity and silty nature.

Concrete

Waste concrete is likely to arise during the construction phase of the Dursey Cable Car and Visitor Centre. It is proposed that waste concrete generated will be returned to the supplier for re-use. For every tonne of concrete waste that is recycled for aggregate in new concrete, significant savings are made in energy and carbon dioxide emissions. It also saves money by avoiding disposal costs, which continue to increase. Residual concrete waste will be source segregated and stored in designated containers at the waste storage area for subsequent separation and recovery at a remote facility.

Stone and rubble

Excavated rock will be loaded directly to vehicles for use within the site of the proposed Dursey Cable Car and Visitor Centre development as appropriate, *e.g*. as fill material.

Metals

Metal waste has a significant scrap value. Although it is now common practice for sites to segregate metals for reuse and recycling, there are still sites where metal is thrown away with general rubbish. One of the primary sources of metal waste is steel reinforcement. Wastage of steel reinforcement will be reduced by ordering made to measure steel from the manufacturer and detailed scheduling of all reinforced concrete structural elements.

Skip hire companies may provide free skips for the storage of scrap metal on sites and this will be investigated prior to construction commencing. When metal storage containers are full they will be removed by the waste storage contractor and sent to a metals recycling facility.

Timber

Timber waste will be stored separately as it is readily contaminated by other wastes and if it is allowed to rot will reduce the recyclability of other stored wastes. Any pallets will be returned to the supplier for re-use. Off-cuts and trimmings will be used in formwork where possible. A container for waste wood will be covered where possible and will be placed in the waste storage area. The waste wood will be collected by a waste contractor who will forward it to a wood recycling facility for chipping.

Treatment of timber with chemicals and the overuse of nails will be minimised and avoided as this will make it difficult to reuse/recycle the timber afterwards. The utilisation of reclaimed timber products will also be investigated.

Packaging and Plastic

Packaging waste can become a major problem on construction sites. Double handling will be avoided by segregating packaging wastes immediately after unwrapping. Many suppliers are now prepared to collect their own packaging for recycling, and this will also be investigated prior to works commencing. It is intended that, where possible, materials with recycled packaging will be purchased. Waste packaging will be segregated and stored in separate containers, preferably covered, in the waste storage area for collection by the waste management contractor and distribution to packaging recycling facilities.

Blocks, Bricks and Tiles

The careful storage of these raw materials will significantly reduce the volume of these wastes arising on site. The most likely wastes produced will be off-cuts, trimmings and waste arising from breakages. Every effort will be made to use broken bricks and off-cuts

Hazardous Wastes

Prior to removal from the site, any hazardous waste identified will undergo a comprehensive waste assessment and classification by a suitably qualified person in accordance with the European Waste Catalogue and Hazardous Waste List. It should be noted that if non-hazardous waste becomes contaminated with hazardous waste the entire load will be considered hazardous. It is, therefore, critical to ensure that waste segregation areas are provided and are used properly to separate out hazardous, non-hazardous and inert waste arising. Hazardous wastes will be identified, removed and kept separate from other construction and demolition waste materials in order to avoid cross-contamination. Specific method statements detailing the necessary mitigation measures required during excavation, handling transportation and disposal of hazardous wastes encountered on the site will be prepared as required.

The likely disposal/treatment options for any hazardous wastes available to the Contractor will depend on the nature of the hazardous material and the concentration of parameters of concern. The costs associated with treatment and disposal will similarly vary depending on the concentration of parameters of concern and on the tonnage involved. There are several operators/facilities in operation within Ireland that could potentially accept the contaminated material depending upon the results of the Waste Acceptance Criteria testing or assist in the export of the material abroad for special treatment where required. Full details of the disposal route for hazardous wastes will be provided in the detailed CDWMP following the appointment of the contract and completion of the further investigations required.

Hazardous Liquids (Oils, Paints, Chemicals)

Hazardous liquid waste arising from the construction process will require careful handling. Oils, paints, bitumen, adhesives and chemicals will be kept in a separate contained storage area which will be locked when not in use. Hazardous liquids will be stored at least 10m from the Dursey Sound. Lids will be kept on containers in order to avoid spillage or waste by evaporation. Waste oils, paints and chemicals, including the containers, will require careful handling and disposal. aThese will be stored in a containment tray with a capacity to contain 110% of the volume of the largest container.

Fuels and chemical will be stored in double-skinned containers or within a bund, i.e. an impervious structure with the capacity to contain 110% of the volume of the largest tank stored within it. All containers will be carefully labelled.

Food Wastes

Site staff generate food waste and packaging waste. Designated receptacles will be provided to allow for the segregation and storage of individual waste streams. These will include receptacles for food waste, *e.g*. brown bin for waste foods and peelings, dry recyclables, *e.g*. green bin for packaging, plastics, metals, wood, paper, cardboard and tetrapack, and residual bin, *e.g*. black bin for mixed food and packaging waste. Separate receptacles for the recyclable fractions may be provided such as plastics, metals, glass and this will be designed and detailed by the WMC in consultation with the selected waste management contractor.

Other Wastes (Residual)

Waste material other than those outlined above can constitute a significant proportion of the total waste generated by a construction site. This waste is normally made up of residual, non-recyclable waste such as soiled paper, cloth, cardboard or plastics, as well as food waste and general waste found on the site, including plastic bottles, bags, cans *etc*. Given the heterogeneous nature of this material, it is most important that residual waste is kept separate from the other waste streams to avoid contamination. This material will be stored in a dedicated container in the waste storage area. Container size and collection frequency will be assessed with waste management contractors as works proceed. All residual wastes will be dispatched to a suitably licensed facility for disposal. Other construction and demolition waste material will be collected in receptacles with mixed construction and demolition waste materials for subsequent separation and disposal at a segregation facility.

6.0 ASSIGNMENT OF RESPONSIBILITIES

A WMC will be appointed who will have overall responsibility for waste management on the site. The Employer (Cork County Council) will receive summaries of any audit reports, which will be completed within three months of the end of each calendar year. The effectiveness and accuracy of the documentation may also be monitored on a regular basis via routine site visits. Following appointment of the preferred Contractor, the CDWMP will be updated in accordance with the final design and copies of the plan will be distributed to the Employer, the Site Manager and the site sub-contractors. The WMC appointed by the Contractor will be appropriately trained and experienced in all aspects of waste management. In addition, he/she and the site crew must be in a position to:

- Distinguish reusable materials from material suitable for recycling;
- Ensure maximum segregation at source;
- Co-operate with site manager on best locations for stockpiling reusable material;
- Separate material or recovery; and,
- Identify and liaise with operators of recovery outlets.

The WMC will be responsible for educating all site staff, sub-contractors and suppliers about the available alternative to conventional waste disposal. Training will also be given to all site staff in materials management on sites. The WMC will continually identify waste minimisation actions on sites and this will be updated in the plan.

7.0 TRAINING

Copies of the CDWMP will be made available to all personnel on-site. All site personnel and sub-contractors will be instructed about the objectives of the plan and informed of the responsibilities that fall upon them as a consequence of its provisions. This is traditionally carried out during the induction process for new staff members. Where source segregation and material re-use techniques apply, each member of staff will be given instructions on how to comply with the CDWMP. Site notices will be designed to reinforce the key messages within the plan and will be displayed prominently for the benefit of staff.

8.0 WASTE RECORDS

When establishing the system for managing the details of all arisings, movement and treatment of construction and demolition waste in the CDWMP, the use of electronic tools should be considered to provide for convenient recording of information in a useful format such as “Smart – waste”.

The Contractor will be required to arrange for full details of all arisings, movements and construction and demolition waste to be recorded during all stages of the proposed development. Each consignment of construction and demolition waste removed from the site will be documented in the form of a Waste Movement Record form, which will ensure full traceability of the material to its final destination. Separate record forms will be completed in respect to each waste transfer that takes place. The Contractor will also receive printed documents/records from waste disposal companies employed, quantifying the exact amount of waste material removed from site. The sheet from the disposal company also identifies how much material went to landfill and how much went for recycling. All such records will be retained in a designated location and made available for auditing of the CDWMP.

9.0 SUMMARY OF THE CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT PLAN

Waste will inevitably be generated during the construction and demolition phase of the Dursey Island Cable Car and Visitor Centre. It is intended that all steel and concrete will be imported for use within the project area. At this stage it is anticipated that excavated material will be re-used on-site.

Other than spoil material from excavations, waste arisings during the construction phase will be minimised by the purchasing manager, who will time the ordering of materials so as to reduce the likelihood of over-purchase or damage during storage. Construction and demolition waste fractions will be segregated and stored on-site in designated areas or containers in the waste storage area prior to transport by licensed hauliers to facilities for segregation recycling and disposal.

A WMC will be appointed to ensure that the CDWMP is followed. Training will be given to all staff so that they are aware of the CDWMP and know their responsibilities.

Records will be kept to trace the inputs and outputs of the construction works at the site and this should allow the Employer to make informed decisions regarding waste management in the future. These records will be made available to the relevant local authorities and the EPA should it be required.

The design and implementation of the detailed CDWMP, in conjunction with the EOP for the Dursey Island Cable Car and Visitor Centre, will provide for the optimum planning/management and handling of waste generated by the project and will ensure that there will be no worse than a neutral or imperceptible impact from waste management practices during construction.

The contractor appointed to undertake the construction of the Dursey Island Cable Car and Visitor Centre will develop their own CDWMP based on their detailed plans, the requirements of this outline plan, the requirements of the EIAR, the requirements of the NIS and any commitments given as part of the project approval process and the Employer's requirements and specifications for executing the Dursey Island Cable Car and Visitor Centre project.

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Chapter 5 Traffic and Transport

5.1 Introduction

This chapter sets out the assessment of the traffic and transport impacts of the proposed Dursey Island Cable Car and Visitor Centre development. It considers the capacity of the existing road and transport network and identifies measures required, including management of visitor numbers to the Visitor Centre and upgrades of the approach road, to accommodate the increase in traffic associated with the proposed development.

5.2 Methodology

Site Visit

The existing road network and traffic environment of the site of the proposed development was visited a number of times by the project team. During these visits traffic and parking conditions were observed and road conditions were measured.

Traffic & Parking Surveys

Traffic surveys were undertaken to determine the baseline traffic conditions along the approach roads. Parking demand surveys were carried out at the existing car park areas at the end of the R572.

Guidance Documents

This Traffic & Transport Assessment has been undertaken in accordance with current best practice guidance and planning policies. The following documents have been referenced during the preparation of this report;

- Transport Infrastructure Ireland Traffic and Transport Assessment Guidelines, PE-PDV-02045, (May 2014);
- TII Publication, DN-GEO-03031 Rural Road Link Design; and
- Cork County Development Plan 2014.

Projected Visitor Numbers

Projected visitor numbers are determined based on a tourism assessment for the proposed Visitor Centre. The associated traffic generation is estimated both annually, monthly, daily and at peak times, and the projected visitor numbers considers the management of visitors considering the car parking capacity and the capacity of the island to accommodate visitors as set out in Chapter 7 of this EIAR.

Car Parking Demand

The car parking demand has been estimated based on the projected visitor numbers and associated traffic generation. This parking demand considers the anticipated peak arrivals and departure times and the average duration of stay.

Traffic Assessment & Roadworks

The methodology used in the traffic assessment for the proposed Visitor Centre involved analysis of the additional traffic loading resulting from the proposed development and an examination of the capacities and potential delays on the approach roads and junctions. Appropriate road upgrades are then identified.

5.3 Baseline Environment / Existing Scenario

5.3.1 Site Location

The proposed Dursey Island Cable Car and Visitor Centre Development is located at the site of the existing Dursey Island Cable Car at the southwestern tip of the Beara Peninsula (Lambs Head) in the west of County Cork. The existing cable car site is located in a remote rural environment, accessed from the Ring of Beara which includes the R572 from Glengarriff and Castletownbere and the R575 from Eyeries leading to the R571 from Kenmare.

The closest town to the site is Castletownbere, 22km to the east, which is the main service town for the Beara Peninsula. Plate 5.1 shows the location of the Beara Peninsula and Dursey Island. Dursey Island is one of fifteen ‘Signature Discover Points’ featured in the Wild Atlantic Way guide.

Plate 5.1 **Road Network – Regional Area**

5.3.2 Existing Road Network

The Dursey Island Cable Car is accessed via the R572 regional road. The R572 commences at Glengarriff, 55km to the east, where it connects with the N71 National Road, and it passes through Adrigole and Castletownbere. The average journey time by car from Glengarriff to the site is 1 hour, which gives an average travel speed of 55kph. The R572 from Glengarriff forms part of the Ring of Beara route along with the R575 from Bealbarnish Gap and then the R571 continuing along the north side of the peninsula via Allihies and Ardgroom and connecting back to the N71 at Kenmare approximately 70km to the northeast. The regional road network is shown on the map in Plate 5.1.

On the final approach to the cable car site, the R572 at the western end of the Beara Peninsula extends 8 km from its junction with the R575 at Bealbarnish Gap to the site, as shown on Plate 5.3. This section of the R572 is a narrow road with numerous tight bends and limited forward visibility on some of these bends where the road skirts around rock outcrops, see Plate 5.2 below. The average journey time by car from Bealbarnish Gap to the Dursey Island Cable Car is 12 minutes, which gives an average travel speed of 40kph, although the journey times can increase at busy times. Much of this section of the R572 is only wide enough for one-way traffic, where traffic in opposing directions must give-way at suitable passing places. Only 30% of the R572 from Bealbarnish Gap to the Visitor Centre has a width of 4.8m or wider, which allows for comfortable passing of cars and light commercial vehicles (mini-buses, camper vans, etc.). The other 70% of the route is too narrow for two-way traffic and traffic must pass at localised passing places, such as accesses and side roads. This often requires opposing traffic to give-way, and at times vehicle are forced to reverse to suitable passing locations, which can lead to traffic congestion at busy times.

Plate 5.2 **R572 view west from the junction with the R575**

An assessment of the forward visibility was carried out on the R572 between the junction of the R575 at Bealbarnish Gap and the cable car site. The existing road has little or no verge width along its length, which restricts the forward visibility on bends. Along some lengths of the road, motorists can potentially see oncoming vehicles across the low stone walls which border the road.

The forward visibility assessment considered a driver’s-eye-position and target-position in the horizontal plane taken from the middle of the carriageway. A driver’s eye height of 1.05m and a target height of 0.26m were used. The forward visibility was then calculated in accordance with TII Publications DN-GEO-03031, using the “Visibility Check” feature of Civil 3D software. Separate checks were carried out at 5-metre intervals in each direction. This exercise highlighted a number of locations where forward visibility is severely restricted, but it is also noted that traffic speeds at a number of these locations is suitably reduced to reflect the road layouts and visibility. While the road has a speed limit of 80kph the average traffic speed along this section of the road is 40kph and traffic speeds on the blind bends has been observed to much less than this, where the risks of driving at higher speeds are obvious to the driver.

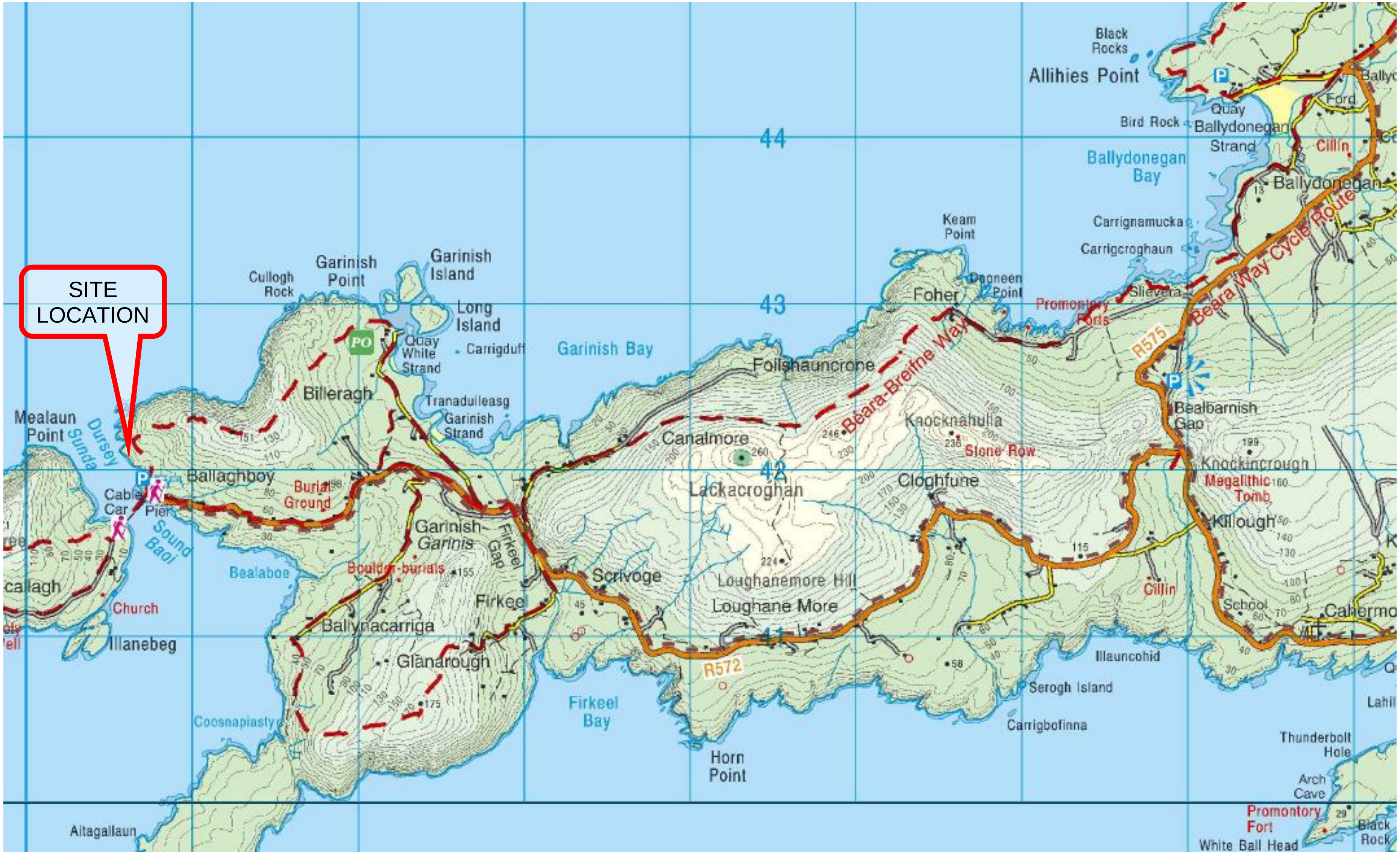

Plate 5.3 **Road Network – Local Area**

5.3.3 Existing Visitor Number & Traffic

The Dursey Island Cable Car currently has approximately 22,000 visitors a year, with the peak months of July and August seeing nearly 10,000 cable car journeys combined.

Detailed traffic surveys were undertaken on May and June bank holiday weekends in 2019. A summary of the results are as follows:

- The existing peak season traffic to the site is estimated at 434 two-way vehicles per day
- The busiest hour at the site in terms of access is from 12:00 – 13:00 with 68 two-way vehicles.

The 8km stretch of the R572 regional road from Bealbarnish Gap to the cable car site also provides access to in excess of 130 private properties, which generates local traffic.

5.3.4 Car Park

The car park at the existing cable car site currently accommodates approximately 70 vehicles, however this is often oversubscribed during peak season. This can lead to cars being parked informally at the side of the road and drivers making awkward U-turn movements, which can result in traffic congestion in the area.

There is car parking available near the end of the peninsula at Lehanmore and Garnish where up to 60 additional cars can be accommodated. This car parking could accommodate people who wish to explore other parts of the headland and to walk along the waymarked routes, including the Beara Way, which extends onto Dursey Island.

Plate 5.4 Visitor Centre car park

5.3.5 Public Transport

There are two Bus Éireann services that operate on the Beara Peninsula as follows:

- Route 236 – operates between Cork City and Glengarriff & Castletownbere – with two service to / from Castletownbere and five services to / from Glengarriff during the week, and one service to / from Castletownbere and three to / from Glengarriff on weekends / public holidays.
- Route 282 - operates on the Ring of Beara from Kenmare during the summer months only (end of June to end of August) with two services per day, one in the morning and one in the afternoon. The route goes from Kenmare to Glengarriff – Castletownbere – Eyeries Cross and back to Kenmare.

There are a number of other private bus service that operate between Castletownbere / Glengarriff and Cork or Killarney and there are a number of local mini-bus / taxi services that operate around the Ring of Beara and connect to the existing cable car site.

5.3.6 Walking and Cycling

There are a number of waymarked walk and cycle ways on the Beara Peninsula as outlined below.

The Beara Way is a trail that provides a circular route on the Beara Peninsula extending nearly 200km. The route follows a mixture of public roads and tracks and connects to the main towns and villages on the Peninsula including Glengarriff, Kenmare, Lauragh, Ardgroom, Eyeries, Allihies and Castletownbere. It extends out to Dursey Sound from Allihies along a route that is mostly off-road on the north side of the peninsula and it then continues across onto Dursey Island via the cableway. A section of the Beara Way, either side of Dursey Sound is shown on Plate 5.5 below.

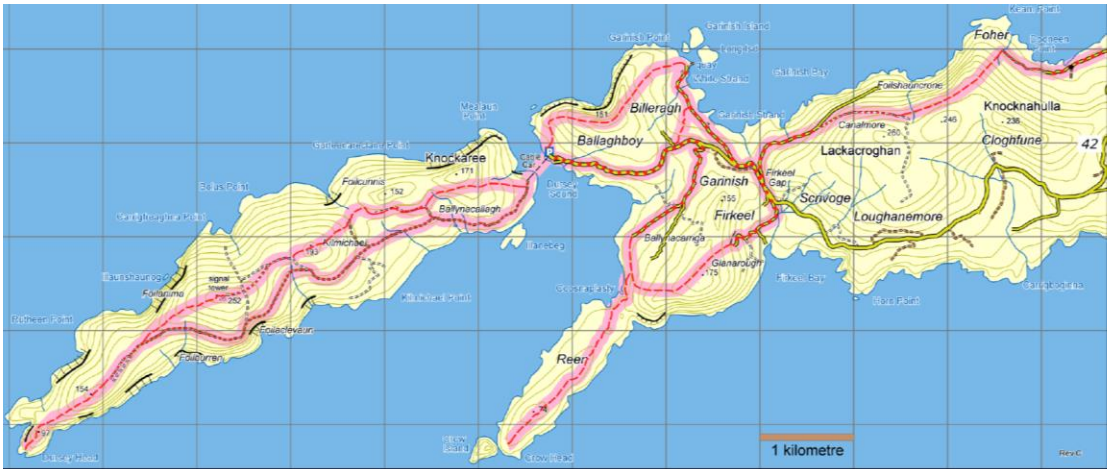

Plate 5.5 **Beara Way**

The Beara Way Cycling Route is a National Cycling Route and for most parts is on country roads. The route travels along the entire Beara Peninsula, following the Ring of Beara and passing through all the towns and villages along the way. It extends along the R572 to the cable car site.

5.3.7 Road Safety

A review of the road safety statistics for the R572 from Bealbarnish Gap to the proposed development reports that there have been four collisions recorded for the period 2005 – 2015 (see Plate 5.6) (two incidents were at the same location). All of these collisions resulted in minor injuries. There were no serious or fatal collisions recorded. These collision statistics do not indicate any specific road safety risk locations.

Plate 5.6 **Road Collision Statistics Locations 2010-2015 (Source: Road Safety Authority www.rsa.ie**

5.3.8 Transport Planning Policy

Cork County Development Plan 2014

The Cork County Development Plan 2014 includes a number of planning policies and objectives that relate to the proposed Visitor Centre and road and transport infrastructure. Extracts of the relevant policies and objectives are provided below.

The Tourism Developments and Facilities section of the Plan includes the following:

- *8.9.1 Facilitating the development of infrastructure to meet the needs of visitors is fundamental to the effective delivery of a sustainable tourism product in County Cork.*
- *8.9.2 The Council will seek to promote the development of tourism in a manner that is compatible with the conservation and enhancement of the environment…..*
- *8.9.7 Both the County Council and the NRA recognise the necessity to facilitate ready access to the many tourist destinations around the country. In this regard the sensitive improvement of access infrastructure and the provision of clear and consistent tourist signage is an essential element in assisting the motoring tourist to locate and access such attractions in a safe and efficient manner….*

The Plan includes the following Transport and Mobility Objectives in:

- *TM 1-1: Transport Strategy: a) Provide a choice of transport modes for all citizens and visitors. Foster sustainable economic and population growth by maintaining and developing an efficient and integrated transport system for the*

County and, at the same time, encourage balanced investment in less polluting and more energy efficient modes of public and private transport.

- *TM 3-2: Regional & Local Roads: c) Seek funding for the following Regional and Local Roads Projects in the County: Projects Critical to the Delivery of Planned Development R572 (Glengarriff to Castletownbere);*
- *TM 3-3: Road Safety and Traffic Management:*
    - *e) Improve the standards and safety of public roads and to protect the investment of public resources in the provision, improvement and maintenance of the public road network. &*
    - *f) Promote road safety measures throughout the County, including traffic calming, road signage and parking.*

The Cork County Development Plan, Volume 2 Chapter 5, identifies Scenic Routes, where the character of views and prospects are to be protected and this includes: Scenic Route S118, which is the R572 Regional Road from Castletownbere via Cahermore to Garnish, with views of Bear Haven, Bear Island, Firkeel Bay, Dursey Sound & Island, the Sea, Slieve Miskish Mountains & surrounding hills.

West Cork Municipal District Local Area Plan, 2017

The West Cork Municipal District Local Area Plan 2017 also includes relevant planning policy as follows:

> *Boundary Objectives for Allihies, DB--04: Encourage the realignment of the R575 from the Bealbarnish Gap and the realignment and improvement to the local roads L4904 & L4905 as important village entrances.*

5.4 Predicted Impacts

5.4.1 Operation Phase

5.4.1.1 Characteristics of the Proposed Development

While the proposed development is described in detail in Chapter 4 of this EIAR, the main components of the development that are particularly relevant to road and transport aspects include:

- A split level visitor car park on the mainland with approximately 100 car parking spaces and retention of a small residents' car park on the island.
- Road improvement works along the 8km stretch of the R572 from Bealbarnish Gap to the cable car site, including the widening of the carriageway at 11 locations (10 no. passing bays and 1 no. visibility splay) and further road improvements to include pavement and verge works at a number of other locations. Works also involve improvements to the junction visibility at Bealbarnish gap and completion of a number of local improvements to improve visibility) on the mainland-side approach road R572. The locations of these improvements are spaced so as to reduce the distances between two-way sections and passing bays and in order to allow opposing drivers to see each other in sufficient time to give way at one-way road sections. It is proposed to acquire the sections of privately-owned roadside land required for these works by means of compulsory purchase order (CPO).

5.4.1.2 Projected Visitor & Traffic Numbers

The proposed development will allow a greater number of site visitors to make the cable car journey to Dursey Island. The existing cableway has limited capacity and it cannot accommodate the current peak season demands, whereas the new cableway will have a much improved capacity and will result in a significant increase in the portion of visitors arriving at the end of the peninsula also travelling across the Cable Car. As detailed in Chapter 7 Biodiversity of this EIAR, specifically Section 7.8, mitigation measures to manage visitor numbers have been developed so that no more than 80,000 visitors per annum and 12,835 visitors per month at peak season will be permitted to make the cable car journey to Dursey Island. Considering the significantly improved capacity of the cable car it is estimated that 80% of all visitors to the Visitor Centre will make the trip on the cable car to the island.

It is estimated that during peak season the proposed visitor centre will see up to 640 visitors per day. The busiest hour would see approximately 1/8 of the daily traffic arriving or departing, or a peak of 65 vehicles per hour. The total daily traffic at peak season on the R572 at the Visitor Centre entrance is estimated at 500 vehicles during peak season. This represents an increase in traffic of 16% per day during peak season.

It is considered that this level of traffic increase during the peak season will require some upgrading of the R572 road from Bealbarnish Gap to the Visitor Centre to allow for increased widths and passing bays that are suitable for two-way traffic.

5.4.1.3 Management of the Visitor Numbers

The mitigation measures detailed in Chapter 7 Biodiversity have been developed and will be implemented for the operational phase so that visitor numbers are controlled at peak times and to ensure a more evenly spread of visitors throughout the season and also during the day to reduce the sharp peak periods. This will ensure that both the car parking capacity and that the capacity of the island to accommodate visitors will be managed and will not impact on the biodiversity, as described in Chapter 7 of this EIAR. While the overall daily visitor numbers will slightly increase, the peak demand will not increase significantly. The management of visitor numbers will involve a range of measures including marketing, pre-booking and discount price tickets for off-peak times and the provision of real time car park information at strategic locations and restricting travel times for the cable car. These measures are all detailed in Chapter 7 and Chapter 18 of this EIAR.

To advise motorists approaching the Dursey Island Cable Car and Visitor Centre along the Ring of Beara, it is proposed to install a Variable Message Sign (VMS) at four locations namely: 1. R572 Bealbarnish Gap, 2. the R572 / R571 Junction at Castletownbere-Bearhaven, 3. the R575 / R571 Junction at Eyeries Cross and 4. the N71 / R572 Junction at Glengarriff, as presented in Plate 5.7. A permanent electronic car park monitor will be provided to record occupancy rates at the Visitor Centre, and this will link to these VMS. At busy times when the Visitor Centre is at capacity the VMS signs will alert drivers to the lack of parking and this will allow people to alter their plans well before they get to the end of the Peninsula.

Plate 5.7 **Proposed locations of VMS to inform visitors of visitor centre/car park capacity**

5.4.1.4 Car Park Provision and Demand

Based on a peak of 640 visitors per day, an average vehicle occupancy of 2.4 persons and an average visit duration of 3 hours, the peak demand for cars based on the current visitor arrival profiles is estimated at 97 vehicles during the peak seasons and peak times. The Mitigation Measures in Chapter 7 Biodiversity (specifically Section 7.8) will restrict the number of visitors that can access the Centre at busy times and will result in a better spread of visitor arrivals during the day. The proposed Visitor Centre car park on the mainland is being increased from 70 spaces to 100 spaces. It is not desirable to provide any additional car parking spaces on site, due to site constraints including biodiversity and landscape. This increase in car parking will accommodate the parking demand through the implementation of the associated mitigation measures contained in this EIAR.

The proposed car park can accommodate a mini-bus set down located at the front of the Visitor Centre building entrance. The layout of the car park is designed with a one-way loop road to provide improved traffic circulation and minimise delays for traffic search for a space and turning around. Camper vans will not be accommodated at the proposed car park and instead will be directed to alternative parking facilities using the aforementioned variable message signs.

On the island side of the site, it is proposed to retain the existing 10-space residents' car park.

5.4.1.5 Road Improvement Works

The approach roads along the R572 from Glengarriff and the R571 & R575 from Kenmare to Bealbarnish Gap have considerable landscape character and do not need to be upgraded for the small increase in traffic during peak season attracted to the proposed Visitor Centre.

Improvement works are required on the 8km stretch of the R572 Regional Road, from Bealbarnish Gap at the R572 / R575 junction to the Visitor Centre, to address existing congestion problems and facilitate anticipated volumes of traffic generated by the proposed development. A number of new and improved two-way sections of road and passing locations are to be created to provide sufficient traffic capacity. The locations of the two-way sections of road and passing bays have been designed so that the distances between two-way / passing sections of road is suitably reduced and also located so that opposing traffic can see each other in sufficient time to give-way at the narrow sections. Other road improvements will include some verge widening to provide adequate forward visibility and pavement strengthening works. This will ensure that the road doesn't become blocked and minimises the risk that some vehicles would need to reverse to the next nearest passing point. It is proposed to acquire the sections of privately owned land required at 11 locations for these works by means of compulsory purchase order (CPO). These road improvements measures will also allow the approach road to better deal with camper vans and mini-buses, including the local school bus service. Details of the proposed road upgrades are shown on Figure 4.12 to 4.22 included in Volume 3 of this EIAR.

Plate 5.8 Indicative design of passing bay to be constructed on R572

5.4.2 Construction Stage

The construction stage of the project is anticipated to last for approximately 18 months. The impacts that the construction stage will have on the surrounding road network in terms of haulage routes, traffic and site compounds and parking has been considered.

It will be necessary to transport materials, including large prefabricated steel and/or concrete elements, to the site via the R572 regional road. This is the only access route to the mainland site up as far as the junction of the R572 and R575 at Bealbarnish Gap, located 8km east of the cable car site. From Bealbarnish Gap construction traffic could come from the direction of Allihies (to the northeast) or Castletownbere (to the east). It is assumed that most of the construction traffic will come from the Castletownbere and Glengarriff direction since it is on the main route from Cork City.

Marine access will be required for construction works on the island. There are existing piers and slipways in the vicinity of both cableway stations. The mainland pier is approximately 250m southeast of the mainland station and the island pier is approximately 300m south of the island station. It is anticipated that materials required for works on the island will be ferried from the mainland pier to the island pier. This crossing is approximately 500m long. From island pier materials will be transported up the existing pier access track to the location of the island works.

However, the mainland pier is relatively exposed and therefore vulnerable to adverse weather and seafaring conditions, and its use may not be possible to cross the sound. Consequently, the contractor may also need to depart from Garinish Point, a relatively sheltered pier and slipway located 1.8km northeast of the cableway (3.6km by road). This entails a 5km trip by boat, provided seafaring conditions are suitable for passage through the sound.

Temporary traffic management arrangements are to be implemented to facilitate ongoing access to the existing cable car via construction access points throughout the works.

Considering that visitor numbers to the site are especially high during the summer months, and since there is a requirement to maintain access to the existing cable car throughout the construction period (insofar as is possible), it is proposed that the timing of the more disruptive works aspects of the works will be carried out during the off-season (October – March) where possible. Limited car parking is to be maintained for visitors throughout the construction stage.

The works contractor, when appointed, will be required to prepare a Construction Environmental Management Plan (CEMP) and associated Traffic Management Plan (TMP) that maximises the safety of the workforce and the public and minimises construction traffic generation and disruption, while maintaining access to properties at all times. The contractor shall provide an appropriate information campaign for the duration of the construction works so local residents and visitors are aware of the traffic management measures that are to be implemented.

5.5 Mitigation Measures

No mitigation measures are required for the roads, traffic and transportation.

5.6 Residual Impacts

The proposed development will result in an increase in traffic associated with the increase in visitor numbers. During the design development and the preparation of this EIAR the need for the proposed Mitigation Measures in Chapter 7 Biodiversity (specifically Section 7.8) was identified and the appropriate road upgrade works have been identified.

The construction stage traffic impacts will be minimised through the implementation of a Construction Traffic Management Plan and restricting the main construction activities and associated traffic to the off season when traffic on the surrounding road network are considerably less than peak season.

The residual impact of the proposed development for roads, traffic and transportation will result in slight to moderate adverse effects, which can be accommodated by the surrounding road and transportation network.

Chapter 6 Population and Human Health

6.1 Introduction

This chapter addresses the potential population and human health impacts related to the construction and operation of the proposed Dursey Island Cable Car and Visitor Centre development, referred to hereafter as the 'proposed development'. The proposed development involves the replacement of the existing Dursey Island Cable Car, the construction of associated structures (including the visitor centre, café, welfare facilities, and cableway line stations) and completion of road improvement works on the R572 – the principal approach road to the site. For a detailed description of the proposed development, refer to Chapter 4 of this Environmental Impact Assessment Report (EIAR). Actual and perceived effects of the proposed development on population and human health may arise from various aspects of the proposed development. These effects are dealt with throughout this EIAR. In particular, interactions will occur with the effects described in the chapters listed in Table 6.1.

Table 6.1 Interactions between this Chapter and other Chapters of this EIAR

Relevant Aspect(s)	Chapter & Specialist Contributor
Human Health: Traffic	Chapter 5: Traffic Analysis (ROD)
Human Health: Contaminated Land	Chapter 8: Soils and Geology (ROD)
Human Health: Noise and Vibration	Chapter 12: Noise and Vibration (AWN Consulting)
Human Health: Air Quality and Climate	Chapter 13: Air Quality and Climate (AWN Consulting)
Human Health: Water Quality and Flooding	Chapter 10: Hydrology (ROD)
Human Health: Landscape and Visual	Chapter 11: Landscape and Visual Analysis (Cunnane Stratton Reynolds; Pederson Focus)
Human Health: Material Assets	Chapter 16: Material Assets and Land (ROD)
Human Health: Major Accidents and Disasters	Chapter 17: Interrelationships, Major Accidents and Cumulative Effects (ROD)

In accordance with the Draft Environmental Protection Agency (EPA) *Guidelines on Information to be contained in the Environmental Impact Assessment Report* (2017), this chapter examines the characteristics of the proposed development with respect to:

- Land use and social considerations, including effects on general amenity, journey characteristics, severance, amenity uses of the site or of other areas in the vicinity;
- Economic activity and employment, including tourism; and

- Human health, considered with reference to interactions with, other environmental receptors contained in corresponding chapters such as air, noise, traffic and flooding, as appropriate.

The contents of this chapter are presented as follows:

- Section 6.2 outlines the methodology employed to conduct the population and human health impact assessment.
- Section 6.3 presents a description of the (baseline) receiving environment with respect to population and human health.
- Section 6.4 describes the predicted effects of the construction and operation of the proposed development with respect to population and human health.
- Section 6.5 sets out a suite of measures to avoid, prevent, reduce or offset any significant, adverse effects identified in Section 6.4.
- Section 6.6 describes potential residual effects – those which may occur after proposed mitigation measures have been implemented.
- Section 6.7 outlines any difficulties encountered in compiling information for the purposes of this Chapter.
- Section 6.8 presents a summary and conclusion of the population and human health impact assessment.
- Section 6.9 presents a list of reference material used in the preparation of this Chapter.

6.2 Methodology

This population and human health impact assessment has been undertaken in accordance with Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, as amended by Directive 2014/52/EU and as transposed into Irish law through S.I. No. 296 of 2018.

6.2.1 Relevant Guidelines

The following guidelines have influenced the preparation of this chapter:

- *Draft Guidelines on Information to be contained in the Environmental Impact Assessment Report* – Environmental Protection Agency, 2017;
- *Draft Advice Notes for Preparing Environmental Impact Statements*, - Environmental Protection Agency, 2015;
- *Guidelines on the Information to be contained in Environmental Impact Statements* – Environmental Protection Agency, 2002;
- *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements* – Environmental Protection Agency, 2003;
- *Environmental Impact Assessment of National Road Schemes – A Practical Guide (Revision 1)* – National Roads Authority & Transport Infrastructure Ireland, 2008;
- *Guidelines on the Treatment of Tourism in an Environmental Impact Assessment* – Fáilte Ireland, 2011;
- *Additionality Guide* – UK Homes and Communities Agency, 2014;
- *Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report* – European Commission, 2017;

- *Health Impact Assessment Resource and Tool Compilation* – United States Environmental Protection Agency, 2016;
- *Health Impact Assessment Guidance* – Institute of Public Health Ireland, 2009; and
- *Framework for Human Health Risk Assessment to Inform Decision Making* – United States Environmental Protection Agency, 2014.
- *Guidance on the Assessment of Dust from Demolition and Construction* – Institute of Air Quality Management, 2014

The description of the quality, significance, extent (magnitude), probability and duration of effects outlined within this assessment are based on the definitions set out within Section 3.7 of the *Draft Guidelines on Information to be contained in Environmental Impact Assessment Reports* (EPA, 2017).

6.2.2 Study Area

There is no national guidance available on an appropriate study area for the assessment of population and human health effects. The study area has been defined with reference to the potential for effects from the proposed development using professional judgement and based on the availability of relevant information. The most significant human health environmental effects are likely to be confined within 50-100m of the proposed development. Some effects, such as those related to air quality and traffic, may accrue to a wider study area, and these are considered as part of the respective specialist assessments that inform this assessment.

A study area of 500m outside of the boundary of the site of the proposed development (Plate 6.1) has been defined as part of this assessment. The study area is located in the Kilnamanagh Electoral Division (ED) (Plate 6.2). EDs are the smallest legally defined administrative areas in Ireland for which Small Area Population Statistics (SAPS) are published every 5 years from the national census. The EDs and SAPS are the best available units of measurement for collecting population and human health data and are relied upon where relevant in order to inform the population and human health profile of the study area.

Plate 6.1 **Population and Human Health Study Area – Site of proposed development (red) plus 500m buffer zone (black)**

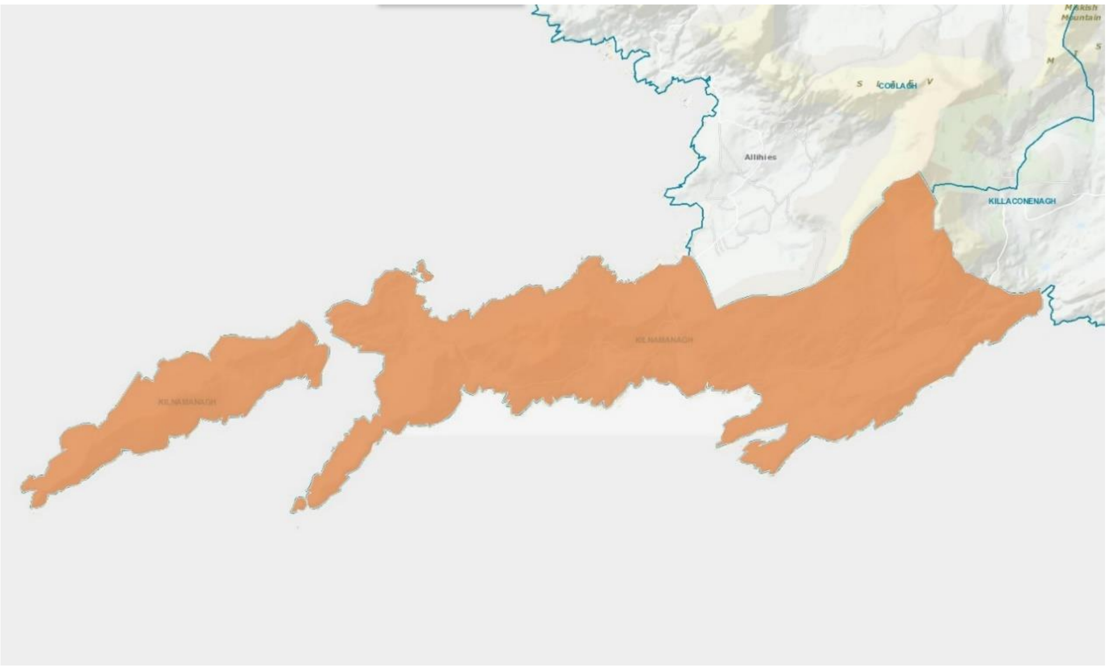

Plate 6.2 **Kilnamanagh Electoral District (orange). Source: MyPlan.ie**

6.2.3 Data Collection Methods

Primary and secondary data were employed in the completion of this impact assessment. Initially, a desk study was conducted to describe the existing receiving environment with respect to population and human health.

6.2.4 Data Sources

Data sources consulted during the desk study included:

- Population, demographics and health data sources:
  - Central Statistics Office (CSO) 2011 and 2016 National Census data
  - An Post GeoDirectory,
  - Failte Ireland;
  - Pobal;
  - the Institute of Public Health (IPH); and
  - the Health Service Executive (HSE);
- An Bord Pleanála planning application database
- Cork County Council (CCC) planning application database
- Other relevant environmental data collated during the various environmental assessments conducted for the purposes of this EIAR, particularly traffic, noise, air and climate, water, land and soil and landscape and visual impacts;
- Ordnance Survey of Ireland aerial photography; and
- Submissions/comments made during stakeholder/public consultations.

A range of planning and development policy documents and technical reports were reviewed as part of the assessment process, including the following key documents:

- *Project Ireland 2040 – National Planning Framework & National Development Plan* – Government of Ireland, 2017;

- *Rural Development Plan 2014 – 2020* – Department of Agriculture, Food and the Marine, 2014;
- *Realising Our Rural Potential – Action Plan for Rural Development* – Government of Ireland, 2017;
- *People, Place and Policy Growing Tourism to 2025* – Department of Transport, Tourism and Sport, 2015;
- *Draft Southern Regional and Spatial Economic Strategy 2019 – 2031* – Southern Regional Assembly, 2019;
- *Cork County Development Plan 2014 – 2020* – CCC, 2014
- *Cork Tourism Strategy 2016: Growing Tourism in Cork: A Collective Strategy* – Cork Strategic Tourism Task Force, 2016;
- *Cork County Draft Landscape Strategy* – CCC, 2007;
- *West Cork Municipal District Local Area Plan 2017* – CCC, 2017; and
- *West Cork Islands Integrated Development Strategy 2010* – Cork County Development Board & RPS, 2010.

6.2.5 Consultations

This section presents a summary of feedback obtained from consultees and members of the public related to potential impacts of the proposed development on population and human health. Non-statutory public consultation events were held in three locations:

- Lehanmore Community Centre in October 2018,
- The Eccles Hotel, Glengarriff, on the 27th of March 2019,
- Lehanmore Community Centre on the 23rd of April 2019

At each of these events, interested parties were invited to submit any comments on the proposed development. Additionally, 75 statutory and non-statutory consultees (relevant organisations and authorities) were invited to submit comments on an EIA Scoping Report developed for the proposed development. Issues raised that informed this assessment include:

Ticketing system: A number of interested parties enquired about how locals and island residents would be accommodated under the new cable car ticketing system.

Movement of goods/ livestock in the cable car: Queries were raised regarding the movement of goods to-and-from the island by Dursey Island residents and farmers. It was suggested that an agreement should be developed setting out details of type, nature and volumes of goods permitted in the proposed cable cars and a timetable for their movement.

Traffic: Concerns were expressed regarding additional traffic on the R572 as a result of the proposed development.

Support for the road improvement works on the R572 was expressed. Suggestions regarding traffic management were made, including that:

- Restrictions should be placed on the movement of coaches and campervans on the R572 beyond the R572-R575 junction at Bealbarnish Gap. It was suggested that these vehicles could potentially access the site through the use of a park-and-ride service.

- Priority should be given to cyclists and pedestrians on the approach road.

Economic effects: A number of submissions supported the proposed development and expressed that it should lead to opportunities for local employment and business development in the immediate and wider area.

Tourism Destination: A submission by Fáilte Ireland pointed out that the unspoilt nature of such sites contributes to their appeal as tourist destinations. It advised that effects detracting from the unspoilt nature of the site should be avoided in order to avoid indirect loss of tourism amenity value at the site.

Access: The layout of the proposed development should allow for emergency services and maintenance access to the carrier cabins. The site should also be accessible to wheelchair users.

In some cases, the consultation process has resulted in design changes and/or agreement of appropriate mitigation measures as part of the design of the development. Where relevant, this mitigation has been integrated into this assessment.

6.2.6 Population Impact Assessment Categories

6.2.6.1 Overview

The purpose of the population assessment is to identify the likely significant impacts as they might affect users of the proposed development and the local community. It usually follows that impacts of a population and human health nature are a function of:

- the location and character of the local environment;
- the sensitivity of the local population and its capacity to absorb change;
- the nature of the environmental effect;
- the scale or extent of the effect in terms of area or population affected;
- the duration and frequency of an effect; and
- the probability of an impact's occurrence and the possibility of effectively reducing the effects through mitigation.

Impacts can result in direct, indirect, secondary and cumulative effects on existing environmental conditions. Effects can be positive, neutral or negative. The significance of an effect depends on, among other considerations, the nature of the environmental effect, the timing and duration of an effect and the probability of the occurrence of an effect. The significance of an effect is described as imperceptible, slight, moderate, significant, very significant or profound. The impacts may be short-term, medium-term or long-term. The duration of an effect may be momentary, brief, temporary, short-term, medium-term, long-term, permanent or reversible in accordance with the timescales detailed in Table 6.2. The frequency of that effect can also influence significance i.e. if the effect will occur once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually. For example, road works involving disruption to road users for a few hours could be described as having a brief imperceptible, negative, brief impact versus the complete closure of a road for a number of months which could be described as a very significant, negative, temporary impact.

The population and human health assessment addresses impacts at a community level rather than for individuals or identifiable properties, although impacts for individual properties are discussed where these are significant or located within close proximity to the proposed development, as appropriate.

This EIAR is focused on providing a clear documentary trail of analysis used to arrive at conclusions. The terms used to describe the predicted effects across impact assessment categories are defined in Table 6.2.

Table 6.2 Definitions of terms used to describe population effects (adapted from *Draft Guidelines on Information to be contained in the Environmental Impact Assessment Report, EPA, 2017*)

Quality of Effects	
Positive	A change which improves the quality of the environment.
Neutral	No effects, or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Negative	A change which reduces the quality of the environment.
Significance of Effects	
Imperceptible	An effect capable of measurement but without significant consequences on population.
Not Significant	An effect which causes noticeable (*Note 1*) changes in the character of the population environment without affecting its sensitivities.
Slight effects	A small effect which causes noticeable changes in the population and character of the environment without affecting its sensitivities.
Moderate effects	An effect that alters the character of the population environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the population environment.
Very significant Effects	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the population environment.
Profound Effects	An effect which obliterates sensitive characteristics.
Extent and Context of Effects	
Extent	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.
Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Probability of Effects	
Likely Effects	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measure are properly implemented.
Duration and Frequency of Effects	
Momentary Effects	Effects lasting from seconds to minutes
Brief Effects	Effects last less than a day

Temporary Effects	Effects lasting less than a year
Short-term Effects	Effects lasting one to seven years
Medium-term Effects	Effects lasting seven to fifteen years
Long-term Effects	Effects lasting fifteen to sixty years.
Permanent Effects	Effects lasting over sixty years
Reversible effects	Effects that can be undone, for example through remediation or restoration.
Frequency of Effects	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hour, daily, weekly, monthly, annually).

Note 1: For the purposes of planning consent procedures

The relevant components of the population aspect of this chapter examine the attributes and characteristics associated with social considerations of the community. These components (i.e. population impact assessment categories) include land use change, journey characteristics, journey amenity, general amenity, severance, and economic activity. The following sections (6.2.6.2 – 6.2.6.6) describe these impact categories.

6.2.6.2 Land Use Change

Land use change can affect populations in different ways. Planning policy plays an important role in guiding and facilitating approximate changes in land use which can influence settlement as well as transportation patterns. Planning policy ensures these changes are managed sensitively and are appropriate to the unique existing and emerging social, economic and environmental conditions. The primary consideration relating to land use change is to assess whether the proposed development conforms with land use policy and to identify if the proposed development is likely to change the intensity of patterns, types of activities and land uses. Therefore, a review of planning policy was carried out as part of this assessment (Section 6.3.2) as well as an assessment of the existing and emerging baseline and its capacity to absorb predicted changes.

6.2.6.3 Journey Characteristics

'Journey length' refers to the distance associated with a journey, while 'duration' refers to the time taken to make that journey. There are obvious interactions between these journey characteristics and 'journey amenity' and 'severance', described in the following sections, as well as with economic impacts and therefore the assessment is combined. The assessment will consider both positive impacts resulting from a decrease in journey length/time as well as negative impacts resulting from an increase in journey length/time. In addition, new transport facilities can improve accessibility or connectivity through the combined effect of reduced journey time and reduced severance. For the purposes of this EIA, average walking speed for pedestrians is assumed to be 5km/h and average cycling speed is assumed to be 20km/h.

6.2.6.4 Journey Amenity and General Amenity

The assessment of journey amenity relies on the significance categories set out in Table 6.2 and is supported by cross-reference where necessary with the relevant chapters of this EIAR. The level of traffic on a road, the proximity and separation of footpaths and cycle-paths, the nature of any crossings/junctions to be negotiated, the legibility of a journey (including signage), visual intrusion (including sightlines) and safety for equestrians, are amongst the factors relevant to the assessment of amenity, as are the number and types of people affected. The principal concern is with pedestrians and cyclists, but journey amenity impacts also apply to drivers; for example, due to safety and anxiety associated with the crossings of major roads. There are also interactions with the assessment of journey characteristics and community severance.

6.2.6.5 Severance

The definition of severance is not precise. Severance is an impact of transport infrastructure development such as roads. Its effect is to discourage community interaction and it occurs where access to community facilities or between neighbourhoods is impeded by a lengthening of journey time or by the creation of a physical barrier. For example, construction of a road can create a physical barrier between communities but can also create further severance due to high traffic volumes or associated perimeter fencing.

The type of severance depends on the location of community facilities, the level of use of facilities, the time of day or duration when traffic conditions are experienced, the sensitivity of the population affected and the geographical spread of the community. Children, the elderly, the mobility impaired and people without access to a private car are among those most likely to be affected by community or social severance and any corresponding loss of neighbourhood interaction or safety concerns caused by barriers such as roads. On the other hand, relief from existing severance may be provided by a new road where traffic volumes or speed are moderated, by the inclusion of crossing facilities in the design or through the presence of overbridges or underpasses. New severance is a negative impact that occurs when a barrier is created between people and community facilities. Where there are implications for real and perceived safety, there are also potential interactions with journey amenity.

Sensitive groups are identified specifically where they comprise a higher proportion of pedestrian journeys or where specific amenities are associated with these groups. Sensitive groups can include children and young people, the elderly, the mobility impaired and people at risk of social isolation. Relevant facilities include schools, surgeries, hospitals, churches, post offices and shops.

Relief from severance is a positive impact which can be defined in relation to existing severance. Relief from severance could follow from a transference of traffic from improvements to road design or sightlines, or from the introduction of crossing facilities, underpasses or bridges.

Table 6.3 Definitions of terms used in the assessment of severance

Impact Level	**Significance Criteria**
Imperceptible	No noticeable consequences for journey patterns
Not significant	Some minor effects on connectivity but present journey patterns are maintained.
Slight	Slight effects on connectivity but journey patterns are maintained with some hinderance to movement.
Moderate	Moderate effects on connectivity. Some moderate hinderance to movement is likely to be experienced by some populations but journey patterns maintained.

Impact Level	Significance Criteria
Significant	Significant effects on connectivity i.e. changes could dissuade/ promote populations from making particular journeys or result in requirement for alternative route to origin and destination.
Very Significant	Very significant effects on connectivity i.e. dramatic changes could dissuade/ promote populations from making particular journeys or result in requirement for alternative route to/from origin and destination.
Profound	Profound changes to connectivity. Populations are likely to be required to completely alter journey patterns.

Table 6.3 outlines definitions of terms used to describe the magnitude of (positive and negative) severance impacts. Where the assessment varies from these definitions due to the context in which the relief occurs, the reasons for the assessment are discussed in the text.

6.2.6.6 Economic Activity

Economic and employment impacts occur at both the regional and local scale and can be either positive or negative. Transport infrastructure is normally proposed with the intention of improving national competitiveness and economic/social linkages; for instance, in relation to improving access to areas, reducing journey time and improving journey time reliability for commercial goods, or for travel and commuting of tourists and the workforce. However, there can also be negative impacts in relation to loss of passing trade to businesses, car parks and those who rely on vehicular access which may be affected by transport infrastructure.

Economic impacts are assessed at community level. However, development may affect identifiable local business. In this case, impacts on individual companies are discussed where relevant. Other economic impacts could affect the wider community, for example where a number of businesses are affected, tourism, or where the retail or business environment of a city or town is impacted.

6.2.7 Human Health Impact Assessment Categories

This section describes the methodology relating to the assessment of human health effects. Health, as defined by the World Health Organization (WHO), is "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." The United States Environmental Protection Agency (US EPA) Human Health Risk Assessment is a useful framework for considering potential human health impacts. It includes four basic steps to inform decision making, detailed in Table 6.4

Table 6.4 Framework for assessment of potential human health impacts (adapted from US EPA Human Health Risk Assessment Framework)

Step 1 – Hazard Identification	Examines whether a stressor has the potential to cause harm to humans and/or ecological systems, and if so, under what circumstances. For example, in the case of a transport infrastructure project, one might consider an emission such as noise or air pollutants and examine its potential for harm.
Step 2 – Dose Response Assessment	Examines the numerical relationship between exposure and likely human health response/effects. For example, typically when the dose/emission increases the response/health effect increases. Some individuals may have a different dose response/ health effect than others e.g. vulnerable groups such as the old, very young or sick.

Step 3 – Exposure Assessment	Examines what is known about the frequency, timing, and levels of contact with a stressor (e.g. emission). For example, estimating human exposure to an emission/agent in the environment or estimating future exposure of an agent that has not yet been released/present in the future environment.
Step 4 – Risk Characterisation	Examines how well the data support conclusions about the nature and extent of the risk from exposure to environmental stressors. A risk characterisation conveys the risk assessor's judgement as to the nature and presence or absence of risks, along with information about how the risk was assessed, and where assumptions and uncertainties still exist. (This includes cross-referencing with the other environmental chapters of this EIAR).

6.2.7.1 Significance of Health Effects

The assessment of significance relates to the identification and assessment of potential human health effects on the community. It does not assess effects on an individual basis. It is recognised that some individuals may have a different response to effects than others, this might include potential vulnerable groups, such as the elderly, very young or the sick.

The 2002 EPA 'Guidelines on the Information to be contained in Environmental Impact Statements' states that:

> *"The evaluation of effects on these pathways is carried out by reference to accepted standards (usually international) of safety in dose, exposure or risk. These standards are in turn based upon medical and scientific investigation of the direct effects on health of the individual substance, effect or risk. This practice of reliance upon limits, doses and thresholds for environmental pathways, such as air, water or soil, provides robust and reliable health protectors [protection criteria] for analysis relating to the environment."*

The significance criteria to assess human health effects are defined in Table 6.5 (as adapted from EPA, 2017). The quality of effects (positive, negative or neutral) as well as the probability, duration and timing of effects that are used to qualify the type of human health impact, are defined in Table 6.5.

Table 6.5 Criteria Used in the Assessment of Human Health Impacts (adapted from EPA, 2017)

Impact Level	Significance Criteria
Imperceptible	An effect capable of measurement but without significant human health consequences.
Not significant	An effect which causes noticeable changes in the character of the environment without affecting the community human health sensitivities.
Slight	A slight/ small effect which causes noticeable changes in the reported symptoms of the population without affecting the community human health sensitivities (morbidity or mortality).
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging community's human health baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment affecting human health (morbidity or mortality).

Impact Level	Significance Criteria
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters **most o**f a sensitive aspect of the environment affecting the community's human health (morbidity or mortality).
Profound	An effect which changes a sensitive characteristic of the environment that profoundly affects the human health status of the community.

6.2.7.2 Health Based Standards

Health based standards are environmental health thresholds set for a range of environmental parameters by bodies such as the WHO and the European Union (EU). The standards are set at levels so as to ensure no adverse health effects on the most vulnerable in society. For example, air quality and noise levels are set at levels to protect the vulnerable rather than the robust (see Chapter 12 -Noise and Vibration - and Chapter 13 - Air Quality and Climate - of this EIAR for the relevant standards). These standards are set to ensure scientific analysis (i.e. modelling) is undertaken on the baseline environment which includes an analysis of the likely changes in the receiving/baseline environment as a result of the proposed development, to predict potential human health effects. This results in a level of certainty in relation to the potential effects (positive or negative) before a project is developed. This scientific analysis provides decision makers with a clear methodology outlining what information was used, data gaps and any assumptions that were made in order to provide a comprehensive assessment of impacts on human health.

Regardless of the methodology, psychosocial effects or wellbeing effects are difficult to quantify since these effects are more subjective in nature. It must also be recognised that there are uncertainties in relation to assessing impacts on individuals due to availability of health data about individuals and the difficulty in predicting effects on individuals, which could be based on a variety of assumptions. Subsequently, the existing receiving environment and relevant health-based standards assessment are relied upon to arrive at conclusions relating to likely human health effects.

6.2.7.3 Identification of Vulnerable Groups

The population baseline characteristics or the community profile is required to inform the assessment of a proposed development on human health and this informs the identification of potential vulnerable groups in the environment. Children and adolescents constitute a vulnerable group as they lack the experience and judgement displayed by adults. Studies also show that they may be more sensitive than adults to noise and air pollution and other environmental impacts.

Older people also constitute a vulnerable group, but the vulnerability of individuals can vary depending on a number of factors including level of income, education, deprivation, individual preferences and genetics. However, an assumption can be made that older populations move more slowly than their younger counterparts, particularly when moving around in traffic and public places. Elderly persons are also more vulnerable to health conditions than their younger counterparts. Ease of access to medical and community facilities become very important in maintaining health and quality of life outcomes for all cohorts. Vulnerable groups, in general, have greater sensitivity to air pollution and potential effects on the respiratory system and cardiovascular system. There are many reasons for this, including the possible presence of other medical conditions such as respiratory or cardiovascular disease. Some subtle changes in the environment have the potential to have an adverse effect that would not be experienced by a younger more resilient person. Other vulnerable groups also include mobility impaired or those with mental illness.

6.2.7.4 Hazard Identification

Human health impacts related to transport infrastructure can arise as a result of a variety of factors and interactions across environmental receptors (e.g. traffic accidents, air and noise pollution, impacts on water quality, flooding, etc.) which have the potential to cause a threat to the health of populations and the wider environment. All aspects of the environment influence human health to some degree or another.

A review from similar projects elsewhere identified that human health impacts can be put into four main hazard categories to include: physical, psychosocial, chemical and biological (summarised in Table 6.6).

Table 6.6 Human health hazard categories

Category	Main hazards identified
Physical	• Noise (including nuisance/disturbance, noise-induced hearing impairment, interference with speech communication, sleep disturbance, hypertension and cardiovascular disease) • Vibration (including nuisance) • Air quality (including construction dust, carbon monoxide, fine particles) • Water quality (including effects due to contaminated land) • Soils (contamination of land) • Traffic (including collisions, injuries or fatalities) • Other physical hazards, e.g. radon
Psychosocial	• Nuisance • Anti-social behaviour • Suicide
Chemical	• Heavy metals • Other contaminants
Biological	• Surface water and ground water (including water contamination) • Aspergillus (a fungi with potential for human health impacts) • Rodent-borne diseases, e.g. Leptospirosis

A literature review was conducted which identified recognised health effects of infrastructure construction and operation on human health. Transport can affect health outcomes both directly and indirectly. For example, direct effects can accrue as a result of air pollution or traffic accidents while indirect effects might arise as a result of the global warming potential of vehicular greenhouse gas emissions.

The Institute of Public Health's (IPH's)2005 'Health Impacts of Transport' report presented a summary of the pathways from transport aspects to human health impacts (Plate 6.3). The main impacts can be summarised as: road traffic injuries, air pollution, noise pollution, effects on physical activity, effects on community (social networks, social capital on health) and social inclusion (effect on access and social inclusion).

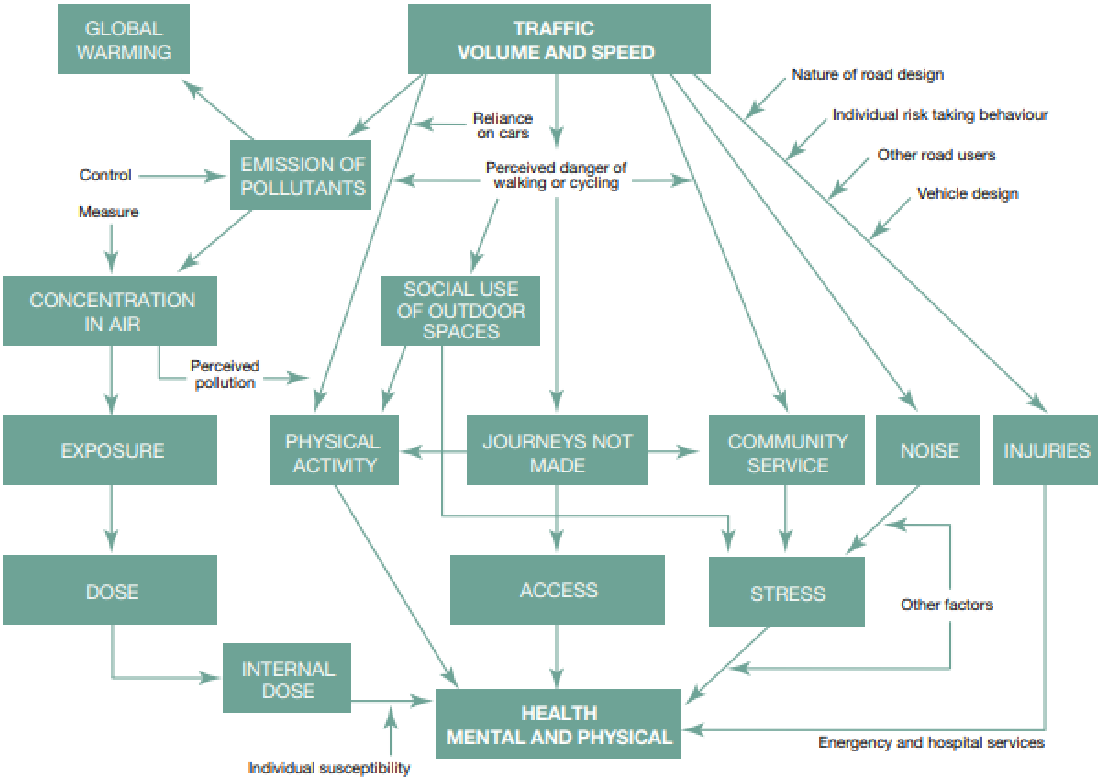

Plate 6.3 Pathways from transport policy to health outcomes. Source: IPH, 2005

6.2.7.5 Impact of Emissions to Air

Air quality is generally considered to be good in Ireland. However, traffic is a key pressure on air quality and is the main cause of air quality problems in our larger towns and cities (EPA, 2016). Vehicles emit a range of air pollutants including nitrogen oxides (NOx), particulate matter (PM10 and PM2.5), black carbon and volatile organic compounds (VOCs) particularly present in urban areas and areas with high congestion levels. Radon is a naturally occurring radioactive gas that originates from the decay of uranium in rocks and soils. It is colourless, odourless and tasteless and can only be measured using special equipment. Radon rises up through the ground to disperse in the air and only becomes a health hazard when it is trapped in buildings.

Pollutants such as those listed above may give rise to significant adverse human health effects, including cardiovascular pulmonary and mutagenic diseases (EPA, 2015).

National standards for ambient air pollutants in Ireland are generally derived from EU Council Directives. In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or 'Air Quality Standards' are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (see Chapter 13, Table 13.1 and Appendix 13.1 Ambient Air Quality Standards of this EIAR). The 2014 Institute of Air Quality Management (IAQM) *Guidance on the Assessment of Dust from Demolition and Construction* have been used in this assessment.

6.2.7.6 Impact of Noise and Vibration Emissions

Noise

According to the WHO, noise is the second greatest environmental cause of health problems after air quality. Excessive noise can seriously harm human health, affect mental health and people's daily activities, particularly at sensitive receptors such as residential properties, schools and workplaces, and during amenity or leisure time. Noise is measured using the standard decibel scale (SI unit = dBA; where 'A' represents a weighting which expresses the loudness of the noise in terms of human hearing).

The assessment and management of noise from the infrastructural transport sources (roads, rail, and airports) are governed by the Environmental Noise Directive and associated 2006 Environmental Noise Regulations (S.I. 140 of 2006). A detailed methodology relating to the assessment of noise and vibration impacts is set out in Chapter 12 of this EIAR - Noise and Vibration. There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. In lieu of statutory guidance, an assessment of significance has been undertaken in Chapter 12 as per *British Standard Institution (BSI) 5228-1: 2009 + A1:2014: Code of Practice for Noise and Vibration Control on Construction and Open Sites – Noise.* This standard sets out guidance on permissible noise levels relative to the existing noise environment. It calls for the designation of a noise sensitive location into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates a significant noise impact is associated with the construction activities.

Table 6.7, which is replicated from Chapter 12, sets out the noise levels which, when exceeded, give rise to a significant adverse effect at the façades of residential receptors.

Table 6.7 Example Threshold of Potential Significant Effect at Dwellings

Assessment category and threshold value period	**Threshold value, in decibels (dBA) ($L_{Aeq,\,T}$)**		
	Category A[A]	**Category B**[B]	**Category C**[C]
Night-time (23:00 to 07:00hrs)	45	50	55
Evenings and weekends [D]	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75

NOTE 1 A significant effect has been deemed to occur if the total L_{Aeq} noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.

NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total L_{Aeq} noise level for the period increases by more than 3 dB due to construction activity.

NOTE 3 Applied to residential receptors only.

A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dBA) are less than these values.

B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dBA) are the same as category A values.

C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dBA) are higher than category A values.

D) 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.

During the assessment period - daytime, in this instance - the ambient noise level is determined through a logarithmic averaging of the measurements for each location and then rounded to the nearest 5dBA. If the construction noise exceeds the appropriate category value, then a significant effect is deemed to occur.

Table 6.8 presents the Design Manual Roads Bridges (2011) likely impacts associated with change in traffic noise level. The corresponding significance of impact presented in EPA guidance (EPA, 2017) is presented alongside this for consistency in wording and terminology.

Table 6.8 Likely Impact Associated with Change in Traffic Noise Level

Change in Sound Level DMRB, 2011 (dBA L_{A10})	Subjective Reaction DMRB, 2011	Impact Guidelines for Noise Impact Assessment Significance (Institute of Acoustics)	Impact Guidelines on the Information to be contained in EIAR (EPA)
0	No change	None	Imperceptible
0.1 – 2.9	Barely perceptible	Minor	Not Significant
3.0 – 4.9	Noticeable	Moderate	Slight, Moderate
5.0 – 9.9	Up to a doubling or halving of loudness	Substantial	Significant
10.0 or more	More than a doubling or halving of loudness	Major	Very Significant

The criteria in Table 6.8 reflect the key benchmarks that relate to human perception of sound. A change of 3dBA is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10dBA change in noise represents a doubling/halving of the noise level. The difference between the minimum perceptible change and the doubling/halving of the noise level is split to provide greater definition to the assessment of changes in noise level. What determines the noise level significance is the baseline noise environment and the amount of the 'exceedance'. For example, if the change from the current baseline is 3dBA or less, even if the absolute levels are above 55dBA the change is likely to be imperceptible.

It is assumed that average noise levels in a building with windows open will be at least an estimated 15dBA less than outside. Average sound inside a building with the windows closed can be greater than 35dBA, depending on the building fabric. Accordingly, the attenuation can vary depending on the size of windows, building type and other factors.

The potential health impacts due to noise include the following:

- Noise-induced hearing impairment;
- Interference with speech communication;
- Disturbance at sensitive receptors;
- Sleep disturbance; and
- Hypertension and cardiovascular disease.

The EPA (2016) states that "*noise can disturb sleep, cause cardiovascular and psychophysiological effects, reduce performance and provoke annoyance responses and changes in social behaviour*". The EPA goes on to state that:

"*a study commissioned by the European Commission on the health implications of road, railway and aircraft noise in the European Union (RIVM, 2014) found that exposure to noise in Europe contributes to:*

- *about 910,000 additional prevalent cases of hypertension;*

- *43,000 hospital admissions per year;*
- *at least 10,000 premature deaths per year related to coronary heart disease and stroke."*

Adverse effects are more likely at higher noise levels - many effects are only demonstrated with ambient noise in excess of 70dBA. Whilst noise levels are often quoted with respect to potential effects on health and they are used in the significance assessment, it should be noted that the differences in significance between the different levels are relative rather than absolute.

Vibration

People can generally perceive vibration at levels which are substantially lower than those required to cause building damage. The human body is most sensitive to vibration in the vertical direction. The assessment of vibration-related effects on human health is informed by BSI Standards: *BS 6472-1:2008: Guide to evaluation of human exposure to vibration in buildings - Vibration sources other than blasting.* This standard does not give guidance on the limit of perceptibility, but it is generally accepted that vibration becomes perceptible at levels of approximately 0.15 to 0.3mms^{-1}.

Vibration has the potential to have health effects when perceptible. Potential adverse effects include, for example, sleep disturbance and nuisance. Another issue is sometimes described is infrasound - sound at frequencies so low that it is not audible to the human ear but, at high levels, may be perceived as vibration. Adverse effects due to vibration/infrasound, only occur when levels are high and perceptible to human beings - for example, vibration generated by an underground train.

6.2.7.7 Impact of Emissions to Hydrology and Hydrogeology

Emissions standards and pathways that affect human health relating to hydrology and hydrogeology include water quality and flood risk. From a human health perspective these pathways are discussed below.

Water Quality

Construction and operational activities pose a risk to watercourses, particularly contaminated surface water run-off from construction activities. Impacts to sources of drinking water are also sensitive and should be considered as part a human health issue in this context.

There are no bathing waters located within the development boundary. There are beaches at White strand (Billeragh Beach, Teernea Bay Beach) located to the north of the Dursey peninsula and Loughane beach located east of the proposed development (off the R572).

Flood Risk

Hydraulic structures such as bridges, culverts, channel diversions and outfalls can, if not appropriately designed, impact negatively on upstream water levels and downstream flows.

6.2.7.8 Impacts of Emissions to Soil

Emissions to the soil as a result of the construction/operation of development have the potential to adversely affect human health. It is also possible that the construction/operation of development will uncover substrate contaminated as a result of the previous land uses (e.g. waste disposal, industrial activities). Depending on the nature of the contaminants in question, if not appropriately treated, such unearthed materials may have the potential to adversely affect human health.

6.2.7.9 Psychosocial Impacts

Consideration of likely negative psychosocial hazards relating to new developments includes nuisance, anti-social behaviour and suicide. On the contrary, there could also be positive psychosocial impacts on the community due to improved connectivity, particularly for pedestrians and cyclists and as a result of regeneration associated with land use changes and increased economic prosperity.

Demolition and property acquisition can also have psychosocial impacts on both the occupant themselves and also at the community level, due to the impact on community ties and amenity of residents, local economy, etc.

6.3 Description of Receiving Environment

6.3.1 Introduction

The proposed development will see the replacement of the existing Dursey Island Cable Car that comprises, one cable car that can convey 6 persons at a time to/from Dursey Island, the crossing takes approximately 6 to 7.5 minutes in one direction. The proposed cableway will include two new cable cars, each with a capacity of approximately 15 persons and will be capable of making the crossing in approximately one minute, however, it is not expected that the cable car will operate at this increased speed but that journey times would be maintained similar to the current time (4 – 6 minutes) in order to maintain the journey amenity and unique 'experience' of those using the cable car. According to ticket sales in 2018, the current cable car transports approximately 22,000 persons to Dursey Island, excluding islanders (who do not have to pay for tickets). The proposed development will be capable of transporting between 200-300 passenger per hour in each direction.

The cableway infrastructure will be comprised of a steel ropeway, a pair of cable cars, two pylons, and two stations – one each on the island and mainland – at which passengers will embark/disembark. The end-to-end length of the proposed cableway will be approximately 375m. The proposed development will also involve the construction of a new visitor centre, café, gift shop, welfare facilities and car park with approximately 100 spaces on the mainland side of the site. The existing approximately 10 no. car spaces on the island will be retained. It is also proposed to carry out improvement works on the R572, including the construction of 10 no. passing bays, 1 no. visibility splay and completion of a number of localised improvements to improve forward visibility.

The site of the proposed development is, for the most part, the same as that of the existing Dursey Island Cable Car, which connects the western end of the Beara Peninsula in west Co. Cork with the easternmost tip of Dursey Island via a narrow tidal channel, the Dursey Sound. The alignment of the proposed cableway infrastructure itself will be offset 14 m to the north-east of the existing structure. This slight relocation will ensure the existing cableway will be maintained in operation for the duration of the construction works, insofar as is possible to ensure safe access.

The Dursey Island Cable Car is primarily accessed via the R572 from the direction of Castletownbere. It can also be accessed from the direction of Kenmare via the N71, R571, R575 and R572 (in turn). Together these roads form an effective loop of the western end of the peninsula. This loop forms part of the Wild Atlantic Way (WAW) and sections of it are on the Beara-Breifne Way walking and cycling trail.

The design and the proposed construction methodology and programme is detailed in Chapter 4 of this EIAR – Description of the Proposed Development and is not repeated here beyond where it is strictly relevant.

An accurate assessment of the receiving environment is necessary to predict the likely significance of the impacts of the proposed development. The following paragraphs present an overview of the context, character, significance and sensitivity of the study area, as it relates to population and human health.

Context

Dursey Island is one of the 7 inhabited islands that lie off the west coast of Co. Cork. It is situated at the western tip of the Beara Peninsula. The island itself is 6.5km long and 1.5 km wide. It is separated from the mainland by a narrow stretch of water called the Dursey Sound, which has a very strong tidal race, and a reef of rocks in the centre of the channel, which is submerged at high tide. Dursey is the only inhabited west Cork island to not have a dedicated ferry route.

The mainland portion of the proposed development is located on the south coast of Ireland on the Beara Peninsula. The cableway infrastructure is situated in the townland of Ballaghboy. Castletownbere is the nearest major town, at approx. 22km from the site of the proposed development. The smaller village of Allihies is approx. 12km away. Cork City is located approx. 147km away.

Character

The general character of the area is rural, remote, isolated, open, treeless and rugged. The entire study area is dominated by farmland – both private land and shared upland commonage. The study area is situated in the Kilnamanagh ED, which comprises a 37km² area of the western end of the Beara Peninsula and Dursey Island. According to the national census, the Kilnamanagh ED had a population of approximately 342 persons (i.e. approximately 9 persons per km²) in 2016. According to census data, there are approximately 4 inhabitants living on Dursey Island, year round. At the time of writing, there are two permanent residents on the island, both of whom are male. According to the *West Cork Islands Integrated Development Strategy* (Cork County Development Board & RPS, 2010) and the *West Cork Municipal District LAP 2017* (CCC, 2017), the island is at substantial risk of depopulation over the coming years.

The island, historically, was made up of 3 distinct clusters of development - Ballynacallagh, Kilmichael, and Tilickafinna, respectively, from east to west. Many of the buildings in these areas are either derelict or temporarily occupied holiday homes. There is no major development outside of these areas. According to the *West Cork Islands Integrated Development Strategy*, this settlement pattern is unique among the West Cork islands, where dwellings tend to be more dispersed. There are no shops, pubs or restaurants on the island, with the exception of a mobile café, which is open at the car park adjacent to the cableway during the summer months.

The mainland side of the study area is characterised by scattered detached dwellings located primarily along local roads radiating from the R572.

The main land use types in the study area are transport infrastructure (road and cableway), agricultural land uses, and tourism, recreation and amenity uses. The road network is generally quite poor, with predominantly narrow winding roads with poor forward visibility. Agriculture is largely pastoral, comprising sheep and dry stock. The area is a popular tourist destination, particularly during summer months. Activities include sight-seeing, walking/hiking and bird and whale/dolphin watching. The study area contains three overlapping national waymarked walking routes – the Beara-Breifne Way, the Beara Way and the Garinish Loop – all of which are in the immediate vicinity of the site of the proposed development.

Significance

The Dursey Island Cable Car is the only cableway in Ireland. Additionally, it is one of the only aerial ropeways in Europe to traverse the open ocean. As such, the site is a rare curiosity. The importance of the island as a tourist attraction is reflected in its designation as a 'Signature Discovery Point' of Fáilte Ireland's WAW experience brand. The cableway is one of the key visitor attractions of West Cork and contributes significantly to the local economy, attracting visitors from home and aboard.

The study area is of historical and cultural heritage significance. In 1602, the famed O'Sullivan Beare Gaelic chiefdom – the last bastion of Irish resistance in the Nine Years' War – was defeated by English forces at the Dursey Massacre, after which Donal Cam O'Sullivan Beare, Lord of Beara and Bantry, set off northwards with his remaining followers in what has become the most well-known march in Irish history. The aforementioned Beara-Breifne Way (Plate 6.5) commemorates this historic march. The area has a very high density of archaeological sites, particularly megalithic monuments. Chapter 14 of this EIAR details the archaeology and cultural heritage of the study area.

The study area is also of significant ecological value, particularly for protected seabird species and marine habitats and species. This is reflected in the designation of two no. Natura 2000 sites in/immediately adjacent to the study area – the Kenmare River SAC and the Beara Peninsula SPA. The entirety of Dursey Island is also a proposed Natural Heritage Area (pNHA). Birdwatching and whale and dolphin watching are popular recreational activities in the area, particularly on Dursey Island. Chapter 7 of this EIAR – Biodiversity – details the natural heritage assets of the study area.

The *Cork County Draft Landscape Strategy* characterises the landscape in the study area as 'Rugged Ridge Peninsulas', a landscape type which is considered to be of 'Very High' sensitivity, particularly with respect to new developments, including tourist facilities. Chapter 11 of this EIAR details the significance of the study area in terms of landscape and visual amenity.

Sensitivity

As a result of its remote, rural and sparsely populated nature, any new developments in the study area would be noticeable, and the area is considered to be more sensitive to change than other more developed locations. In the context of this assessment, the most sensitive receptors to change in the study area are its inhabitants. Other sensitive receptors are road users of the R572, walkers/hikers, cyclists and tourists. The appeal of the study area (particularly the island) as a place to live and work is likely to be sensitive to significant regional developments.

6.3.2 Planning Policy Overview

The policy review in Chapter 2 of this EIAR – Need for the Proposed Development – has shown that the proposed development supports and aligns with national, regional and local planning policy. This section provides an overview of some of the key planning and land use considerations that are likely to influence existing and future land use and social considerations in the study area. For a more in-depth analysis of these policies, refer to Chapter 2.

'Project Ireland 2040'

Project Ireland 2040 is the overarching policy and planning framework for the social, economic and cultural development of the country. It includes the National Development Plan (a detailed capital investment plan for the period 2018 to 2027) and the 20-year National Planning Framework 2040. It addresses growing our regions, cities, towns and villages and rural fabric; building more accessible urban centres of scale; and better outcomes for communities and the environment through more effective and coordinated planning, investment and delivery. Objectives of this policy document of relevance to the proposed development are outlined in Chapter 2 of this EIAR.

Rural Development Plan 2014 – 2020

The Rural Development Plan 2014 – 2020 of the Department of Agriculture, Food and the Marine aims to (i) promote the competitiveness of the Irish agri-food sector, (ii) bring about more sustainable management of natural resources, and (iii) ensure more balanced development of rural areas. It sets out the need to promote social inclusion, poverty reduction and economic growth in rural areas.

The Action Plan for Rural Development sets out the objective to "*Support sustainable jobs through targeted rural tourism initiatives, including through the support of key marketing initiatives such as Ireland's Ancient East and the Wild Atlantic Way*".

People, Place and Policy Growing Tourism to 2025

This policy document sets out the Government's long-term vision for the Irish tourism sector. Its overarching goals are to increase (i) revenue, (ii) employment and (iii) visitor numbers associated with tourism in Ireland. It aims to do so by marketing Ireland in accordance with Fáilte Ireland's experience brand framework (which includes the WAW) and by targeting markets with the greatest growth potential. The Cork Tourism Strategy 2016, 'Growing Tourism in Cork – A Collective Strategy' similarly aims to promote growth of its tourism sector by aligning the attractions of the county with the national WAW brand, and by targeting promising market segments. At the same time, it seeks to differentiate the county as 'Ireland's Maritime Paradise'.

Draft Southern Regional, Spatial and Economic Strategy 2019 – 2031

The draft RSES provides a 12-year strategic framework for planning and economic development of the Southern Region in line with Project Ireland 2040. Objectives of this policy document that are of relevance to the proposed development include enhancement and promotion of tourism, the environment, and to seek investment in island and coastal communities. Specific policy objectives are outlined in Chapter 2 of this EIAR.

Cork County Development Plan 2014 – 2020

The Development Plan is Cork County's principal planning and development policy document. The objectives of the Plan include the promotion of a stronger, sustainable tourism and leisure economy, protecting the natural, cultural and built heritage of the county, including its islands, supporting the development of infrastructure and services, and economic development on islands, and prioritising developments which contribute to the retention of permanent island inhabitants. Specific policy objectives are outlined in Chapter 2 of this EIAR.

West Cork Municipal District Local Area Plan 2017 - 2020

The West Cork LAP sets out the detailed planning and development policy for the West Cork Municipal District and is in line with the national and regional policies. It sets out general planning and development objectives for all of the West Cork Islands as well as some specific objectives for Dursey Island. Both sets of objectives (as they relate to the proposed development) are outlined in Chapter 2 of this EIAR.

West Cork Islands Integrated Development Strategy 2010

In 2010, the West Cork Islands Interagency Group published a 10+ year strategy for the physical, economic, social and cultural development of the seven inhabited West Cork Islands – Dursey among them. the overarching aim for the island expressed in this Strategy is "To conserve the landscape and cultural quality of Dursey, while recognising the needs of its occupants and improving service provision to the island" (p. 2). A number of general objectives for all seven islands have been set down. Those of relevance are outlined in Chapter 2 of this EIAR.

With respect to the Dursey Island Cableway, the Strategy states:

> *"The cable car to Dursey Island represents a significant piece of infrastructure that is of strategic importance in terms of tourism in the South West of Ireland. The cable car, which was replaced in 2009, is Ireland's only such facility. The cable car trip in itself is a unique experience in Ireland and its tourist potential should be maximised. It could attract additional visitors to Dursey, Beara and West Cork, with clear spin-off benefits for the West Cork Islands. A review of operating hours, pricing and promotion would support this objective."*

6.3.3 Land Use and Social Considerations

The predominant land uses in the study area include transport infrastructure, agricultural land and associated dwellings or one-off housing, amenity, recreation and tourism uses. Transport infrastructure in the area comprises the road network (regional roads, R572 and R575, and local unnamed roads) and the cableway infrastructure itself (for further details on transport infrastructure see Section 6.3.8).

The area is popular for tourism and recreation. The WAW traverses the study area in a number of locations, and Dursey Island itself is a Signature Discovery Point on this route. The cableway is the principal visitor attraction in the area. The area also features a number of popular national waymarked walking routes, including the Beara-Breifne Way, Beara Way and Garinish Loop. There are plenty of options for sight-seeing in the study area, including the many archaeological and architectural sites of interest; on Dursey for instance, there are the Signal Tower and St. Mary's Abbey, while on the mainland there are Loughane More Ring Fort and the wedge tomb at Killough, among others. Dursey Island itself is popular for birdwatching and whale and dolphin watching.

There is a pedestrian route (See Plate 6.4 (1)) that leads into/out of the site of the proposed development on the mainland side of the site - a stile leading onto the Beara-Breifne Way/Garnish Loop/Ring of Beara walking route (Plate 6.5; on north-western edge of site) adjacent to the existing parking areas. There is also a gate leading onto private agricultural land immediately adjacent to this walking trail (Plate 6.4 (2)). The R572 itself forms part of the Beara Way cycling route.

Plate 6.4 **Image depicting (1) entrance to Beara-Breifne Way/Ring of Beara walking route and (2) gateway to private farmland on the site of the proposed development. Source: Google Maps.**

Plate 6.5 **Location of a section of the Beara Way on Dursey Island and the mainland. Source: IrishTrails.ie**

The study area is dominated by farmland, and agriculture on both the mainland and island is predominantly pastoral, with both sheep and dry stock cattle. Thin soils in the study area are suboptimal for tillage or arable farming. On Dursey Island, agricultural activity is concentrated on the less exposed, low lying southern flank of the land mass, while the exposed upland northern flank is dominated by open heathland. Despite the importance of nearby Castletownbere as a fishing port, the exposed nature of the western extremity of the Beara Peninsula and of Dursey Island has limited fishing activity. As stated in the West Cork Islands Integrated Development Strategy:

> "*a small level of [fisheries] activity is maintained [on Dursey] but opportunities have declined significantly since the closure of the salmon fishery. Neither the pier on the island or mainland are suitable for providing sheltered berthage for vessels. The viability of the fishery here is questionable and future entrants are unlikely at*

> *the current time given the age profile of the island's residents. There may be tourist potential for rock fishing from the island however*".

6.3.4 Population

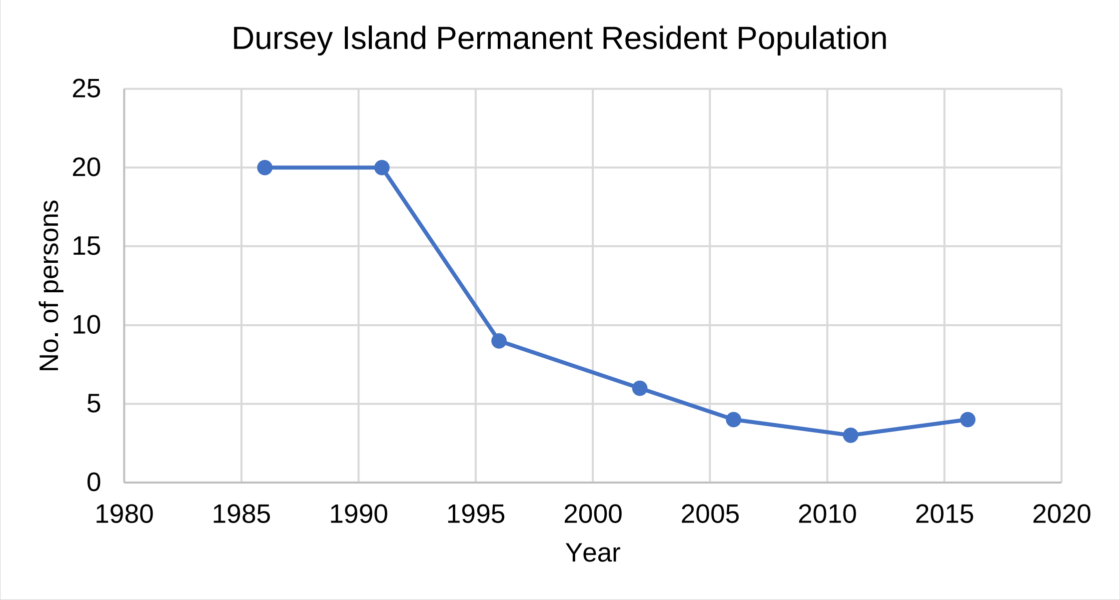

Plate 6.6 **Permanent resident population of Dursey Island between 1985 and 2016 census years (Source: West Cork Municipal District LAP)**

According to the most recent CSO national census, in 2016 the ED of Kilnamanagh had a population of 342 persons (174 males, 168 females). Of these, 4 persons were residents of Dursey Island (1 male, 3 female). However, reports from CCC representatives indicate that the permanent island population at present has reduced to just two persons in the interim, both of whom are male. The population of the ED declined by approximately 10% between the 2011 and 2016 censuses. The overall population trend for Dursey Island is one of continuing decline (Plate 6.6). According to the *West Cork Island Integrated Development Strategy,* the island is threatened with permanent depopulation. However, as stated in the *West Cork Municipal District LAP*, the population of the island increases considerably during the summer months, when holiday makers take up seasonal residence.

6.3.4.1 Age Profile

Plate 6.7 illustrates the age profile of the ED. The smallest groups are:

- infants (13 no. individuals aged 0 - 4),
- early-20s (13 no. individuals aged 20 - 24) and
- the very elderly (10 no. individuals aged 75 – 79; 12 no. individuals aged 80 – 84; 3 no. individuals aged over 85).

The majority of Kilnamanagh residents are in the five no. age groups between ages 45 and 69. The average age in the ED in 2016 was 44.5 years – an increase from 2011's average of 42.1. The national average age in Ireland in 2016 was 37.4.

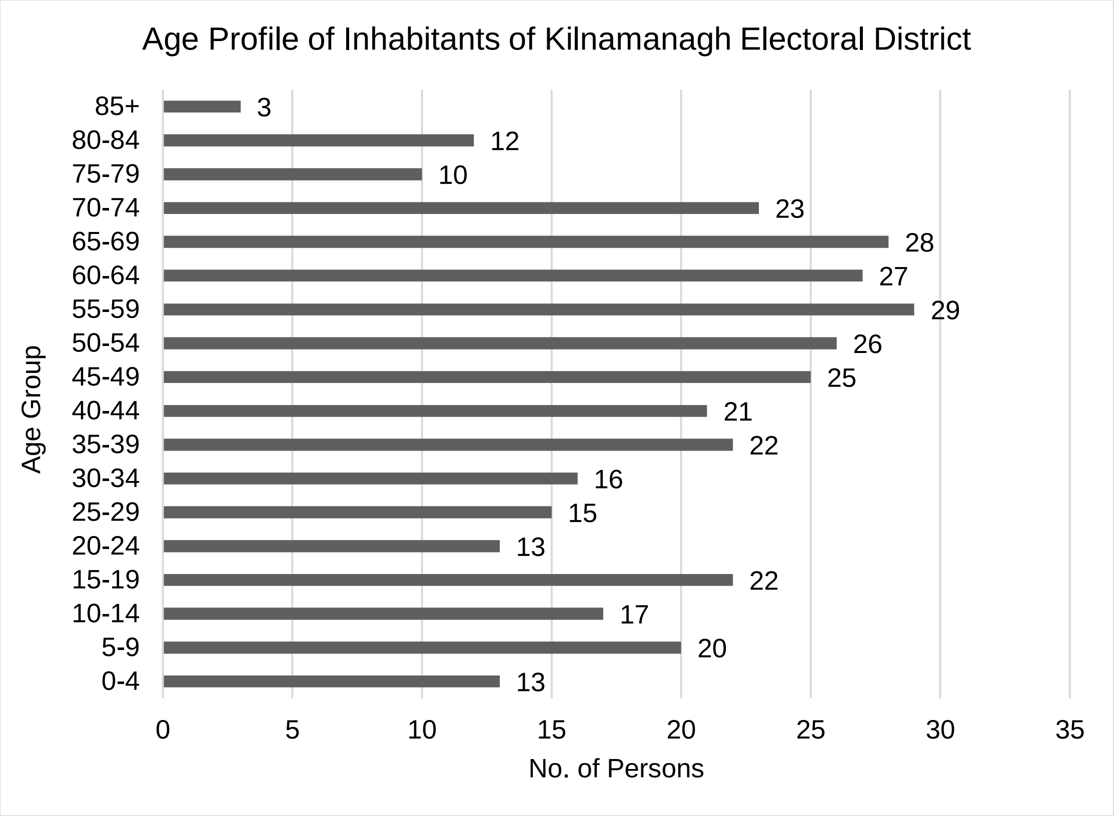

Plate 6.7 **Persons per age group in Kilnamanagh Electoral District in 2016 (CSO, 2017)**

The age dependency ratio is the ratio of those who are *not* typically in the labour force ('dependents' or those aged 0 - 14 and 65+) and those who *are* typically in the labour force (15 - 64). It is an indicator of the pressure on the productive population to support services for younger and older age cohorts. The age dependency ratio in the Kilnamanagh ED in 2016 was 58.3% – an increase from the 2011 figure of 51.6%, meaning the proportion of dependents relative to the working age population has increased in the study area in recent years. The proportion of dependents in Kilnamanagh was greater than the 2016 national average (52.7%) and that of the County (56%). However, it was lower than that of a number of other EDs in the vicinity, including that of Bere Island (74%) and Glanmore (81.3%).

6.3.5 Housing and Households

According to the national census, the total housing stock in Kilnamanagh ED in 2016 was 247 units. Of these:

- 52 were vacant (not including holiday homes),
- 59 were unoccupied holiday homes, and
- 136 were occupied (with one of these temporarily vacant) (Plate 6.8).

It is evident that a high proportion of housing stock in the ED are holiday homes. These data support the statement of the *West Cork Municipal District Local Area Plan* that the population of the study area increases substantially seasonally (i.e. during the summer months) due to the presence of holidaymakers.

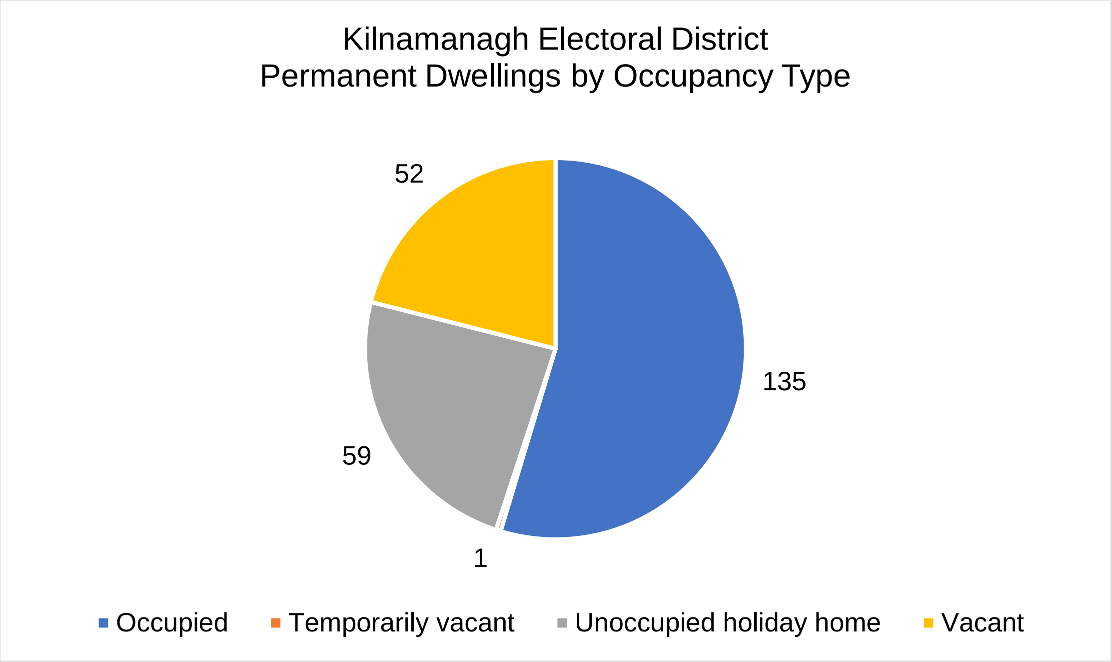

Plate 6.8 **Permanent dwellings by occupancy type in Kilnamanagh ED in 2016 (CSO, 2017)**

According to the national census, in 2016 there were 137 households in the ED (where 'households' refers to a usually inhabited dwelling and its inhabitants). The vast majority of households (128) were inhabiting a built house. Five were inhabiting a caravan/mobile home. Four households (7 persons) did not respond to this census question. Most households contained more than one person 61% (84 households). Of these, most were married couples with children (24% of total households (33 households)). Married couples without children were the next largest group (23 households; 17% of total households). The remainder of group households (28 households; 20% of total households) were of a variety of types, including cohabiting couples with and without children, single parent households, and non-familial households. Households with one person only were well represented (53 households; 39% of total households). According to the 2016 Census, there are also three 'communal establishments' in the ED, with a total of 8 persons in such living arrangements. For an overview of these data, see Plate 6.9.

In 2016, the vast majority of permanent residences in Kilnamanagh were owner occupied. Of these, the majority were owned without a mortgage (78 households; 59% of total households). Thirty-six households (27%) were owned with a mortgage. Six households were rented (5%). Six households were occupied without rent or ownership (5%). A further six census respondents declined to answer this question.

As is evident from these data, rented 'house share' type households are very uncommon in the study area. Most permanent residences are occupied by families or individual persons who own their homes.

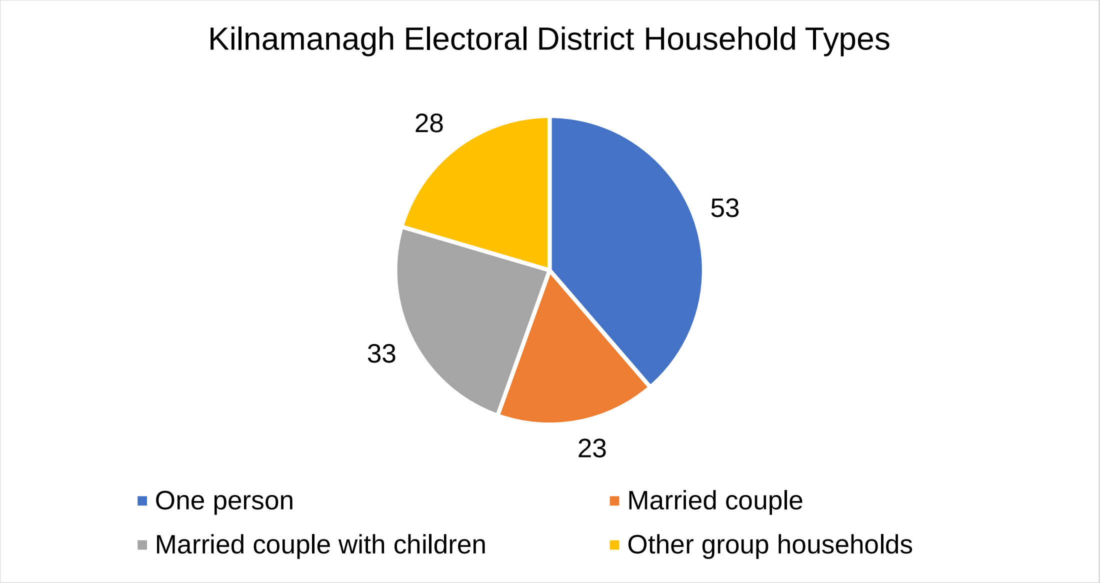

Plate 6.9 **Household types in the Kilnamanagh ED in 2016 (CSO, 2017).**

6.3.6 Education

In 2016, 25 persons in the Kilnamanagh ED were still in school/college. A further 12 persons indicated that they had not yet completed their respective educations (although they were not in formal education at the time). (CSO, 2017).

According to census 2016, Kilmamagh ED was home to 255 persons aged 15 years and over in 2016. The highest level of education attained for persons in this group is presented in Plate 6.10. At least 18% had attained primary school education only. A further 30% approximately went on to complete some form of secondary level education (i.e. Leaving Certification and/or Junior Certificate). Approximately 18% went on to complete a technical/vocational course, advanced/higher certificate or apprenticeship. Approximately 16% attained an ordinary or Honours Bachelor' degree. Approximately 5% went on to complete Master' studies. One individual reported completing a Doctoral/Post-doctoral degree programme. 24 persons or approximately 9% declined to respond to this aspect of the census.

The census data reveals that males in the Kilnamanagh ED have been more likely to leave formal education early i.e. at primary or lower secondary levels than their female counterparts. Females have been more likely to complete studies for vocational/technical courses, Higher Certificate, Honours Bachelor and postgraduate courses/degrees. While males in the study area have been more likely than females to complete studies for Advanced Certificates, apprenticeships or ordinary Bachelor' degrees (CSO, 2017).

Reflecting the rural, agricultural nature of the region, the most common stated field of study among this group was 'Agriculture and Veterinary' (20 persons; approx. 8% of those aged ≤15), followed by 'Engineering, Manufacturing and Construction' (18 persons; approx. 7% of those aged ≤15), 'Health and Welfare' (17 persons; approx. 6.5% of those aged ≤15), 'Social Sciences, Business and Law' (17 persons; approx. 6.5% of those aged ≤15) and 'Education and Teacher Training' (16 persons; approx. 6% of those aged ≤15) (CSO, 2017).

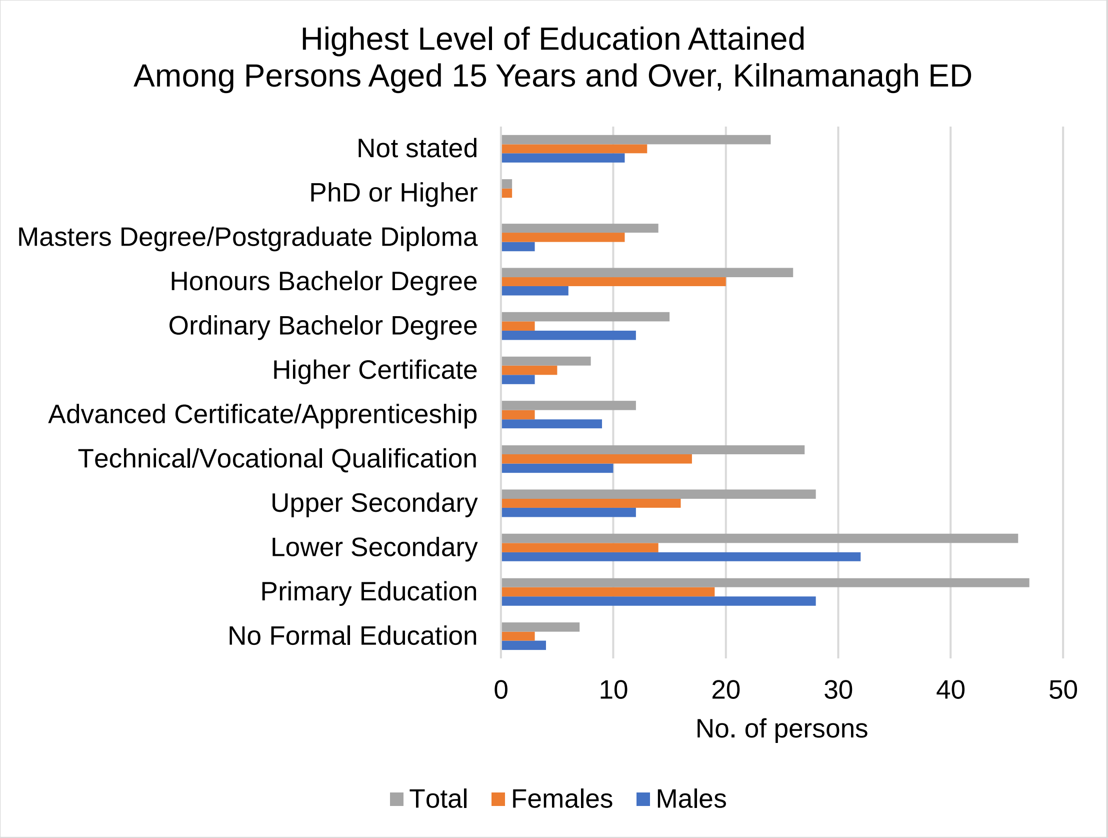

Plate 6.10 **Education level attained among persons aged ≥15 in Kilnamanagh ED in 2016 (CSO, 2017)**

6.3.7 Community Infrastructure

Community infrastructure can include a range of physical, social and economic infrastructure. It can comprise educational, religious facilities as well as other community facilities such as medical centres, youth clubs and sports centres. It can also include public parks or amenity areas such as walking trails.

There is no school, medical facility or place of worship in the study area. Lehanmore Community Centre (run by Lehanmore Community Co-Operative Society Ltd.) is immediately adjacent to the R572 in the townland of Loughane More (and within the study area) and serves the communities of Cahermore, Lehanmore and Garinish. It provides facilities for community events, camps, festivals and classes. The Community Centre also contains the Cable Car Café, a bar, and shop which stocks gifts, beach, and fishing equipment, and campervan parking facilities (all of which are open seasonally).

As already stated, the study area contains three overlapping national waymarked walking routes – the Beara-Breifne Way, Beara Way and Garinish Loop – all of which are in the immediate vicinity of the proposed development.

Public toilets are available on the mainland at the cableway line station for visitors of the site. There are no public toilets or any other community facilities on Dursey Island.

The nearest Garda Station and pharmacy are located in Castletownbere. The nearest major hospital is Bantry General Hospital, located approximately 66 km from the study area. Castletownbere also has a Community Hospital which serves the entire Beara

Peninsula including Bere Island and Dursey Island and provides long stay, respite, community support and palliative care.

According to the West Cork Municipal District LAP 2017, "*Dursey has an extremely limited and restricted level of social and community facilities. Such facilities need to be expanded and the needs of islanders met if the island is to retain a permanent population and expand this to a level that creates an environment to support further improvements over time*".

Outside the Study Area

There are other facilities outside of the study area but within the Kilnamanagh ED. These facilities are outlined in Table 6.9.

Table 6.9 Community facilities outside the study area but within the Kilnamanagh ED

Facility and Location (Townland)	Distance from Site of Proposed Development
Cahermore National School, Killough East	1km
St. Michael's Catholic Church, Killough East	1.8km
Dzogchen Beara Buddhist Meditation Centre, Garranes	7.8km

6.3.8 Transport Infrastructure

Transport infrastructure are also considered important community facilities. The R572 and R575 regional roads serve the mainland section of the study area. A number of (largely unnamed) local roads branch off these regional roads, leading to private dwellings and farms. On Dursey Island, an unnamed public road runs along almost the full length of the island, linking inhabited areas on the southern flank of the island.

Traffic surveys conducted on the R572 (the approach road to the mainland-side site of the proposed development) have found that forward visibility is very limited on the road due to its winding nature, and the road itself is quite narrow, with insufficient passing space to support the volumes of traffic currently using the road. Local residents have complained about high volumes of traffic on the road as a result of visitors travelling to the existing cable car site. Additionally, site visitors are also known to park opportunistically along the R572 during busy periods when the visitor car park is full.

Public Transport

There are no public transport services operating in the study area. However, there are four public Bus Éireann routes serving the wider Beara region – the 270, 252, 236 and 282. Of these routes, the 282 and 236 come closest to the study area, with a bus stop located at the square in Castletownbere, opposite the Top petrol station. There is no rail network in the study area. The nearest train station is Rathmore (approx. 116km away). A number of private taxi services operate in the vicinity of the study area including Shanahan's Taxi, Beara Cabs and AD Hackney Service. There are also a number of private bus/coach operators in the vicinity. Harrington's Bus operates between Ardgroom and Cork city (via Castletownbere), with one service in each direction per day (excl. Thursdays). O' Donoghue's Bus also operates between Castletownbere and Cork city. There are no public transport services operating on Dursey Island, although there is at least one private bus service (Thomas Hartnett Coach Hire) in operation at certain times of the year on the island.

Transport to Work, School or College

Census data indicate that the principal means of transportation in the Kilnamanagh ED is the private car. According to the 2016 census, 106 of 132 households surveyed owned one or more car(s). Among those who worked/attended school or college outside of the home, car/van was also the primary means of transportation to/from work/school/college (101/175 persons; 58%). Bus/minibus/coach was the next most important means of transport for this group (41/175 person; 23%). Approx. 7% of this group (13 persons) identified walking as their principal means of transportation. Just one individual in the study area reported travelling to/from work/school/college by bicycle. Another reported travelling by motorcycle/scooter. Plate 6.11 presents a summary of this information (CSO, 2017).

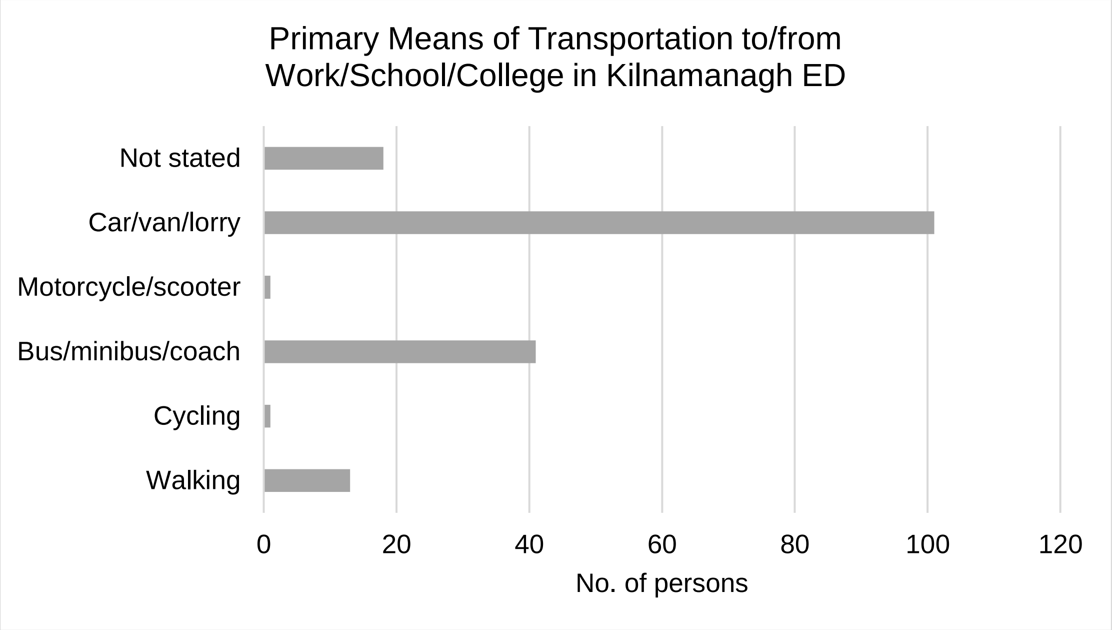

Plate 6.11 **Primary means of transportation to and from work/school/college among residents of the Kilnamanagh ED who worked/were in education primarily outside of the home in 2016 (CSO, 2017).**

In 2016, the greatest proportion of journeys to/from work/college/school (by all means of transportation) took somewhere between 15 and 30 minutes. Few people had a commute of one hour or more (Plate 6.12).

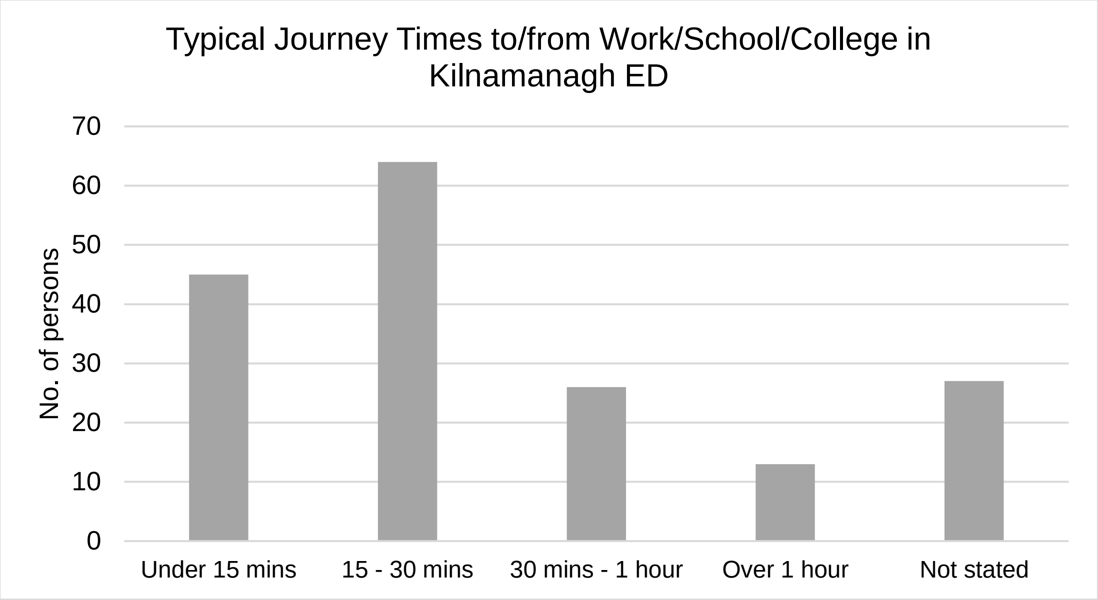

Plate 6.12 **Typical journey times (for all means of transportation) to/from work/school/college in Kilnamanagh ED in 2016 (CSO, 2017).**

Dursey Island Cable Car

The Dursey Island Cable Car (operated by CCC) is an essential means of transportation for residents of the island and for farmers who use land on the island. Up until 2012, the cableway was used to transport livestock to-and-from the island. The cableway is still used by islanders and island farmers for the transportation of goods required for home/agricultural use. According to the *West Cork Islands Integrated Development Strategy 2010*, unlike ferries to the other inhabited West Cork Islands, the Dursey Island Cable Car is not state-subsidised. However, there is an informal arrangement in place whereby islanders are permitted to travel on the cable car for free and are not expected to queue. At present, the cableway operates within set operating times (see Table 6.10), every day of the week (including Sundays). The cableway is closed for lunch between 13:00 and 13:30 daily. There is no service on Christmas Day (25th December), St. Stephen's Day (26th December) or New Year's Day (1st January). At present, the return fare for the cable car journey is €10 per adult and €5 per child. The journey itself typically takes between 6 - 7.5 minutes in one direction.

A safety inspection of the existing cableway carried out by ROD in 2016 concluded that, while there were no immediate safety concerns at the time, the existing infrastructure is not and cannot be fully compliant with the European Standards for '*The Safety Requirements for Cableway Installations Designed to Carry Persons*', S.I. No. 470/2003 or S.I. 766/2007. ROD identified substantial corrosion of structures, including both pylons and the island station. In order to continue to operate in spite of these non-compliances, the cableway has been granted a number of exemptions by the Commission for Railway Regulation.

Table 6.10 **Operating Hours of Dursey Island Cable Car in 2019. Source: DurseyIsland.ie**

Period	Operating Hours
1st March – 31st May 2019	Monday – Sunday: 09:30 – 19:30

Period	Operating Hours	
1st June – 31st August 2019	Monday – Thursday: 09:30 – 19:30	Friday – Sunday: 09:30 – 21:30
1st September – 31st October 2019	Monday – Sunday: 09:30 – 19:30	
1st November – 28th February 2019	Monday – Sunday: 09:30 – 16:30	

Marine Transport

There are three slipways for launching boats in the vicinity of the site of the proposed development, as follows:

1. A privately-owned slipway approx. 280m south-west of the cableway on Dursey island;
2. A slipway owned by CCC approx. 100m south of the cableway on the mainland; and
3. A privately-owned pier and slipway at Garinish Point, approx. 1.7km north-east of the mainland side of the cableway.

There is no regular ferry service between the island and the mainland. This is due to the hazardous prevailing conditions in the Dursey Sound, which is shallow and tidal with fast-moving currents. When conditions permit, the slipways on both island and mainland are used for launching and landing of boats. Since 2012, when the practice of moving livestock in the cableway ceased, CCC has provided ferries to move cattle between the island and mainland approximately 4 – 5 times per year (O'Sullivan, 2019, pers. comm.). Additionally, Dursey farmers are known to occasionally move sheep from island to mainland in small private boats via slipways 1 and 2, above (O'Sullivan, 2019, pers. comm.). While the pier at Garinish Point is used for the berthage of fishing vessels, the exposed nature of the Dursey Sound has discouraged fishing activity from the piers nearest the cableway (O'Sullivan, 2019, pers. comm.). Islanders keep small boats at the island-side slipway but – because of its especially exposed position – the slipway nearest the cableway on the mainland is not known to be used for the berthage of vessels or storage of equipment (O'Sullivan, 2019, pers. comm.). The pier at Garinish Point is shallow and may not be accessible at low tide. (O'Sullivan, 2019, pers comm.).

6.3.9 Economic Activity

The 2016 Relative Pobal HP Deprivation Index measures the relative affluence/disadvantage of a Small Area using 2016 (i.e. most recent) census data. It is a function of three 'dimensions' of affluence/disadvantage, which themselves are calculated using quantitative indicators, as outlined in Table 6.11. The absolute Index Score for a Small Area is rescaled according to scores for other Small Areas to produce a Relative Index Score. Relative Index Scores may be interpreted according to the labelling system set out in Table 6.12, below.

Table 6.11 Framework for calculation of Pobal HP Deprivation Index (Haase & Pratschke, 2017)

Dimension	Indicators
1. Demographic Profile	1. % change in population over previous 5 years 2. % of population of non-working age (≤15 and ≥64) 3. % of population with primary school education only 4. % of population with third level education 5. % of households with single parents and children aged <15 6. Mean no. persons per room
2. Social Class Composition	1. % of population with primary school education only 2. % of population third level education 3. % of households headed by professionals/managerial or technical employees (incl. farmers with ≥100 acres) 4. % of households headed by semi-skilled/unskilled manual workers (incl. farmers with <30 acres) 5. Mean no. persons per room
3. Labour Market Situation	1. % of households with single parents and children aged <15 2. Male unemployment rate 3. Female unemployment rate

Table 6.12 Labelling system for Relative Pobal HP Deprivation Index Scores, showing proportion of Small Areas falling within each Index category in 2011 (Haase & Pratschke, 2017).

Relative Index Score	Label	Proportion of Small Areas (2011)
>30	Extremely affluent	30 (0.2%)
20 to 30	Very affluent	472 (2.6%)
10 to 20	Affluent	2,411 (13%)
0 to 10	Marginally above average	6,234 (33.7%)
0 to -10	Marginally below average	6,483 (35.1%)
-10 to -20	Disadvantaged	2,408 (13%)
-20 to -30	Very disadvantaged	448 (2.4%)
< -30	Extremely disadvantaged	2 (0.0%)

The Relative Deprivation Index Score for the ED of Kilnamanagh in 2016 was -2.06, meaning it falls within the category 0 to -10, 'Marginally below average', meaning the area is disadvantaged. As shown in Table 6.12, this category describes the greatest proportion (35.1%) of Small Areas in Ireland.

6.3.9.1 Employment

There are currently 3 operators employed by Cork County Council to operate the cableway, all of whom reside in the study area. Census 2016 reports that of the 147 individuals in active employment in the Kilnamangh ED, the greatest proportion (42 persons or 28.5%) were employed in the 'agriculture, forestry and fishing' industry. The vast majority of those working in this industry were male 39/42 persons or 93%). The next most important industry was 'professional services' with a total of 35 persons or 24% of all those in active employment, comprising 29 females and 6 males. The next greatest proportion of the labour force is in categories/industries not listed on the census options comprising 33 persons or 22% of all those in active employment in the ED. 'Commerce and trade' industry comprised 15 persons or 10% of all those in active employment in the study area. 'Building and construction', 'manufacturing', 'transport and communications' and 'public administration' industries were also represented in the study area, although to a lesser degree (each with 6 or fewer workers). (CSO, 2017).

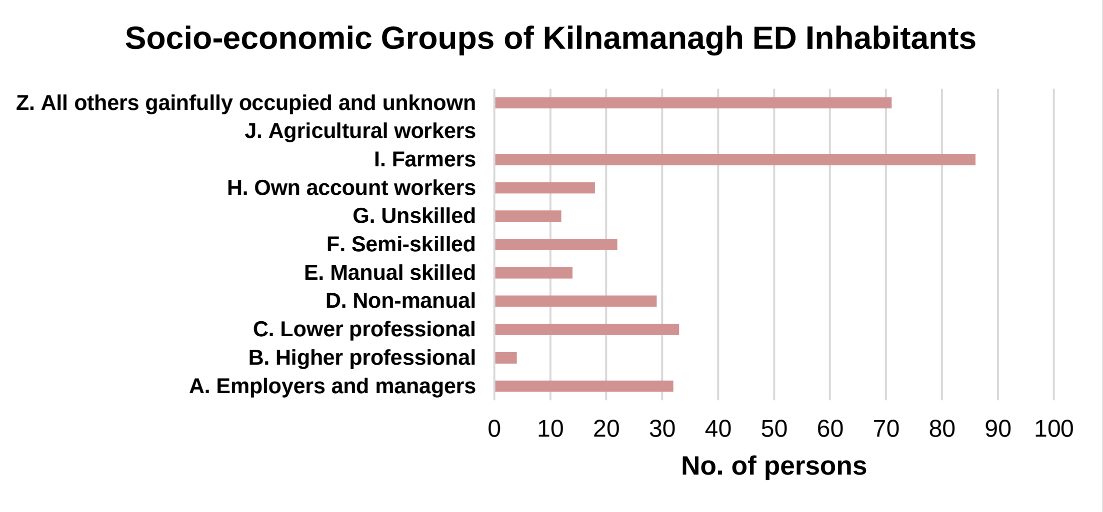

Plate 6.13 **Socio-economic group categories of Inhabitants in Kilnamanagh ED (CSO, 2017).**

The census reports that 'Farmers', comprises the largest socio-economic group in 2016 in the Kilnamanagh ED followed by 'all other gainfully occupied and unknown' (Plate 6.13).

According to the *West Cork Municipal District LAP 2017*, farming is the main economic activity on Dursey Island. However, additional costs associated with accessing services (such as veterinary and agricultural contractor services) and transportation of livestock and products to-and-from the island, reduce the competitiveness of island farmers with respect to their mainland counterparts.

At present, three persons are employed to operate the existing Dursey Island Cable Car. All of these are local residents.

6.3.9.2 Unemployment

Plate 6.14 shows the principal economic status of persons aged 15 years and over in the Kilnamanagh ED. According to the 2016 census, half of all working-age persons (147 individuals; 50%) were actively employed in the Kilnamagh ED. A large proportion of working-age people (63 individuals; 21.5%) were retired. Not considering retirees or individuals engaged in full-time education (25 individuals; 8.5%), full-time housekeeping/familial duties (32 individuals; 11%), or those unable to work due to long-term illness or disability (8 individuals; 3%), a minority of working-age persons were unemployed in the study area (12 individuals; 4%). This is less than half the 2016 rural national average unemployment rate of 11.2% (CSO, 2017).

The labour force participation rate in the study area was 48.3% in 2011 (AIRO Maps, 2019). This is substantially above the national average of 12.6% (AIRO, 2018).

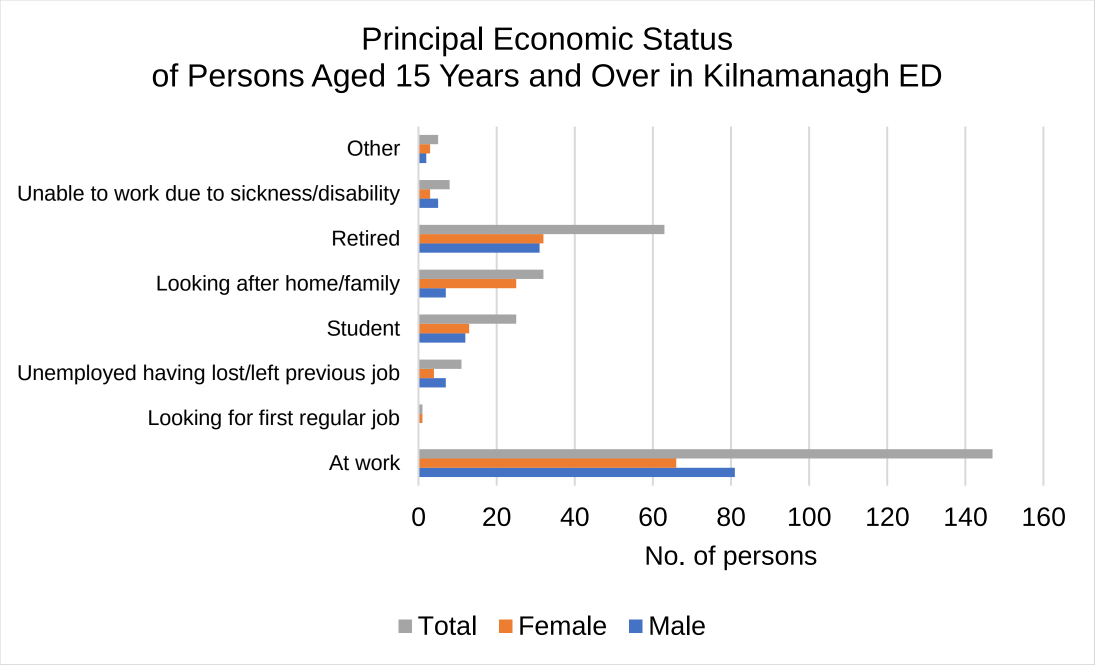

Plate 6.14 **Principal economic status of persons aged ≥15 in Kilnamanagh ED in 2016 (CSO, 2017)**

6.3.9.3 Retail and Commercial Activity

There is not a lot of retail or commercial activity in the study area. A list of private businesses obtained through desk studies is detailed in Table 6.13, below. This table does not include the holiday home rentals properties located in the study area. There is at least one B&B in the study area – the Harbour View B&B (in Garnish, immediately adjacent to the R572). There are other business present such as the Beara Baoi Tours whom offers guided walking tours of the Beara area and Dursey Island.

Table 6.13 **Commercial businesses in the study area**

Name	Details
Rosarie's Mobile Café	A mobile café and shop offering snacks and beverages. Located in the existing car park immediately adjacent to the cableway on Dursey Island. Operation during the summer months only.
Murphy's Mobile Catering (also known as 'Dursey Deli')	A mobile catering van offering hot food (fish and chips, etc.). It can be found in the carpark at the mainland side during the summer months.
Cable Car Café	Brick-and-mortar café/ restaurant, and gift shop located approximately 4.1km east, immediately adjacent to the R572 in the townland of Loughane More on the mainland.

Plate 6.15 **Rosarie's Mobile Café (left; on Dursey Island; Source: durseyisland.ie) and Murphy's Mobile Catering (right; in mainland-side visitor car park; Source: Tripadvisor)**

There are no grocery shops within the study area or the greater Kilnamanagh ED. The nearest grocery store is located in the village of Allihies. Castletownbere, located approximately 22km from the mainland side of the site, is the nearest major retail and service centre for the population.

6.3.9.4 Tourism

The study area is a tourism and amenity destination which attracts both domestic and overseas visitors. The novelty of the cableway, and the dramatic, rugged landscape and remote, traditional character of the area form the basis of its appeal as a tourist destination. The study area is part of Fáilte Ireland's WAW tourist route. Dursey Island is one of 15 'Signature Discovery Points' on that route. In the Cork County Development Plan 2014, the site is identified as a "key tourist attraction of national importance".

Annual visitor numbers to Dursey Island in 2017/2018 were at approximately 20,424 (See Chapter 7 of Volume 2 of this EIAR – Biodiversity; Table 7.28 and Plate 7.13). Visitor numbers are seasonal, with between 140 and 313 visitors per month during the winter months (November – February) and 4,954 and 4,943 per month during the peak months of July and August, respectively. Thus, over the two peak months of the year, Dursey receives approximately 50% of its annual visitor numbers. If it were not for the limited capacity and turnover of the cableway, it is highly likely that significantly more visitors would travel to the island during the peak months.

In order to inform this assessment, a survey of visitors to the site carried out by Tourism Development International (TDI) in 2018 found that:

- Half of the respondents came from Ireland with other principal nationalities in the sample being German, British and North American;
- Three out of four considered the area to be 'unspoilt', 'wild' and 'beautiful';
- 22% commented on the area's peacefulness, isolation and lack of crowds and commercialisation;
- 31% commented on the views;
- 21% commented on the site's authenticity, quaintness and simplicity
- 17% commented on the novelty of the site;
- Principal issues cited with respect to the site were long wait times (31%) and safety concerns related to the ageing appearance of the infrastructure (18%)
- Improvements suggested included increasing the capacity of the cableway to reduce queues (24%) and providing interpretive information on the island's history.

It is anticipated that considering the existing growth trend in the Irish tourism sector, visitor numbers at the site of the proposed development would continue to increase year-on-year without any intervention. However, at present, the limited capacity and turnaround of the cableway is severely limiting the number of individuals who can make the cable car crossing at peak times. During peak times, visitors are queueing for up to two hours (and sometimes more) to travel on the cable car.

Walking trails (the Beara-Breifne Way, Beara Way and Garinish Loop), rock fishing and birdwatching and whale/dolphin watching opportunities also attract visitors to the study area.

Tourism is of substantial economic value to the study area and surrounding environment, supporting small and medium-sized local business including B&Bs, holiday rental properties and cafés.

6.3.10 Human Health Profile

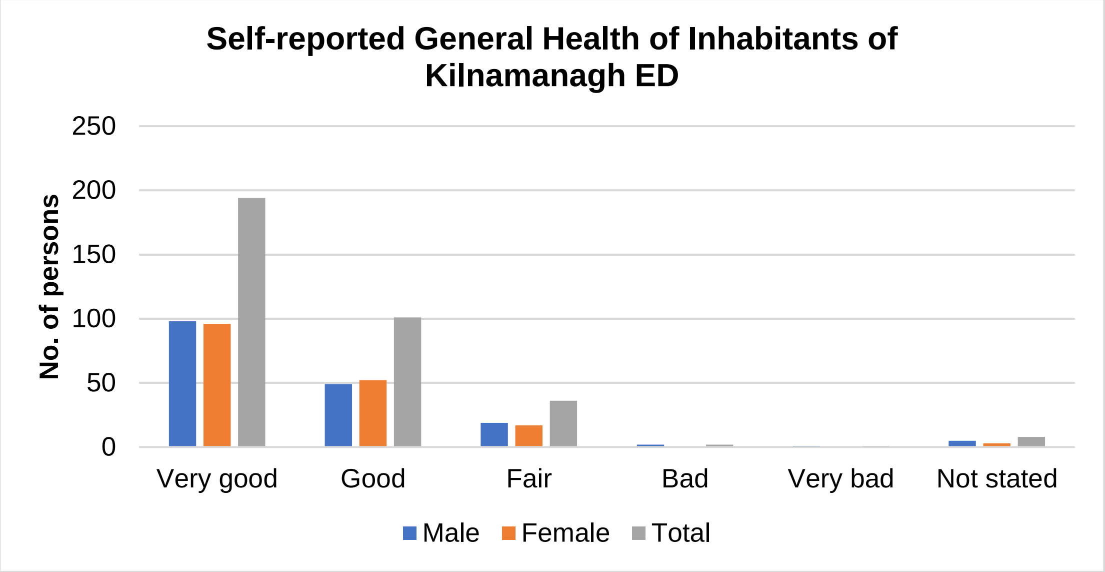

Plate 6.16 **Self-reported general health condition of inhabitants of Kilnamanagh ED in 2016 (CSO, 2017).**

In the 2016 census, the majority of Kilnamanagh inhabitants reported that their health was 'very good' or 'good' 57% and 29.5%, respectively) (Plate 6.16). Approx. 10.5% considered their general health to be 'fair'. Two individuals characterised their general health as 'bad'. Just one individual reported being in 'very bad' general health. A further 8 persons declined to answer this question.

Of the 342 inhabitants in the ED, a total of 46 persons were reported to have a disability in the 2016 census (26 males, 20 females).

6.3.10.1 Noise Environment

A baseline noise survey conducted at the site of the proposed development (in the vicinity of the cableway on the island and mainland and on the R572). The results from these surveys are as follows:

- General:
    - Baseline noise levels at all locations dominated by sea and wind noise with some bird calls audible.
    - Existing cableway silent in its operation.

- R572:
    - Ambient noise levels in the range of 50 to 51 dB LAeq.
    - Background noise levels on the R572 ranged from 48 to 49dB L_{A90}.
- Mainland side of cableway:
    - Ambient noise levels ranged from 52 to 62 dB LAeq, the highest value being measured during a particularly gusty period.
    - Background noise levels ranged from 50 to 56 dB LA90.
- Island side of cableway:
    - Ambient noise levels ranged from 52 to 53 dB L_{Aeq}.
    - Background noise levels ranged from 49 to 50 dB L_{A90}.

These values are considered to be representative of prevailing conditions in the study area for more information on noise and vibration levels refer to Chapter 12 of this EIAR.

6.3.10.2 Air Quality

The Environmental Protection Agency report on the current air quality at the time of writing (July 2018) the Rural West AQIH Region is reported as having 'fair' air quality.

Chapter 13 of this EIAR – Air Quality and Climate states, there were no air quality parameter recordings for the study area. However, based on existing data for similar rural areas, the following estimates have been developed:

- A conservative estimate of the current background NO2 concentration for the region of the development is 11µg/m^3. This is well below the annual average limit value of 40µg/m^3.
- An appropriate estimate for the current background NOX concentration in the region of the proposed development is 6µg/m^3.
- Based on the above information a conservative estimate of the current background PM10 concentration for the region of the development is 19µg/m^3.
- A conservative ratio of 0.65 was used to generate a background PM2.5 concentration for the region of the development of 12.4µg/m^3.
- A conservative estimate of the current background concentration in the region of the development is 0.2µg/m^3.
- A conservative estimate of the current background CO concentration in the region of the development is 0.6mg/m^3.

6.3.10.3 Road Traffic Collisions

According to the Road Safety Authority (RSA), there were 4 no. road traffic collisions in the study area between 2005 and 2015 – all of which involved minor casualties which occurred on the R572. Two incidents (in 2009 and 2011, respectively) occurred at virtually the same spot (a bend in the road at approx. 51.610879, -10.070395) suggesting this may be a particularly risky spot for road traffic incidents.

6.3.10.4 Hazardous Substances

Surveys were conducted at the site of the proposed development (i.e. in the proposed development footprint) for (i) asbestos containing materials (ACMs) and (ii) lead-based paints during April 2019. No evidence was found of asbestos at the site of the proposed development. The presence of lead was detected in the paint on a number of structures as detailed in Table 6.14.

Table 6.14 Locations at the site of the proposed development where lead-based paint identified

Location	Metal (Pb)	m/m (%)
Green paint on vertical steels on island anchor	473	0.05
Paint layers on horizontal section of island anchor	3551	0.36
Paint layers on angled steel section of islander anchor	2397	0.24
Cross section of island anchor	2084	0.21
Island pylon leg	6426	0.64
Island pylon leg	2984	0.30
Island pylon leg	3955	0.40
Island pylon leg	3340	0.33
Green paint on mainland anchor	305	0.03
Green paint on angled steel section on mainland	83	0.01
Layers of paint on mainland anchor	7451	0.75
Grey flaking paint on mainland anchor	526	0.05
Mainland pylon leg	2747	0.27
Mainland pylon leg	3035	0.30
Mainland pylon leg	3337	0.33
Mainland pylon leg	1975	0.20

6.4 Description of Predicted Impacts

In accordance with the EPA Guidelines and the above methodology, the following sections provide an overview of the predicted impacts on:

- Land use and social considerations, including effects on general amenity, journey characteristics, journey amenity, severance;
- Economic activity including tourism, e.g. employment and population including associated land use; and
- Human health, considered with reference to and interactions with other environmental receptors contained in corresponding chapters such as air, noise and traffic.

Likely or predicted significant impacts are split based on construction and operational phases under the headings above.

Do-Nothing Scenario

As discussed in Chapter 3 of this EIAR, the current cableway is not and cannot be made fully compliant with the requirements of the European Standards for "*The Safety Requirements for Cableway Installations Designed to Carry Persons", S.I. No. 470 / 2003 and S.I. 766 / 2007*. Although exemptions for most of the non-compliances have been granted by the Commission for Railway Regulation, many of these exemptions have been granted on the basis that the cableway will be replaced in 3-5 years.

As a result, the do-nothing scenario would result in the closure of the Dursey Island Cable Car in the short to medium term for safety reasons thus significantly impairing access for residents and visitors to the island. Due to the rough seafaring conditions to and from the island, the establishment of a dedicated ferry service would not be likely to occur, as is the the case with all other West Cork Islands. It is likely that further depopulation would occur, and further land abandonment would occur on the island.

If the proposed development is not advanced, the site would continue to operate as it does at present. During the high season, the existing cableway would continue to operate at or over capacity with a supply deficit and (as a result) lengthy queues. This deficit would increase over time, as visitor numbers to the site increase (in accordance with the general trend of growth in the Irish tourism sector and promotion of the WAW by Fáilte Ireland). The annual visitors to Dursey Island would continue to be limited by the capacity of the existing cableway to somewhere in the region of 22,000/ year (based on upper figures reported in 2018). If the road improvements are not made, journey characteristics, journey times and journey amenity along the R572 would continue to pose a problem for users and would likely worsen over time. Additionally, the shortfall of the already oversubscribed visitor car park would increase over time, either exacerbating the existing issue of informal roadside parking on the R572 or resulting in detracting from the area due to traffic issues.

As the cableway serves an important function for the existing residents of the island and is a unique and distinguishing characteristic of the Beara Peninsula and West Cork, and has been for the past 50 years, it was decided that the do-nothing scenario was not a reasonable or realistic option.

6.4.1 Construction Phase Impacts

Details of the construction methodology are included as part of Chapter 4 of this EIAR, which has been relied on for this impact assessment and is not repeated here.

6.4.1.1 Land Use and Social Considerations

The site of the proposed development will be a substantial construction site for approximately 18 months. The large-scale visible land use changes will begin once the construction of the buildings and other structural elements – Visitor Centre, café, cableway and station buildings – and road improvement works commence. Noise, vibration, landscape and traffic associated with construction activities may cause nuisance and disruption to the study area for the duration of the works. Construction activities are likely to be confined to the site of the proposed development and construction compound.

While it will be necessary to divert some utility infrastructure during the construction phase (since there are ESB network lines crossing the site), these diversions will not result in any significant interruptions to utility services for residents in the study area.

As stated in Section 6.3.3, the main land use types in the study area are:

1. Agriculture;
2. Recreation, amenity and tourism; and
3. Journey Characteristics, Journey Amenity and Severance

Effects of the construction phase of the proposed development on each of these land use types are discussed in the following sections. Overall, it is considered that the construction phase of the proposed development will have a slight, temporary adverse impact on land use in the Study Area.

Agriculture

There will be no significant impacts to agriculture as a result of the construction works.

Recreation, Amenity and Tourism

Nuisance caused by noise, vibration, dust emissions and visual effects associated with construction works will result in a temporary loss of amenity value of recreational and amenity activities at the site of the proposed development and in its immediate vicinity. Surveys of visitors to the Dursey Island Cable Car conducted for the purposes of the proposed development indicated that the remote, unspoilt character of the site contributes to its appeal as a tourist destination. While the operation of the existing cable car will be maintained throughout the construction phase, it will be restricted during certain periods of the construction phase, thus impacting on tourists travelling on the cableway. Furthermore, the appeal of the site as a tourist attraction may be somewhat reduced by the adjacent works. Equally, the redevelopment may prompt greater visitor numbers, since a certain proponent will want to use the original cable car before the upgraded facility is constructed.

The recreation value of small sections of walking trails in the immediate vicinity of the site (i.e. the Beara-Breifne Way, Beara Way and Garnish Loop) will result in slight negative, short-term impacts. No significant impacts are likely on the environment.

Any adverse effects on recreation, amenity or tourism described in this Chapter will be slight negative and short-term in nature – lasting only as long as the works themselves (maximum of 18 months or shorter based on the phase of the development taking place). Furthermore, as the most disruptive aspects of the construction phase (including earthworks) are proposed to be carried out during the low season months – when tourist numbers are at their lowest – this will mitigate effects on recreation, amenity and tourism resources.

Journey Characteristics, Journey Amenity and Severance

Construction traffic will result in an increase in heavy goods vehicles (HGVs) transporting construction materials and plant/machinery on the R572. This construction traffic has the potential to effect journey times during specific periods for road users. However, in order to minimise disruptions, the most disruptive activities (i.e. earthworks) are proposed to be carried out during the low season when tourism and associated traffic volumes are at their lowest in the area. For a detailed assessment of traffic-related effects, refer to Chapter 5 of Volume 2 of this EIAR.

Construction of the passing bays and visibility splay on the R572 may also give rise to nuisance to road users for approximately three months, the proposed duration of the improvement roadworks. It is proposed to carry out these works during the off-season (September – April), in order to minimise traffic disruption. Access will be maintained to all properties along the R572 throughout the construction works. There will be a slight negative temporary impact to road users during the road improvement works. The works will also involve the installation of Variable Messaging Signs (VMS) at four locations along the approach roads, namely on: the R572 at Bealbarnish Gap, the R572 Castletown-Bearhaven, at R575 at Eyeries Cross and on the N71 (junction with the R572) at Glengarrif. These installation works will not cause any significant impacts to road users.

In order to maintain access to and from Dursey Island for residents and tourists, the existing cableway will remain in operation with some potential restrictions throughout the duration of the construction phase. Restrictions will be avoided insofar as possible and stakeholders will be notified in the event of any interruptions. Keeping the cableway in operation during the construction phase (insofar as possible) will minimise any temporary severance of the island and mainland-side communities. If islanders were temporarily restricted from travelling to/from the island on short notice, the impact will be moderate, temporary and negative in nature.

The construction compound will be situated in the mainland-side visitor car park area and will significantly reduce parking spaces available at the site, however as the disruptive elements of the construction phase will take place during the off-season (September – April) this is not expected to impact users significantly. Access to the Beara Breifne Way/ Garnish Loop at the car park site will be maintained throughout the construction phase. However, there will be slight negative short-term impacts to journey amenity as a result of the construction activities. There is also a private access (farm gate) leading to agricultural land. This access will be relocated during the construction phase to facilitate maintaining vehicular access to these lands. Access or alternative access will be maintained in agreement with the landowner throughout the construction phase, no significant impacts will occur.

Access to slipways on the island and mainland will be maintained throughout construction and operation. As stated in Chapter 4 of this EIAR, it is likely the slipways will need to be used to transport materials to the island side of the site of the proposed development during the construction phase. This use of the slipways may give rise to temporary disruptions to those launching/landing craft at these sites. However, because of the often-hazardous seafaring conditions in the Dursey Sound, these slipways are reported as being seldom used and, therefore, impacts will not be significant.

Nuisance due to construction traffic on haulage routes is likely to result in momentary negative effects to walkers/hikers at points where the road network traverses the Beara-Breifne Way and the Beara Way.

In summary, the construction phase of the proposed development is expected to have short-term to temporary, moderate, negative effects on journey characteristics, journey amenity and severance for users in the study area.

6.4.1.2 Economic Activity

The two mobile catering facilities currently operating at the cable car site (one on the island and one on the mainland) will be required to be relocated during the construction works. Any associated adverse effects are likely to be moderate and temporary in nature, lasting only as long as it takes to establish the businesses in question elsewhere.

Increased direct and indirect employment opportunities will occur as a result of the construction phase of the proposed development. There will be approximately 20 - 30 persons employed on-site at any one time during each construction phase. Services required by construction workers will include accommodation and provision of food these services will provide opportunities for local businesses during the 18-month construction period. It is considered that these effects will be positive, slight, and short-term in nature.

The revenue of the existing cableway (which will be kept open during the construction of the proposed development, insofar as possible), as well as that of nearby businesses may be adversely affected during the construction phase, as people may be less likely to travel to the area due to (real or perceived) adverse effects related to construction works. However, these businesses are seasonal in nature and will be closed during the winter months, when it is proposed to carry out the most disruptive aspects of the construction works. It is considered that any such adverse effects arising as a result of the construction phase will be imperceptible to slightly negative effects that will be short-term in nature.

6.4.1.3 Human Health Impacts

As already stated, environmental health standards are set to protect the vulnerable and not the robust, who are generally more resilient to changes in their environment. In accordance with the methodology outlined in Section 6.2, a summary of likely significant human health impacts/hazards relating to the proposed development have been identified to include:

- Impacts of emissions to air;
- Impacts of noise and vibration emissions;
- Impacts of emissions to hydrology;
- Impacts of collisions/ risks of accidents; and
- Psychosocial impacts.

Effects relating to each of these pathways are considered in turn in the following sections.

6.4.1.4 Impacts of Emissions to Air

A preliminary asbestos survey of the site of the proposed development was carried out by OHSS Safety Consultants in 2019. It found no evidence of asbestos containing materials (ACMs) at the proposed development site. However, the report recommends that a more detailed asbestos survey will be required prior to any refurbishment or demolition works. With the implementation of standard construction practices dealing with ACMs including appropriate training, PPE and appropriate licences, there will be no significant adverse human health effects during the construction phase.

An occupational hygiene survey including paint sample analysis was carried out at the site of the proposed development, by OHSS Safety Consultants in 2019. The analysis found evidence of lead-based paint on a number of structures that will be demolished/decommissioned as part of the development works (Refer to Table 6.14). With the appropriate standard construction practices implemented at the construction stage including appropriate training, PPE and appropriate licences there will be no significant human health effects.

The Air Quality and Climate assessment of this EIAR (Refer to Chapter 13), best practice mitigation measures associated with a low risk of temporary human health impacts are proposed for the construction phase of the proposed development. These will focus on the pro-active control of dust and other air pollutants to minimise generation of fugitive emissions at source. The mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of the construction of the proposed development is likely to be short-term and imperceptible with respect to human health.

6.4.1.5 Noise and Vibration Impacts

The Noise and Vibration assessment of this EIAR (Refer to Chapter 12) assessed impacts on human health from noise and vibration. It found that with the implementation of standard best practice construction methods, binding hours of operation and mitigation measures in that Chapter, any effects due to noise and vibration will be temporary in nature and will not affect human health.

6.4.1.6 Impacts of Emissions to Surface and Groundwater

Water Quality

Construction activities within and alongside coastal and surface waters can contribute to the deterioration of water quality. There are no bathing waters located in proximity to the proposed development.

Chapter 10 of this EIAR – Hydrology includes an assessment of water quality impacts including to potable water supplies. Construction shall be undertaken in accordance with the measures outlined in the Construction Environmental Management Plan. It is considered that, provided the mitigation measures are adhered to, there will be no significant human health effects as a result of the construction phase of the proposed development. With the application of standard construction methods, the EOP and mitigation measures detailed in Chapter 9 and 10 of this EIAR any impacts to water supply and quality were found to be unlikely and temporary in nature, therefore, there is a slight impact on human health during the construction phase.

6.4.1.7 Impacts of Collisions/Accidents

Construction activities may increase the risk of collisions due to an increase in the number of movements of HGVs entering and exiting from the construction compound and travelling on a trafficked roadway (R572). Construction workers may be at risk of potential accidents from working at heights or close to the sea. It is considered that the risk of such accidents occurring is low, and that implementation of a Construction Traffic Management Plan will mitigate against such an event occurring.

6.4.1.8 Psychosocial Impacts on Human Health

There may be some minor, temporary nuisance to properties, businesses and road users along the R572, during the 3-month roadworks phase and main construction works. There will be no significant psychosocial effects as a result of the construction phase of the proposed development.

Acquisition of private agricultural lands/hedgerows is required in order to carry out road improvement works/construction of passing bays along the R572. The acquisition of these lands will not cause severance or interfere significantly with current land uses.

No demolition or acquisition of private houses is required as part of the proposed development.

Overall, it is considered that the construction phase of the proposed development will not result in any significant psychosocial effects as a result of the proposed development.

6.4.2 Operational Phase

6.4.2.1 Land Use and Social Considerations

The proposed development is consistent with national, regional and local planning policy. It is aimed at creating a coherent, distinct, environmentally sensitive and considered tourism destination at the existing location of the Dursey Island Cableway.

The main land uses in the study area are:

1. Agriculture;
2. Recreation, amenity and tourism; and
3. Journey Characteristics, Journey Amenity and Severance

Overall, it is considered that the operation of the proposed development will have a long-term, significant, positive effect on land use and social considerations in the Study Area.

Agriculture

As described in Chapter 4 of this EIAR, the proposed road improvement works will require the acquisition of small areas of private farmland. Additionally, construction of the island-side structures of the proposed development will result in the acquisition and loss of a small area of commonage land which is currently being used for livestock grazing. Details of landowner and impacts is set out in Chapter 16 of Volume 2 of this EIAR – Material Assets and Land – and concludes that since the scale of land acquisition is relatively small, associated effects on agricultural land are considered to be imperceptible or slight in nature and insignificant at County level.

Additionally, by improving the ease of access to and from Dursey Island, the operation of the proposed development will facilitate/support, to some degree, repopulation and economic activities of the island and has the potential to reverse the current trend of depopulation and land abandonment on the island. Thus, it is considered that the operation of the proposed development will have a long-term, slight to moderate, positive effect on agriculture in the Study Area.

Recreation, Amenity and Tourism

The proposed development will increase the capacity and turnover of the Dursey Island Cable Car, based on a maximum of 80,000 persons to travel to the island per year (upper limit set by CCC, although cableway capable of conveying a greater number). The proposed development will improve the transportation network between Dursey and the mainland and will enhance the recreational value of the area. The addition of a Visitor Centre and café will also serve to enrich the overall experience of visitors to the site. It will improve the comfort levels of visitors to the site, who currently spend protracted periods queuing in an unsheltered outdoor area in order to use the cableway. The overall visitor experience will be improved not only by the improvements in the physical infrastructure but also as a result of the provision of practical and interpretative information, which will provide information to visitors on the natural and cultural heritage of the area, and activities available in the area (e.g. birdwatching, whale/dolphin-watching). Additionally, in order to promote broad economic benefits for the tourism sector in the greater Beara/West Cork region, it is proposed to promote local businesses in the visitor centre. The operational phase of the proposed development will have a very significant, long-term, positive effect on recreation, amenity and tourism in the study area.

Journey Characteristics, Journey Amenity and Severance

Road improvement works to be carried out on the approach road (R572), and the proposed use of VMS to advise road-users when the visitor car park is full will serve to improve traffic flows on the R572. The increase in capacity of on-site parking facilities from 70 to approximately 100 spaces (43% increase) and 1 bus bay will facilitate increased passenger numbers visiting the site. As stated in Chapter 5 of this EIAR – Traffic and Transport – it is considered that the proposed car park will provide sufficient parking for anticipated visitor numbers. The proposed development is also likely to reduce severance between the island and mainland; by increasing the capacity and turnover of the cableway. The proposed development will also increase the safety and comfort of the cable car journeys for its users. The operation of the proposed development is not expected to affect access to pre-existing slipways on the island or mainland.

As part of the proposed development on the mainland, a section of the existing cable site that is currently used for car parking will be removed to facilitate the construction of the cable car station building. There are two accesses that are currently located to the north west of this general area and will required to be altered to maintain access: one public access (pedestrian) and one private access (Refer to Plate 6.4). The private access is a vehicular farm gate leading to private agricultural land and will be relocated in line with the internal road network to create a new vehicular access to these lands. The public access is a pedestrian access, that forms part of the Beara Breifne Way/ Garnish Loop and will be relocated behind the station building. The walking route leading towards the walking route will be altered slightly due to the construction of the proposed development buildings and internal road network.

The cableway will be capable of making the 375m crossing in approx. 1 minute which will be a significant reduction from the current journey time, of approximately 6 – 7.5 minutes. However, it is not expected that the cable car will operate at this increased speed but that journey time would be maintained similar to the current duration (or slightly decreased to between 4 and 6 minutes) in order to maintain the journey amenity and unique user 'experience' of the cable car. The speed can be increased if required (i.e. for residents when there are no tourists using the cable car and in case of emergencies). This will improve journey times for those who live and/or work on Dursey Island. According to ticket sales in 2018, the current cable car transports approximately 22,000 persons to Dursey Island, this figure excludes islanders (who do not have to pay for tickets). As a result of the proposed development works the cableway will be capable of transporting between 200-300 passenger per hour in each direction.

Additionally, since the proposed cableway will feature two desynchronised cabins, those travelling to/from the island will have less time to wait or indeed will not have to wait at all. The operational phase of the proposed development will have a significant, positive, long-term effect on journey characteristics including journey times, journey amenity and general amenity and will reduce severance between the mainland and the island.

Social and Community Considerations

Improved transportation infrastructure and improved confidence in transportation networks can contribute to revitalising rural areas such as the Beara Peninsula and Dursey Island. This area has suffered population decline over the years, and prevention of total depopulation is a foremost objective for Dursey Island in local planning and development policy. Additionally, the development of the interpretative centre will serve to improve local community facilities. The proposed development will also improve the overall comfort and safety for users of the cable car into the future. Furthermore, increased capacity and arrangement of the car, the provision of expanded parking, as well as the improvements in the local road network will contribute to enhancing the physical infrastructure and connectivity of the area for local users and emergency services. The proposed development will enhance and support community networks and infrastructure as well as support further economic and community development opportunities. By facilitating further economic development opportunities on Dursey Island and improving ease of access to-and-from the island, it may indirectly contribute to the prevention of depopulation on the island and improve community networks. The operational phase of the proposed development will have significant, long-term, positive effects on social and community infrastructure in the area.

6.4.2.2 Economic Impact

By supporting increased visitor numbers at the Dursey Island Cable Car, the proposed development will increase the revenue generated by its operator, CCC, and will create economic opportunities for local business owners and entrepreneurs.

Because of the nature of the proposed car park, and the presence of a new café as part of the proposed development, it is unlikely that mobile catering facilities will be able to continue to operate in the car park of the Dursey Island Cable Car and Visitor Centre during its operation. As a result of the mobile nature of these businesses (which can establish themselves elsewhere), any resultant change is likely to have a temporary, moderate adverse effect on these businesses.

The proposed development will create additional employment opportunities at the site of the proposed development. It is expected that approximately 3 employees will continue to operate the cable car and another 3-5 employees will be employed to operate the visitor centre and café.

The proposed development will support the development of Fáilte Ireland's value proposition for the Wild Atlantic Way, and will increase access to Dursey Island, a Signature Discovery Point of that route. By referencing other attractions in the Beara Peninsula and broader west Cork areas, and on the Wild Atlantic Way, the interpretive materials in the proposed visitor centre will encourage longer dwell times – and, as a result, economic/tourism sector growth - in these areas.

It is proposed to increase the return fare price for the cableway in order to ensure the economic viability of the proposed development. The particulars of the pricing system for tickets for the proposed development have not yet been determined and will be determined after the economic and operational plan has been completed.

Overall, it is considered that the operation of the proposed development will give rise to very significant, long-term, positive economic effects for the population in the study area, the extent of which will be moderate to large.

6.4.2.3 Human Health Impacts

In accordance with the methodology outlined in Section 6.2, a summary of likely significant human health impacts/hazards relating to the proposed development have been identified to include:

- Impacts of emissions to air;
- Impacts of noise and vibration emissions;
- Impacts of emissions to hydrology;
- Impacts of collisions/ risks of accidents; and
- Psychosocial impacts.

Effects relating to each of these pathways are considered in turn in the following sections. Overall, it is considered that the operation of the proposed development will result in a net long-term, slight or imperceptible positive effect on human health.

6.4.2.4 Impacts of Emissions to Air Quality

As stated in Chapter 13 of this EIAR – Air Quality and Climate - traffic related air emissions have the potential to impact air quality which can affect human health. However, as the traffic generated by the proposed development is below the thresholds requiring quantitative assessment, it can be determined that the impact to human health during the operational stage is long-term and imperceptible.

6.4.2.5 Impacts of Noise and Vibration Emissions

Chapter 12 of this EIAR, Noise and Vibration, details the assessment of noise and vibration on human health. The assessment did not identify any likely significant effects related to noise and vibration during the operation phase of the proposed development that will affect human health.

6.4.2.6 Impacts of Emissions to Surface and Groundwater

Water Quality

Development of hardstanding surfaces can lead to increased surface water run-off which can contribute to the deterioration of water quality. As discussed in Chapter 10 of this EIAR – Hydrology - the proposed development will incorporate sustainable drainage systems which will mitigate any potential adverse effects related to changes in run-off rates and volumes, whilst also maintaining quality of water in the vicinity of Dursey Sound. It is, therefore, considered that any adverse human health effect of the operation of the proposed development related to water quality will be imperceptible and insignificant in nature.

Potable Water Supply

Chapter 9 & 10 of this EIAR have been cross-referenced to inform this aspect of the human health assessment. No significant impacts are likely to occur to drinking water supplies and water quality as a result of the proposed development.

Flooding

The hydrological impact assessment carried out in Chapter 10 of this EIAR found no indication that the site floods from coastal, fluvial or pluvial sources. The proposed development will incorporate sustainable drainage systems which will maintain the current flow regime to receiving water bodies. As such, there will be significant human health impacts related to flooding as a result of the proposed development.

6.4.2.7 Impacts of Collisions/ Risk of Accidents

Visibility on the R572 regional road is poor and increased volumes of traffic on the road as a result of the proposed development may lead to an increase in the risk of road traffic collisions. However, road improvement works proposed for the R572 should serve to improve road safety conditions and decrease the likelihood of road traffic accidents occurring.

It is considered that the overall safety of the cableway infrastructure will be increased substantially as a result of the proposed development. The existing infrastructure is outdated and substantially rusted in places.

In order to prevent the occurrence of accidents, unlike the existing cableway, the proposed development shall include all necessary safety features, as required by the relevant Eurocode requirements.

Maintenance works on the cableway and associated structures have the potential to result in accidents. All maintenance to be carried out during the operation of the proposed development will be executed in accordance with the relevant guidelines. Additionally, an operational maintenance manual will be developed for the site.

An evacuation procedure plan is in place for the existing site, and a new plan will be developed for the proposed development.

In short, it is considered that the operation of the proposed development will reduce the risk of road traffic collisions and other accidents, having a moderate, long-term, positive effect in this respect.

6.4.2.8 Psychosocial Impacts on Human Health

Increased volumes of traffic on the R572 approach road and increased volumes of visitors on Dursey Island may result in some minor nuisance for properties in the vicinity. It is considered that any associated adverse psychosocial effect would be insignificant and very limited in extent, affecting only a small proportion of the population.

There is a growing body of research indicating that there are causative relationships between positive psychosocial health/wellbeing and (i) recreation in the natural environment (Coon *et al*., 2011; Hartig *et al*., 2014) and (ii) exposure to biodiversity (Sandifer *et al*., 2015; Prescott *et al*., 2016). Thus, it is conceivable that biodiversity loss and/or habitat destruction/degradation can have negative implications for human health. It is difficult to characterise the significance of such potential effects since the relationship between biodiversity and psychosocial health is not well understood. Additionally, since the Study Area is a popular destination for nature-based recreation, particularly fishing, whale and dolphin watching and birdwatching, significant biodiversity loss (particularly of species of fish, marine mammals and birds) in the Zone of Influence will almost certainly diminish the recreational value of the area. Since the area of habitat loss as a result of the construction of the proposed development is relatively small, and since anticipated adverse effects on recreation, amenity and tourism have been characterised as temporary and slight (insignificant) in nature, it is not considered the operation of the proposed development will have a significant adverse effect on psychosocial health that is related to biodiversity. As stated in Chapter 7 of this EIAR – Biodiversity - it is considered that, provided the mitigation measures set out in this EIAR – particularly those in Chapter 7 – are adhered to, no adverse effects on population and human health related to biodiversity will occur.

By providing substantially enhanced welfare and shelter facilities and eliminating the need for visitors to spend protracted periods queuing outdoors, it is anticipated that the proposed development will provide a more comfortable and more enjoyable experience for cable car users.

Overall, it is considered that the operational phase of the proposed development, will have a neutral to positive effect on psychosocial health.

6.5 Mitigation and Monitoring Measures

6.5.1 Construction Stage Mitigation Measures

The following mitigation measures are required to be implemented:

- The Contractor shall undertake a more detailed asbestos survey prior to the commencement of works.
- A Construction Environmental Management Plan (CEMP) shall be developed by the Contractor in agreement with the location authority, prior to the commencement of works. As stated in Chapter 4, the CEMP should address any potential risks related to working near asbestos and lead-based paint. This document shall also include a Dust Management Plan, including the following measures to prevent adverse effects related to lead-based paints:

  - A HEPA-filter vacuum shall be employed to clean up debris resulting from the removal (accidental or otherwise) of paints on the structures in question.
  - Where paint removal is required, a wet-based method shall be applied.
  - Any paint debris shall be disposed of in accordance with the Waste Management Act.
  - All personnel engaged in the removal of (or otherwise working on or near) structures which have been determined to be coated with lead-containing paint shall wear appropriate protective clothing.
- A Stakeholder Management and Communication Plan shall be developed by the Contractor in agreement with CCC prior to the commencement of the construction phase. It shall include measures addressing the communication of information to local residents, those working in the area, businessowners and visitors regarding the nature and duration of works to be carried out. The Plan shall be implemented throughout the duration of the construction works.
- All of the mitigation measures set out in Chapters 7, 9, 10, 12 and 13 of this EIAR are required to be implemented.
- When restrictions/ changes to the operation of the cableway are required the Contractor shall be required to:
  - Provide written notice and/or verbal notice to all Dursey Island residents and landowners at least 1 week prior to the first day of the interruption, or as soon the interruption is known.
  - In the event of emergency situations, the contractor will be required to notify the 2 Dursey Island residents and landowners immediately or as soon as is practicable by phone/in person and in writing to notify them of changes to the operation of the cableway.
  - Provide up to date notifications to the general public about any interruptions to the service via a webpage set up for the purpose on the site website (for example on: DurseyIsland.ie). The notification(s) should include details regarding the nature of the interruption (i.e. whether the cableway is partly operational or fully out of service) and the duration of the interruption.

6.5.2 Operational Stage Mitigation Measures

This impact assessment has found that, provided the mitigation measures set out in the other Chapters of this EIAR are implemented, the operation of the proposed development will have a net long-term, significant, positive impact on population and human health in the Study Area. Provided the mitigation measures set out elsewhere in this EIAR are implemented, no significant adverse effects on population and human health are likely to occur during the operation of the proposed development. Therefore, no further mitigation measures are necessitated.

6.6 Residual Impacts

Provided the mitigation measures set out in this EIAR are adhered to, it is considered that no significant, negative residual effects will occur as a result of the proposed development.

6.7 Difficulties Encountered

No particular difficulties were encountered in preparing the population assessment. In terms of the human health assessment, there are uncertainties in relation to assessing impacts on individuals or communities due to the lack of available health data and the difficulty in predicting effects, which could be based on a variety of assumptions.

6.8 Conclusion

This population and human health impact assessment has found that, without mitigation, the proposed Dursey Island Cable Car and Visitor Centre development is likely to have (i) a net short-term to temporary, slight to moderate, negative impact during the construction phase and (ii) a net long-term, significant, positive impact during the operational phase on population and human health. Assuming implementation of the mitigation measures set out in Section 6.5 of this Chapter and in Chapters 4 - 16 of this EIAR are implemented, it is considered that no significant, negative effects on population and human health will occur as a result of the construction or operation of the proposed development. Chapter 18 of this EIAR presents a compilation of all required mitigation measures.

6.9 References

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Chapter 7 Biodiversity

7.1 Introduction

This chapter examines the ecology of the receiving environment within and surrounding the proposed Dursey Island Cable Car and Visitor Centre Development, Beara, west Co. Cork (hereafter 'the proposed development') and assesses its potential impacts on biodiversity. The methods employed to establish the ecological baseline within and around the proposed development are described, together with the process followed to determine the nature conservation importance of the ecological features present. The ways in which habitats, species and ecosystems are likely to be affected by the proposed development are explained and the magnitude of the likely effects are predicted while taking into account the conservation condition of the habitats and species under consideration. Mitigation and enhancement measures are also proposed, and any residual effects are assessed, taking into account the mitigation and enhancement measures proposed.

7.1.1 Biodiversity Conservation Legislation and Planning Policy

The European Communities (Birds and Natural Habitats) Regulations, 2011, as amended ('the Habitats Regulations'), transpose into Irish law Directive 2009/147/EC (the 'Birds Directive') and Council Directive 92/43/EEC (the 'Habitats Directive'), which list priority habitats and species of international (European Union) conservation importance which require protection. This protection is afforded in part through the designation of Natura 2000 sites - areas that represent significant populations of listed species within a European context. Areas designated for bird species are classed as Special Protection Areas (SPAs), while those designated for other protected species and/or habitats are classed as Special Areas of Conservation (SACs). Wild bird species in SPAs, and habitats and species in contained in SACs that are listed on Annexes I and II (respectively) of the Habitats Directive, are legally protected. Additionally, species listed on Annex IV of the Habitats Directive are strictly protected wherever they occur – whether inside or outside the Natura 2000 network. This protection is afforded to animal and plant species by Sections 51 and 52, respectively, of the Habitats Regulations. Annex I habitats outside of SACs are still considered of national and international importance and, under Section 27(4)(b) of the Habitats Regulations, public authorities have a duty to strive to avoid the pollution or deterioration of Annex I habitats and all habitats integral to the functioning of SPAs.

The Wildlife Act 2000, as amended ('the Wildlife Acts') is the principle legislative mechanism for the protection of wildlife in Ireland. A network of nationally protected Nature Reserves, which public bodies have a duty to protect, was established under the Wildlife Acts. Sites of national importance for nature conservation are afforded protection under planning policy and the Wildlife Acts. Natural Heritage Areas (NHAs) are sites that are designated under the Wildlife Acts for the protection of flora, fauna, habitats and geological features of interest. Proposed Natural Heritage Areas (pNHAs) are published sites identified as of similar conservation interest but have not been statutorily proposed or designated – but are nonetheless afforded some protection under planning policies and objectives. The Wildlife Acts also protect species of conservation value from injury, disturbance and damage to individual entities or to their breeding and resting places. All species listed in the Wildlife Acts must, therefore, constitute a material consideration in the planning process.

An additional, important piece of national legislation for the protection of wild flora, i.e. vascular plants, mosses, liverworts, lichens and stoneworts, is the Flora (Protection)

Order, 2015, which makes it illegal to cut, uproot or damage listed species in any way or to alter, damage or interfere in any way with their habitats.

Ireland's *National Biodiversity Action Plan 2017-2021* (Department of Culture Heritage and the Gaeltacht, 2011), in accordance with the Convention on Biological Diversity, is a framework for the conservation and protection of Ireland's biodiversity, with an overall objective to secure the conservation, including, where possible, the enhancement and sustainable use of biological diversity in Ireland and to contribute to collective efforts for conservation of biodiversity globally. Action 1.1.3 of the National Biodiversity Strategy states that "all Public Authorities and private sector bodies move towards no net loss of biodiversity through strategies, planning, mitigation measures, appropriate offsetting and/or investment in Blue-Green infrastructure". This is particularly relevant to developments. The plan is implemented through legislation and statutory instruments concerned with nature conservation. The *All-Ireland Pollinator Plan 2015-2021* (NBDC, 2015) seeks to halt the decline in pollinators through a range of objectives. This plan is supplemented by the guidance document *Councils: actions to help pollinators* (NBDC, 2016).

The *Cork County Development Plan 2014* (Cork County Council (CCC), 2014) sets out a number of objectives with the aim of conserving the integrity of 'green infrastructure' (including habitats), soils and surface/groundwater bodies of the county, although biological diversity is not directly referred to. The *County Cork Biodiversity Action Plan 2009 – 2014* (CCC, 2009; now expired) aimed to "conserve and enhance biodiversity, and to ensure that every person in the county has the opportunity to appreciate and understand its importance in our lives" (p. 5). It set out 6 key objectives, and 21 corresponding actions with respect to conservation of biological diversity. Under the Action Plan, "Inappropriate development in sensitive areas" was identified as a key threat to biodiversity.

7.1.2 Approach and Objectives

A 'habitat' is the environment in which an organism lives and is generally defined in terms of vegetation and physical structures. Habitats and species of ecological significance occurring or likely to occur within the defined **Zone of Influence** and **Study Area** of the proposed development were classified as **Key Ecological Receptors**.

In accordance with Transport Infrastructure Ireland (TII) *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (2009), an impact assessment has been undertaken of Key Ecological Receptors within the Zone of Influence of the proposed development. According to these guidelines, the Zone of Influence is the "effect area" over which change resulting from the proposed development is likely to occur and the Key Ecological Receptors are defined as features of sufficient value as to be material in the decision-making process for which potential impacts are likely.

In the context of the proposed development, a Key Ecological Receptor is defined as any feature valued as follows:

- International Importance
- National Importance
- County Importance
- Local Importance (Higher Value)

Features of local importance (Lower Value) and features of no ecological value are not considered to be Key Ecological Receptors. The assessment presented in this

Chapter does not consider any other type of environmental effects other than those on biological diversity (of flora and fauna). This Chapter quantifies the potential effects on identified Key Ecological Receptors and prescribes mitigation measures required to avoid and reduce any significant negative effects identified.

Determining the ecological issues to be addressed in the assessment was informed by early engagement with relevant stakeholders. During this scoping process, selected consultees were allowed the opportunity to provide comments and observations on the proposed development. Further details of the consultation process, including a list of the statutory and non-statutory consultees, are presented in Section 7.2.5.

On completion of the scoping process, a desk study was undertaken to review all available published data describing ecological conditions within the greater area of the proposed development. The desk study cross-referenced this published data with publicly available maps and aerial orthophotography from Ordnance Survey Ireland (OSi), National Parks & Wildlife Service (NPWS) and Environmental Protection Agency (EPA) to identify Key Ecological Receptors. During this assessment, the statutory conservation agency, the NPWS, provided data on nature conservation designations, habitats and species of conservation interest. The baseline information obtained from the desk study constituted the first stage in defining the Zone of Influence of the proposed development.

In addition to this desk study, a number of ecological surveys were carried out in 2018 and 2019 in order to obtain primary data regarding the baseline environment with respect to biodiversity and to identify potential effects thereon. Section 7.2.6 presents details of these surveys.

Where potential significant negative effects were identified, detailed and specific mitigation measures have been proposed in accordance with the hierarchy of options suggested in European Commission report, '*Assessment of plans and projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC'*. Accordingly, the avoidance of effects at their source is the prioritised approach. Where this is not possible, the following approaches are adopted, in order of decreasing preference: (i) reduction of effects at source, (ii) on-site abatement, and finally, (iii) abatement at receptor. These mitigation measures (as set out in Section 7.8 of this chapter) have been incorporated into the design of the proposed development.

The information provided in this chapter accurately and comprehensively describes the baseline ecological environment, provides an accurate prediction of the potential ecological impacts of the proposed development, prescribes specific mitigation as necessary and describes the likely residual ecological effects.

7.1.3 Terminology

The valuation of Key Ecological Receptors and the terminology used to determine ecological value is in accordance with aforementioned guidance (TII, 2009). The description of effects is in accordance with the EPA's Draft *Guidelines on the Information to be Contained in Environmental Impact Statements* (EPA, 2017).

7.2 Methodology

This section describes the methodologies that were followed in collecting information, in describing the baseline ecological conditions and in assessing the likely effects of the proposed development.

7.2.1 Guidelines on Environmental Impact Assessment

The process of identifying, quantifying and evaluating potential impacts of the proposed development on habitats, species and ecosystems was undertaken in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) best practice guidance (CIEEM, 2018). In addition, reference to the following recognised guidance on the Environmental Impact Assessment of National Road Schemes provided for an appropriately defined scope and evaluation process:

- EPA (August 2017). Draft Guidelines on information to be contained in the Environmental Impact Assessment Report;
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- TII (2008b). Guidelines for Ecological Survey Techniques for Protected Flora and Fauna during the Planning of National Road Schemes;
- TII (2008c). Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes;
- TII (2008d). Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes;
- TII (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes;
- TII (2010). Guidelines on Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads;

7.2.2 Establishing the Zone of Influence

The key variables determining whether Key Ecological Receptors will be subject to effects through development are:

- the physical distance of the proposed development to the Key Ecological Receptors;
- the sensitivities of the Key Ecological Receptors within the receiving natural environment; and
- the potential for in-combination effects.

The Zone of Influence, as presented in Plate 7.1, was defined as follows:

- The proposed development itself;
- The R572 approach road west of the Bealbarnish Gap and all of the proposed works (passing bays and visibility splays) along it;
- All established roads and walking routes west of the Firkeel Gap, including those on Dursey Island, Garinish Head, Crow Head and routes linking these; and,
- A 500 m buffer around all of the above.

The on-road and off-road walking trails on Dursey Island and in the vicinity of the cableway on the mainland (i.e. at Garinish Head and Crow Head) have been included since it is known that a proportion of visitors to the site will undertake walks in the vicinity (particularly on the island) and, as a result, increased visitor footfall at the site and on Dursey Island (as a result of the proposed development) has the potential to give rise to indirect negative effects on biodiversity in these areas.

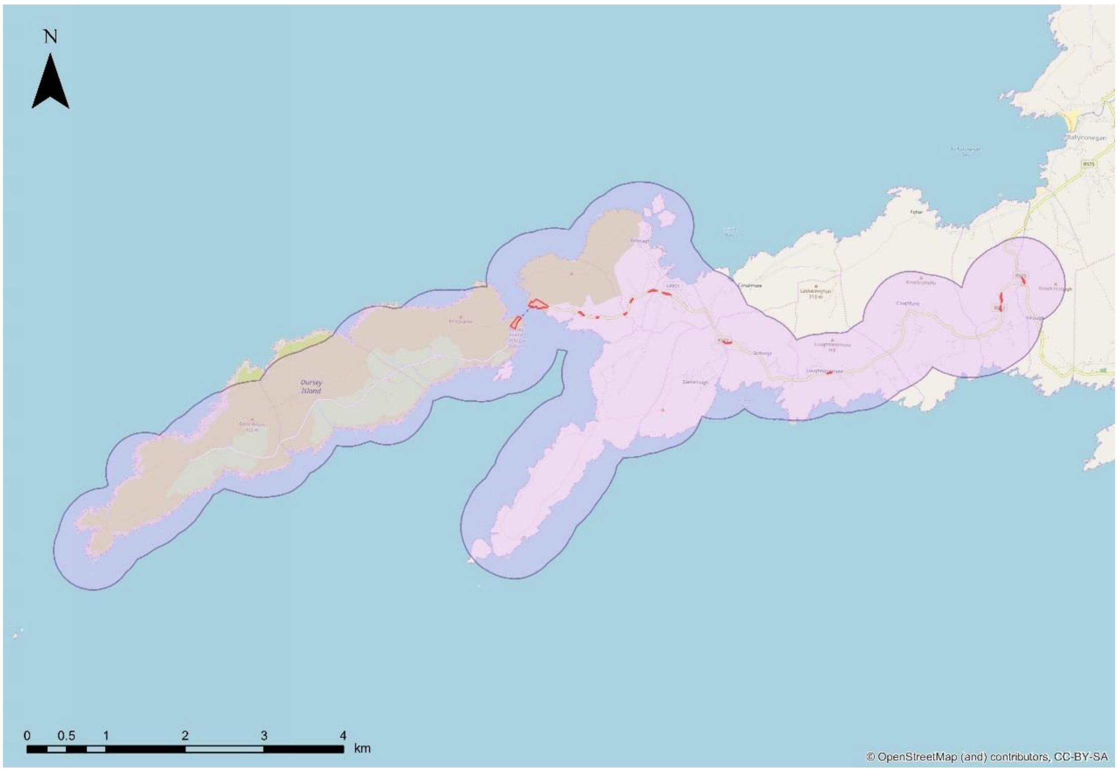

Plate 7.1 **Map depicting the proposed development (including proposed works along the R572) (red) and the Zone of Influence (magenta)**

7.2.3 Establishing the Study Area

The extent of the study area is defined by the ecological features likely to occur within an effects distance from the proposed development. This is informed by the findings of the desk study (presence/absence of protected habitats, flora or fauna within the Zone of Influence) and best practice methodology referenced above for assessing effects on those ecological features. The study area in this case is similar to the defined Zone of Influence in that the ecological features which are likely to be impacted by the development are potentially found within and around the site of the proposed development, within 250m of the walking routes on Dursey Island itself, and also along the R572 approach road between Bealbarnish Gap (R572 – R575 junction).

7.2.4 Desk Study

The desk study undertaken for this assessment included a thorough review of the available baseline data relating to biological diversity in the study area. The following resources were used:

- Colhoun & Cummins (2013). Birds of Conservation Concern in Ireland 2014-2019.
- Environmental Protection Agency (EPA) Unified GIS Application data related to Water Framework Directive Status of waterbodies and watercourses within the Zone of Influence
- National Parks & Wildlife Service (NPWS) Map Viewer
- NPWS documents related to NHAs, pNHAs and Natura 2000 sites within the Zone of Influence
- National Biodiversity Data Centre (NBDC) Map Viewer
- NBDC National Invasive Species Database
- Crushell, P., Foss, P. & Kirwan, B. (2015). Wild Atlantic Way Signature Discovery Points: Ecological Study of Visitor Movement Areas 2015. Report prepared for Fáilte Ireland.
- CAAS Ltd. (2016). Strategy for Environmental Surveying and Monitoring for the Wild Atlantic Way Operational Programme: Visitor Observation Study Results. Report prepared for Fáilte Ireland.
- CAAS Ltd. (2018). Environmental Surveying and Monitoring of the Wild Atlantic Way Operational Programme: 2017 Visitor Observation Study Results. Report prepared for Fáilte Ireland.
- Botanical Society of Britain and Ireland (BSBI) (2019). Distribution Database.

As with all desk studies, the data considered were only as good as the data supplied by the recorders and recording schemes. The recording schemes provide disclaimers in relation to the quality and quantity of the data they provide, and these were considered when examining outputs of the desk study.

7.2.5 Consultation

The statutory and non-statutory consultees listed in Table 7.1 were contacted during the desk study, sent a copy of the EIA Scoping Report, and invited to submit any observations in relation to the proposed scope of the EIAR.

The purpose of the consultations was to:

- Identify any relevant information that consultees held, including the presence of data on protected species or species of conservation concern;
- Identify any concerns that consultees may have about the proposed development with respect to biodiversity; and,
- Identify any issues that the consultees would like to see addressed in the biodiversity impact assessment.

The responses received from the organisations or individuals consulted in relation to biodiversity, are also listed in Table 7.1. In each case, only the responses relevant to this Chapter have been included, even in cases in which responses received addressed other topics of relevance to the EIA – those elements of the responses are discussed in the relevant Chapters of this EIAR.

In addition to responses received as a result of written consultations, meetings were held with (i) Dr. Philip Buckley of NPWS and (ii) Mr. Mike Trewby of Woodrow Environmental Consultants in order to inform the biodiversity impact assessment:

- On the 7th of May 2019, a conference call was held between representatives of the Project Team from ROD and Mr. Mike Trewby, ornithologist at Woodrow Environmental Consultants and national expert on the ecology of red-billed chough (*Pyrrhocorax pyrrhocorax*; hereafter 'chough'). It was the opinion of Mr. Trewby that, in order to conserve the resident chough population, a numerical carrying capacity should be established for Dursey Island based on Keribiou *et al*. (2009; see Appendix 7.3). It was also advised that, in order to facilitate future monitoring of the chough population, the key parameter to be measured during the breeding bird surveys was productivity (i.e. breeding success) of the population.
- On the 9th of May 2019, a meeting was held between Dr. Philip Buckley, NPWS Divisional Manager for the Southern Region, and representatives of the Project Team from ROD and CCC, including the CCC Biodiversity Officer. The need to obtain sufficient breeding season survey data for the resident population of chough was emphasised by Dr. Buckley. It was stated that data required for the population was (i) location of nest sites, (ii) key areas of habitat, and (iii) flush distances. It was advised that a minimum survey schedule should include 3 – 4 surveys per week during May and June 2019. It was also stated that data should be obtained regarding the movement of visitors on the island, particularly with a view to identifying what proportion of walkers (i) wander onto the western end of the island, and (ii) stay on established walking routes.

All issues raised by the consultees have been addressed insofar as possible herein.

Table 7.1 Consultation Responses

Consultee	Date Correspondence Received	Summary of Responses with Respect to Biodiversity
Inland Fisheries Ireland (IFI)	14th March 2019	There should be no interference with, bridging of, draining of, or culverting of any watercourse or its banks or bankside vegetation without prior approval of IFI. The EIAR should detail all construction methodology to be employed to facilitate a complete assessment of potential impacts on fisheries.
Irish Peatland Conservation Council (IPCC)	21st March 2019	It is hoped that the necessary surveys are carried out and that wetland habitats will not be negatively affected. IPCC want assurance that the hydrological system of the Glanmore Bog SAC (which overlaps with the Kenmare River SAC) is preserved or improved as a result of the proposed development. It is pointed out that the site may be affected by the import of foreign soils and species, peat slippage as a result of construction vehicles, noise pollution and nutrient pollution during the construction phase. IPCC want the proximity of the proposed development to the Pulleen Harbour NHA to be considered. They want the site to be protected, particularly with respect to its hydrological integrity. It is pointed out that, according to the Wetlands Survey Ireland Map, there are two wetlands in the vicinity of the proposed development which should be considered in the EIA, particularly with respect to the potential impact of haulage routes on the sites in question. It is requested that landscaping in the proposed development will not utilise peat-based compost or non-native species, which pose a risk to the surrounding habitats.
Irish Water	2nd April 2019	The EIA should consider whether the integrity of any protected or sensitive sites is affected by the abstraction of water or discharge of wastewater. Corresponding mitigation measures should be developed, as appropriate.
Fáilte Ireland	11th of April 2019	The ecological integrity of the Irish environment contributes to its appeal as a tourist destination. As such, it should be considered that negative effects on flora and fauna may indirectly result in negative effects on tourism.
Cork Environmental Forum	3rd of May 2019	Concern is expressed regarding the nature of EIA, which does not always monitor a full year of activity of sensitive species. It is pointed out that the study area is species rich.

7.2.6 Overview of Ecological Surveys

Specific ecological surveys were carried out with respect to the following:

- Habitats and vegetation
- Breeding birds
- Bats
- Betony (*Betonica officinalis*)
- Invasive alien plant species (IAPS)

In addition, multidisciplinary site walkover surveys were carried out by the Project Ecologist on a number of occasions during 2018 and 2019. These surveys aimed to identify any occurrence of rare and protected habitats and species in the study area, including those for which specific surveys were not ultimately deemed necessary, including badger and otter.

Paul Murphy of EirEco Environmental Consultants was contracted as the Project Ecologist for the proposed development. Mr. Murphy is a Chartered Environmentalist with over 25 years of experience carrying out ecological assessments. He holds an MSc degree in Environmental Science from Trinity College Dublin. Mr. Murphy completed the surveys of habitats/vegetation and betony. Surveys of breeding birds were carried out principally by Paul Murphy, with assistance from three ROD employees – Ms. Christina McKiernan, Mr. Tadhg Twomey and Mr. Jason Cahill – and sub-consultant ecologist, Mr. John Deasy.

Surveys of IAPS were carried out partly by Paul Murphy and partly by Kyran Colgan of Invasive Plant Solutions. Mr. Colgan has 5 years of experience in the identification and management of IAPS.

Dr. Tina Aughney of Bat Eco Services carried out the bat surveys. Dr. Aughney has over 13 years of experience conducting bat surveys. At the time that these surveys were conducted, Dr. Aughney held the relevant bat survey licences (C30/2017 to handle bats, 33/2017 to photograph/film bats, and DER/BAT 2017-09 to disturb a roost).

Sections 7.2.7 – 7.2.11 outline the methodologies applied during these surveys. Results of these surveys are presented in Section 7.4.

7.2.7 Survey of Habitats and Vegetation

In order to identify the habitat types and their extents within the study area, aerial imagery was initially employed, followed by a multi-disciplinary walkover survey and field-based ground-truthing of findings on the 6th and 7th September 2018 and the 22nd to 25th of May 2019. During the field surveys, detailed botanical assessments were conducted (i) in order to verify habitat classifications according to *A Guide to Habitats in Ireland* (Fossitt, 2000) and (ii) to determine each habitat's conformity to those listed under Annex I of the Habitats Directive. A species list was compiled for each habitat and abundances of particular species were estimated using the DAFOR scale. Hand-drawn habitat maps were produced on Ordnance Survey of Ireland (OSi) Discovery maps of the study area, and later digitised. The survey was carried out in accordance with the Heritage Council's *Best Practice Guidance for Habitat Survey and Mapping* (Smith et al., 2011) and *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes* (NRA, 2008). Habitat maps are presented in Figures 7.2 – 7.12 of Volume 3 of this EIAR.

7.2.8 Surveys of Breeding Birds

Surveys of breeding birds were carried out between March and July 2019. Post-breeding surveys have commenced and will continue to be carried out on a monthly basis throughout the months of August – November 2019. While all breeding birds in the defined study area have been included in the surveys, an emphasis has been placed on Chough (*Pyrrhocorax pyrrhocorax*), which is a Qualifying Interest (QI) of the Beara Peninsula SPA.

Surveys were carried out according to the methodologies set out in McKeever *et al*. (2010) and Trewby *et al*. (2004). Transects were based on the existing network of paths on Dursey Island, as well as the established looped walks on Garinish Head and Crow Head (both on the mainland). Dedicated nest watches were also undertaken wherever potential nest sites were identified and at the locations of nest sites identified in previous surveys (Berrow *et al*., 1993; Scott, 2002; Gray *et al*., 2003). The schedule of surveys for Chough is outlined in Table 7.2, below.

Table 7.2 Breeding bird survey schedule, indicating activity phase of the focal species of the surveys, Chough

Date	Survey Type	Chough Activity Phase
March 2019	Spring	Early breeding season – mature adults nest making. Young Choughs take up to three years to reach breeding age and over this sub-adult stage they join a flock of non-breeding birds.
April 2019	Breeding	Breeding commences early to mid-April. Eggs are laid in the wool lined nest cup. The female is solely responsible for incubating the eggs and during this time the male forages alone returning to the nest periodically to feed the female and allowing her time to feed close to the nest.
May 2019	Breeding	Breeding season – adults foraging locally.
June - July 2019	Fledging / Dispersal	Nestlings start to fledge and form family group which remains within their breeding season home range.
August – November 2019	Post-breeding	Family groups have formed flocks and communal roosting begins.

Data recorded during the breeding bird surveys included the following:

- Maximum chough flock size;
- How individuals first detected (seen/heard, flying/on ground, distance from surveyor);
- Location (grid reference, place name, description);
- Behaviour (foraging/flying/preening/vigilant/loafing/breeding/heard only);
- Habitat/micro-habitat patch use;
- Land use on habitats in question (i.e. grazed/ungrazed/etc.; livestock type);
- Flush distance of chough, defined as "*the distance at which a foraging bird or flock will fly off when approached [i.e. disturbed] by a person or group of persons*" (Keribiou *et al*., 2019; p. 658);
- Chough nest site locations;
- Number of chough juveniles fledged per known nest;

- Weather (wind force, wind direction, visibility, occurrence of precipitation);
- General notes on other interesting observations, including:
    - Features of land use and habitats (e.g. poaching, strip-grazing, out-wintering of livestock, timing of agricultural activities (e.g. spring grazing, cutting of silage)); and
    - Behavioural aspects of individual birds (e.g. direction of flights).

7.2.9 Survey of Bats

Bat surveys were carried out throughout the day (including the entire night) on 29th – 30th September 2018. Surveys were carried out within the footprint of the proposed development, on both island and mainland sides. The day-time survey involved the examination of the site of the proposed development with a view to identifying potential bat roosts and foraging habitats. The night-time surveys involved the use of two bat detectors ((i) Wildlife Acoustics EchoMeter Touch 2 Pro and (ii) Pettersson D200 Heterodyne) by the surveyor at dusk on 29th September. Additionally, two units of Wildlife Acoustic SongMeter 2 BAT+ Platform were set-up to record bats calls from fixed locations between sunset and sunrise. Recordings made by the latter were analysed using various software, including SongScope.

The corresponding report was developed in accordance with the following reports and guidelines:

- McAney, K (2006). Irish Wildlife Manual No. 20: A conservation plan for Irish vesper bats. Report prepared for NPWS.
- Kelleher, C. & Marnell, F. (2006). Irish Wildlife Manual No. 25: Bat Mitigation Guidelines for Ireland. Report prepared for NPWS.
- Department of Arts, Heritage and the Gaeltacht (2017). *National Biodiversity Action Plan 2017 - 2021*
- Department of Arts, Heritage and the Gaeltacht (2013). The Status of EU Protected Habitats and Species in Ireland 2013

7.2.10 Survey of Betony

On 25th October 2018, a survey was conducted to identify and map the distribution and abundance of the Flora (Protection) Order (2015) species, betony (*Betonica officinalis*) at the mainland side of the site of the proposed development. This rare floral species was known to be present in the environs of the site of the proposed development (Botanical Society of Britain and Ireland, 2019). Locations where the species was identified were recorded on field maps, and corresponding grid coordinates were logged using a Satmap hand-held GPS device. Photographs were taken using a Fuji XP Digital camera. The survey was carried out in accordance with *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes* (NRA, 2008).

7.2.11 Survey of Invasive Alien Plant Species

On the 16th October 2018, a survey was conducted (by Kyran Colgan) to provisionally identify and map all IAPS listed in Part 1 of the Third Schedule of the *European Communities (Birds and Natural Habitats) Regulations 2011* in the following areas:

- R572 approach road and road margins between Castletownbere and the site of the proposed development, and,
- The site of the proposed development (island and mainland).

It involved a walkover inspection of the site of the proposed development and a drive-through inspection of the R572. Areas outside the bounds of the survey area were also inspected, where these could be safely and easily accessed. Each time an IAPS was sighted, the following data were recorded:

- Species level identification;
- GPS position;
- Photographic image;
- Approximate area of plant/stand;
- General condition of plant(s);
- Broad habitat occupied;
- Proximity to waterbodies; and
- Other relevant site-specific factors.

A Satmap GPS device was used to log grid coordinates. Locations of IAPS were subsequently plotted onto aerial maps using Google Maps.

Since the provisional IAPS survey was carried out outside of the optimum survey period for identification of plants, a further IAPS survey was carried out following the same methodology (by Paul Murphy) in May 2019. It took in the following locations:

- The locations of proposed passing bays on the R572;
- The entire Zone of Influence; and
- The entirety of Dursey Island.

7.2.12 Ecological Evaluation and Impact Assessment Methodology

The ecological evaluation and impact assessment within this chapter follows the methodology that is set out in Chapter 3 of the '*Guidelines for Assessment of Ecological Impacts of National Roads Schemes*' (TII, 2009).

7.2.12.1 Evaluation of Ecological Resources

The criteria used for the ecological evaluation follows those set out in Section 3.3 of the TII Guidelines (2009). These guidelines set out the context for the determination of value on a geographic basis with a hierarchy assigned in relation to the importance of any particular receptor. The guidelines provide a basis for determination of whether any particular site is of importance on the following scale:

- International
- National
- County
- Local Importance (Higher Value)
- Local Importance (Lower Value)

This guidance clearly sets out the criteria by which each geographic level of importance can be assigned. For example, Locally Important (Lower Value) receptors contain habitats and species that are widespread and of low ecological significance and only of importance in the local area. Conversely, Internationally Important receptors are either designated for conservation as part of the Natura 2000 network (SAC or SPA) or provide the best examples of habitats or internationally important populations of protected fauna.

All habitats and species within the Zone of Influence and study area were assigned a level of significance on the above basis and Key Ecological Receptors were established and classified on this basis.

7.2.12.2 Impact Assessment Methodology

The impact assessment uses the EPA 2002 and 2003 guidelines, but also has regard to the 2015 and 2017 draft revised guidelines with respect to characterising the impact of the proposed development on the receiving environment. The parameters used to characterise impacts were:

- Magnitude – relates to the quantum of impact, for example the number of individuals affected by an activity;
- Extent – relates to the area over which the impact occurs;
- Duration – intended to refer to the length of time for which the impact is predicted to continue, until recovery or re-instatement;
- Reversibility – whether an impact is ecologically reversible, either spontaneously or through specific action; and,
- Timing – timing and/or frequency of impacts in relation to important seasonal and/or life-cycle constraints should be evaluated. Similarly, the frequency with which activities (and associated impacts) would take place can be an important determinant of the impact on receptors.

It is necessary to ensure that any assessment of impact takes account of construction and operational phases; direct, indirect and cumulative impacts; and, those that are temporary, reversible and irreversible. The most relevant criteria for assessment of effects include quality and significance and these criteria are defined in Table 7.3 and 7.4. Definitions of terms used when quantifying duration of effects are defined below (as per EPA, 2017):

- Temporary – up to 1 year
- Short-term – 1 to 7 years
- Medium-term – 7 to 15 years
- Long-term – 15 to 60 years
- Permanent – over 60 years

Table 7.3 Criteria for Assessing Impact Significance (EPA, 2017)

Impact Magnitude	Criteria
No change	No discernible change in the ecology of the affected feature
Imperceptible Impact	An impact capable of measurement but without noticeable consequences
Slight Impact	An impact which causes noticeable changes in the character of the environment without affecting its sensitivities
Moderate Impact	An impact that alters the character of the environment that is consistent with existing and emerging trends
Significant Impact	An impact which, by its character, its magnitude, duration or intensity alters a sensitive aspect of the environment
Profound Impact	An impact which obliterates sensitive characteristics

Table 7.4 Criteria for Assessing Impact Quality (EPA, 2017)

Impact Type	Criteria
Positive	A change which improves the quality of the environment e.g. increasing species diversity, improving reproductive capacity of an ecosystem or removing nuisances
Neutral	A change which does not affect the quality of the environment
Negative	A change which reduces the quality of the environment e.g. lessening species diversity or reducing the reproductive capacity of an ecosystem

Once the potential impacts are characterised, the significance of any such impacts on each of the Key Ecological Receptors is evaluated.

7.2.12.3 Assessing Significance of Effects

The significance of effects was determined following guidance set out in Section 7.2.20 of the TII guidelines (2009), whereby effects are assigned significance based on their characterisation, irrespective of the value of the receptor. Significance is determined by effects on conservation status or integrity, regardless of geographical level at which these would be relevant.

7.2.12.4 Mitigation

The proposed development has been designed to specifically avoid, reduce and minimise negative effects on all Key Ecological Receptors. Where potential significant negative effects on Key Ecological Receptors are predicted, mitigation has been prescribed to ameliorate these effects.

Proposed best practice design and mitigation measures are specifically set out in this Chapter and are realistic in terms of cost and practicality. Provided measures follow the prescribed methodologies and best practice guidelines where available. They have a high probability of success in terms of addressing the impacts on the identified Key Ecological Receptors.

The potential impacts of the proposed development were considered and assessed to ensure that all impacts on Key Ecological Receptors are adequately addressed.

7.2.12.5 Survey Limitations

Standard survey methods were followed and no particular difficulties were encountered during the completion of the surveys described above. However, any biases or limitations associated with these methods could potentially affect the results collected. While every effort was made to provide a full assessment and comprehensive description of the study area, ecological trends (e.g. population trends) may not be fully reflected due to the instantaneous/short-term nature of the field surveys. However, the data obtained from field surveys coupled with the background knowledge provided by the desk study provides a robust representation of the baseline for the habitats and species within the Zone of Influence.

7.3 Desk Study Results

7.3.1 General Description and Context

The proposed development will see the replacement of the existing Dursey Island Cable Car (located in the townland of Ballaghboy, Beara Peninsula, west Co. Cork), which traverses the Dursey Sound, connecting the mainland with the nearby island of Dursey. It is also proposed to construct a new interpretative exhibition space ('Visitor

Centre') and café. The existing car park, which accommodates approximately 70 spaces, will be replaced with an approx. 100-space car park. Additionally, it will be necessary to carry out improvement works on the principle approach road to the site, the R572, including construction of 10 no. suitably spaced passing bays and 1 no. visibility splay. For a detailed description of the proposed development, refer to Chapter 4 of this EIAR.

The site of the proposed development is situated in a sparsely populated, rural area on the coastline of west Co. Cork. The mainland side of the site is approx. 12km from the village of Allihies, 22km from Castletownbere (the nearest major town), and 145km from Cork City. Principle land uses in the area are agriculture, transportation and recreation/tourism. Farming in the area is largely pastoral, with both dry stock cattle and sheep farming represented. Anecdotal evidence indicates that periodic burning of heath and some degree of peat extraction occur on the island.

The environment in the study area is considered to be of exceptional natural beauty. The rugged, treeless landscape is dominated by undulating landforms, indented rocky coastline and open Atlantic seascapes. Thin peaty soils are punctuated by exposed purple and green sandstone and siltstone. Predominant terrestrial habitats are dry humid acid grassland (GS3) and dry siliceous heath (HH1).

Dursey Island itself has an area of approx. 6km^2 and is orientated in a north-westerly to south-easterly direction. A high elevation spine runs along the length of the island from its south-western to its north-eastern points. Farmland is concentrated on the sheltered south-eastern flank of the island, while the less accessible, windswept north-western flank and the hilltops are dominated by open heathland. Grazing pressure is particularly heavy on the island (as opposed to the mainland), where sward heights are consequentially short. A fence at the bounds of the CCC lands on the mainland excludes livestock, and sward heights are higher in the immediate vicinity of the cable car site as a result.

In 2015, Fáilte Ireland established an environmental monitoring programme for the fifteen Signature Discovery Points of the WAW, of which Dursey Island is one. Under the programme, data related to the pattern and intensity of visitor activities, and the ecological status of vegetation in the immediate vicinity of the site of the proposed development were recorded in 2015 (CAAS, 2015; Crushell *et al*., 2015), 2016 (Crushell *et al*., 2016) and 2017 (Boyle, 2017; CAAS, 2018a; 2018b). These data indicate that visitor footfall on vegetated areas immediately adjacent to the cable car site has resulted in trampling and some de-vegetation, soil compaction/erosion in certain localised heavily trafficked areas.

> *"Overall, the condition of the coastal paths was fair, with some evidence of erosion due to visitor numbers."*– CAAS, 2018b, p. 29
>
> *"The trampling effects [of visitors] were seen to have low impacts and were localised to within the immediate vicinity of the [cable car]"* – CAAS, 2018a, p.21

Dursey Island and the Beara Peninsula are popular destinations for recreational walkers. The current situation with respect to walking routes in the Zone of Influence is as follows:

- On Dursey Island, there is a public road running along the central high elevation spine of the island from east to west. There are a number of informal paths on private land, which generally run in parallel to the public road, from east to west. Roads and paths are largely situated inland and not near potential chough nesting sites (i.e. sea cliffs). With the exception of the western end of the island (beyond Tilickafinna), walkways are fairly well defined. On the extreme western end of the island (a chough 'hotspot'), there is no defined trail, creating a risk of walkers spilling out across the open habitat. Yellow waymarker posts guide walkers to the hill of Maoil on the extreme western end of the island. A map of the island and its existing looped walk is provided on the mainland, but is not placed in a prominent position and is likely to be overlooked by many visitors.

- At Garinish Head, the Garinish Loop walk is well defined and the trail attracts considerable numbers of visitors, not all of whom are likely to undertake the full route, but rather use the existing cable car car park as a starting point. Between the site of the proposed development and Garinish Pier, the walk is on a well-defined walking trail, which is heavily eroded in a small number of localised areas. From Garinish Pier back to the Cable Car, the walk is on public roads.
- At Crow Head, the walkway is poorly defined, creating a risk of walkers spilling out over open habitat, though this walk appears to attract very few visitors.

Plate 7.2 presents a map of established paths/roads on the island.

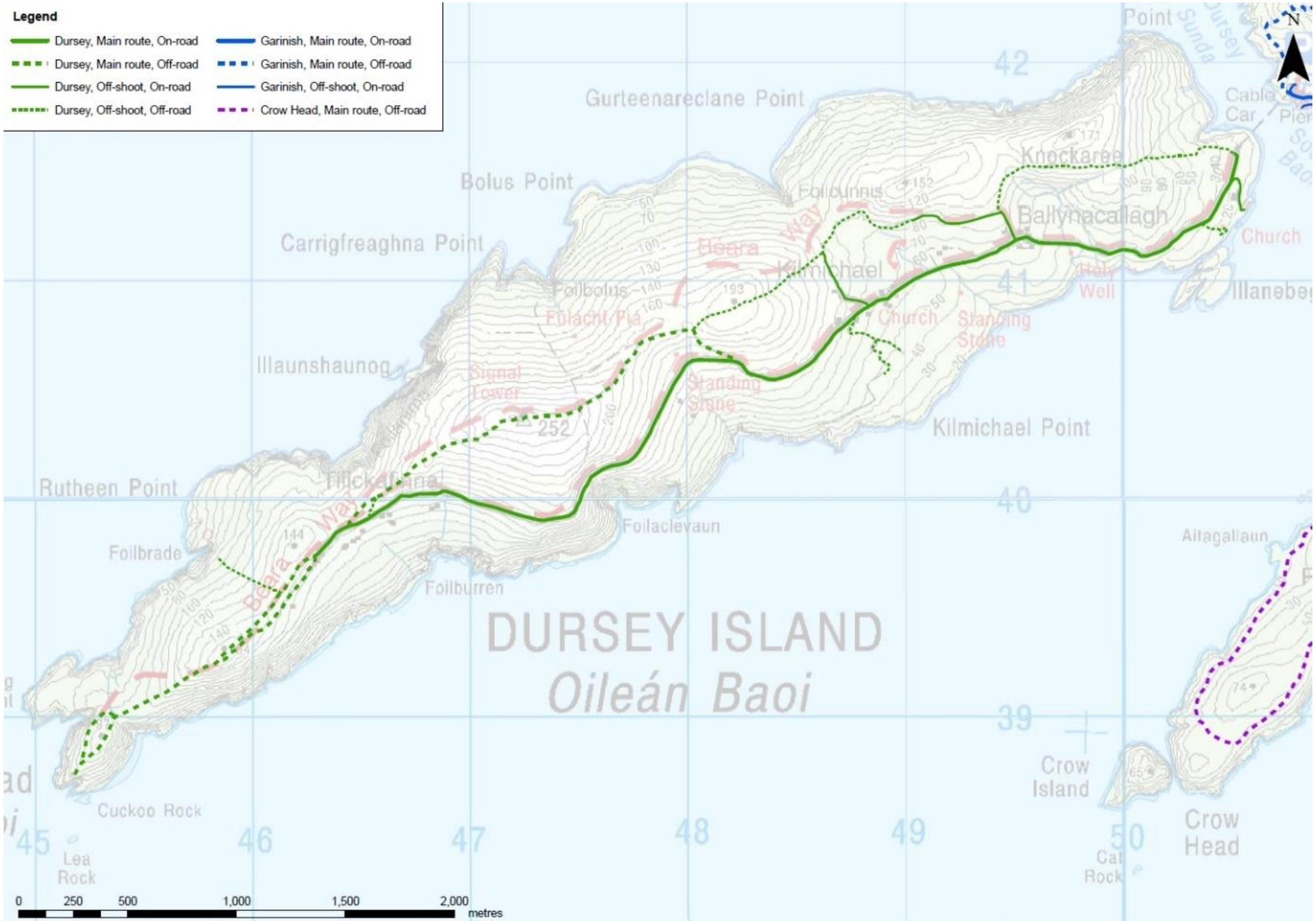

Plate 7.2 Map of Dursey Island showing key walking paths (dotted green line) and road (continuous green line)

7.3.2 Designated Sites

The NPWS web-based Map Viewer was consulted in order to identify legally designated sites within the Zone of Influence. Table 7.5 lists those sites. Thereafter follows a description of the sites in question, according to the NPWS site synopses (NPWS, 2009; 2015; 2016), conservation objectives (NPWS, 2013; 2018) and Natura 2000 Standard Data Forms (NPWS, 2017a; 2017b) for the respective sites, where available.

Table 7.5 Designated sites within the Zone of Influence

Site	Distance from Proposed Development
Designated under European Law	
Beara Peninsula SPA [004155]	Site of proposed development is within SPA
Kenmare River SAC [002158]	SAC extends to high water mark immediately adjacent to site of proposed development
Designated under National Law	
Dursey Island pNHA [000086]	Island-side of proposed development is within the pNHA
Garinish Point pNHA[001986]	Mainland-side of proposed development is within the pNHA
Firkeel Gap pNHA [001051]	R572 approach road (a part of the proposed development) traverses the pNHA

7.3.2.1 *Beara Peninsula SPA*

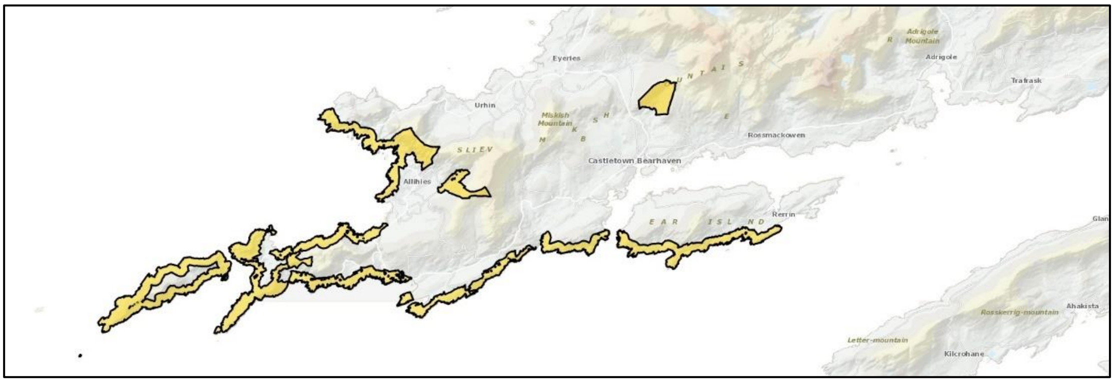

Plate 7.3 Location of Beara Peninsula SPA (yellow). Source: NPWS Map Viewer

The Beara Peninsula SPA (Plate 7.3) is a coastal site situated on the west coast of Co. Cork. It encompasses the high coast and sea cliff sections of the western end of the peninsula from Reenmore Point/Cod's Head in the north, around to the end of Dursey Island in the west, and as far east as Bere Island in the south.

The QIs of the SPA (Table 7.6) are red-billed chough (*Pyrrhocorax pyrrhocorax*, hereafter 'chough') and northern fulmar (*Fulmarus glacialis*, hereafter 'fulmar'). In addition to these QIs (discussed below), the site synopsis states that the SPA supports populations of other breeding seabirds including: shag (12 pairs), herring gull (20 pairs), lesser black-backed gull (4 pairs), razorbill (5 pairs) and black guillemot (87 individuals in 1999) – all seabird data from 2000. The site is also used by peregrine falcon (4 pairs in 2002). The conservation objective of the SPA is to maintain or restore the favourable conservation condition of the site QIs – fulmar and chough.

Table 7.6 Qualifying Interests of the Beara Peninsula SPA

Species Common Name	Scientific Name	NPWS Code
Fulmar	*Fulmarus glacialis*	[A009]
Chough	*Pyrrhocorax pyrrhocorax*	[A346]

Fulmar

Fulmar are protected under the Irish Wildlife Acts but the species is not considered to be of conservation concern in Ireland. Birds winter and feed at sea and nest and roost on sea cliffs and caves – and occasionally on level ground or in artificial structures in coastal areas (BirdWatch Ireland, 2019b). Fulmars forage principally on fish and crustaceans and are partly reliant on scavenged fish from commercial fishing vessels but also catch live prey themselves (Phillips *et al*., 1999). The species is not native to Ireland, and the first national breeding record is from Co. Mayo in 1911 (Ussher, 1911). Research suggests that Iceland and St. Kilda are the ancestral range of the species (Fisher, 1966; Burg *et al*., 2003). However, the abundance and range of the species has increased greatly in the boreal and sub-boreal North Atlantic over the last two centuries, although numbers in certain areas (including the Isle of Muck in north-east Ireland) have declined somewhat in recent years (Fisher, 1966; Mitchell *et al*., 2004). The dramatic expansion of the species' distribution is often attributed to concurrent growth in the commercial whaling and fishing industries (Fisher, 1952; Mitchell *et al*., 2004), although other factors, such as climate change, may also be at play (Thompson, 2006). The species is now found at sea and in coastal areas across the entirety of the Irish coastline (NBDC, 2019c) and is one of the most abundant seabirds in the Northern Hemisphere (Mitchell *et al*., 2004). At the turn of the century (1998 – 2002), Ireland had approximately 32,918 individual fulmars (Mitchell *et al*., 2004). The Beara Peninsula SPA supports a nationally important breeding population (575 pairs, according to the NPWS site synopsis). A seabird survey of Dursey Island and Crow Head/Island was carried out in May 2016 and (to a lesser degree) May 2018 (Heardman, pers. comm., 2019). This survey identified a total of 487 individual fulmars on Dursey Island in 2016 (426 on the north coast of the island, 52 on the south coast, and 9 on the west coast). A flock of 12 individuals was also observed on Crow Head/Crow Island. Seven individuals were identified in the Dursey Sound area (the only area surveyed) in 2018.

Chough

Choughs are a corvid species primarily associated with coastal areas. They are amber-listed species under Birdwatch Ireland's *Bird of Conservation Concern in Ireland* (BWI BoCCI), afforded statutory protections under the Irish Wildlife Acts and the EU Birds Directive (Annex I). They generally nest on ledges in cliffs and in sea caves, but also occasionally in suitable artificial structures (i.e. derelict buildings) (Holyoak, 1972; Bignal *et al*., 1987; BirdWatch Ireland, 2019a) or on inland cliffs with suitable foraging habitat in their vicinity (Blanco *et al*., 1993; Gray *et al*., 2003). Research indicates that choughs distribute nesting site faithfulness, with some sites being used by successive generations (Kennedy *et al*, 1954). Choughs lay somewhere in the region of 2 – 6 eggs per clutch (Holyoak, 1972; Bullock *et al*., 1983; Bignal *et al*., 1987; Stillman *et al*., 1998), typically in late March – April (Holyoak, 1972; Keribiou & Julliard, 2007; BirdWatch Ireland, 2019a). The average number of young fledged in the south-west of Ireland is 3 (Trewby *et al*., 2006a) The fledging period is typically in June (Keribiou & Julliard, 2007; BirdWatch Ireland, 2019a), when somewhere in the region of 1 – 3 offspring are generally successfully fledged (Bullock *et al*., 1983; Bignal *et al*., 1987;

BirdWatch Ireland, 2019a). There is evidence to indicate that the availability of suitable forage is a key limiting factor on survival of juveniles (Keribiou & Julliard, 2007; Keribiou *et al*., 2009). Research indicates that chough populations may have high proportions of non-breeders (as much as 30%; Holyoak, 1972), since individuals do not generally begin breeding until their third year (Bignal *et al*., 1987; BirdWatch Ireland, 2019a). After the breeding season, choughs tend to join flocks at communal roost sites, while some pairs tend to remain in the vicinity of their nest site throughout the year (Bignal *et al*., 1997).

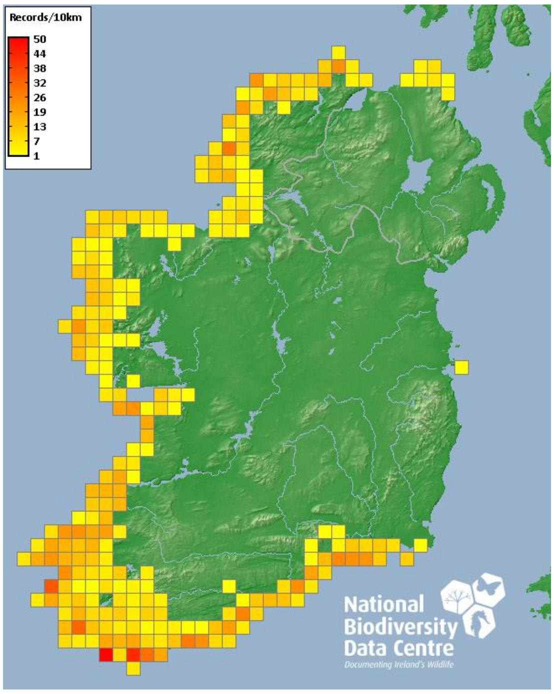

Plate 7.4 National distribution of chough. Source: NBDC, 2019

Choughs in Ireland are known to forage principally on grazed grassland with short sward heights, earthen banks, coastal machair and maritime turf, and to a lesser degree, also on heathland, dunes, cliffs, improved grassland and tidewrack (Holyoak, 1972; Bullock, 1980; Bullock *et al*., 1983; Berrow *et al*., 1993; Robertson *et al*., 1995; Trewby *et al*., 2006a; 2006b). Dung – particularly cattle dung – is also thought to provide an important supply of invertebrate prey during the autumn months (Trewby *et al*., 2006b). Anthills and invertebrates associated with carrion have also been observed to be used by Irish choughs (Trewby *et al*., 2006b). Birds use their curved bills to dig for food – almost exclusively insects and arachnids (including ants, beetles, spiders and soil-dwelling invertebrate larvae, particularly those of leatherjackets (*Tipulidae* spp.), wireworms (*Elateridae*) and beetles) (Holyoak, 1972; Bullock *et al*., 1983; Robertson *et al*., 1995; Keribiou & Julliard, 2007) with some plant material (particularly grains) also eaten during the winter months when insect availability is low (Keribiou & Julliard, 2007). Research has found evidence that the Alpine chough (*Pyrrhocorax graculus*) will forage opportunistically on food scraps left behind by humans (Holyoak, 1972) but there is no record in the academic literature of this behaviour in *P. pyrrhocorax*. On the contrary, research indicates that red-billed choughs are particular in their choice of food items (Keribiou & Julliard, 2007).

A survey of the species in Britain and Ireland carried out in 1982 (Bullock *et al*., 1983) found that distribution was influenced by the quality of coastal foraging habitat, with birds exhibiting a strong preference for heavily grazed grassland. The presence of grazing animals (such as sheep and rabbits) seem to be of critical importance for chough populations (McCanch, 2000). Indeed, sheeps' wool forms a key component of nests, and choughs have been observed to travel long distances to obtain the material (Holyoak, 1972).

According to Trewby and co-authors (2006b), "*Choughs occupy a relatively restricted niche in terms of both nesting and feeding habitat and species could be regarded as prone to localised extinction*" Bullock *et al*. (1983) reviewed 9 factors affecting the abundance and distribution of chough in the British Isles: land use change, human disturbance, human persecution, geographical isolation and inbreeding, disease, toxic chemicals, climate, predation, and interspecific competition with other corvids. They concluded that land use change (i.e. de-stocking of land) represented the greatest threat to the conservation of the species. With respect to human disturbance, Bullock and colleagues (1983) state that,

> "*the species is extremely tolerant of human disturbance and continues to breed at several tourist spots. Prolonged disturbance, such as climbing in inland quarries in the vicinity of traditional nest sites, seems the only serious form of direct [human disturbance] threat*" (p.395).

Indeed, research indicates that choughs at tourist sites can become habituated to human disturbance in terms of physiological and behavioural responses (Jimenez *et al*., 2011) and surveys conducted for the purposes of an Appropriate Assessment at Bray Head, Valentia Island, Co. Kerry (Wild Eye & Ecology Ireland, 2018, p. 52) support this conclusion: "*Chough at Bray Head appear to show a high degree of tolerance to disturbance from human visitors to the site, with many instances of birds not flushing even at low distances of 15-20m, and many instances of Chough approaching humans to distances of less than 20m*". However, a more recent research paper (Keribiou *et al*., 2009; Appendix 7.3), found that human disturbance constitutes a significant threat to the short-term viability of chough populations in heavily trafficked areas. They found that, on the French island of Ouessant, the number of visitors at any one time was negatively correlated with the foraging probability of choughs, and that juvenile survival rates were lowest in months when visitor numbers were greatest. Human disturbance has been identified as a potential threat to the choughs of Dursey Island (CAAS, 2018b):

> *"The potential risks to local bird population of current levels of visitors using the site are mainly centred on the risk of increased disturbance to Choughs which use the maritime grasslands along the peninsula to feed"*

Ireland supports over 60% of the total north-western European chough population (Johnstone *et al*., 2007). The Beara Peninsula SPA supports an internationally important population of chough. The peninsulas of west Co. Cork and Co. Kerry are a stronghold of the species, with each County supporting roughly 30% of the national population (Gray *et al*., 2003). During the breeding seasons of 2002/03, Dursey Island had a total of 46 birds, with 10 pairs identified, of which 8 were confirmed to be breeding (Gray *et al*., 2003). Only two islands – Valencia and Achill – were found to have a greater absolute population size than Dursey (with 52 and 66 birds, respectively). Three islands had greater numbers of confirmed breeding pairs – Clare Island (10 confirmed breeders), Achill (11 confirmed breeders) and the collective Aran Islands (9 confirmed breeders).

Between the 1992 (Berrow *et al*., 1993) and 2002/03 surveys (Gray *et al*., 2003), the chough populations in Counties Cork, Kerry, Mayo, Sligo and Donegal remained relatively stable while those in Wexford, Waterford and Galway decreased, and those in Clare and Leitrim increased (Table 7.8). Overall, the national Chough population incurred a decline of approximately 8% between 1992 and 2002/03. It should be noted that different methodologies were employed during the 1992 and 2002/03 surveys, and this is likely to account for some of the differences in numbers recorded. According to Trewby *et al*. (2006b), actual trends for the intervening years may have been of "less severe decreases or even stability".

It was found that while the south-west Cork region and the Beara Peninsula had both incurred Chough population declines between 1992 and 2002/03 (of -33% and -25%, respectively), the Dursey Island population had more than doubled over the same period, from a total of 20 birds in 1992 (Berrow *et al*., 1993) to 46 birds in 2002/03 (Gray *et al*., 2003). Fifty-eight breeding pairs were recorded within the entire SPA in the 1992 survey and 54 in the 2002/03 survey (Trewby *et al*., 2006b). In the 1992 survey (Berrow *et al*., 1993), 2 confirmed breeding pairs, 3 probable breeding pairs and 5 possible breeding pairs (possible total of 10 breeding pairs) were recorded on Dursey Island. In the 2002/03 survey (Gray *et al*., 2003), 8 confirmed breeding pairs and 2 possible breeding pairs (possible total of 10 breeding pairs) were recorded on the island (Table 7.7). According to Trewby *et al*. (2006b), breeding pairs on the Beara Peninsula are likely to have been under-recorded in 2002 and overestimated in 1992. Thus, "*in term of its breeding population, the picture for the Beara Peninsula seems to have remained relatively stable over the last decade*" (Trewby *et al*., 2006b).

Table 7.7 Numbers of chough breeding pairs recorded on Dursey Island during the 1992 and 2002/03 all-Ireland chough surveys. Sources: *Berrow et al., 1993; **Gray et al., 2003

Year	No. Breeding Pairs			
	Confirmed	Probable	Possible	Possible Total
1992*	2	3	5	10
2002/03**	8	0	2	10

Because of the lack of 'honeypot' habitats (such as dune systems) in the area, flocking activity is considered to be less pronounced on the Beara Peninsula than elsewhere and choughs tend to disperse widely during the post-fledging and winter months with more cohesive flocks developing in the run-up to the breeding season (i.e. late winter). By contrast, large winter flocks were observed at the Derrynane dune system on the neighbouring Iveragh Peninsula (Co. Kerry). However, during the 2002/03 surveys, smaller, "ephemeral" communal roosts were identified at cliffs on the eastern end of the island, overlooking the Dursey Sound (12 birds observed) and at Allihies (30 birds observed). The potential sensitivity of communal roosts to human disturbance has been highlighted (Trewby *et al*., 2006b).

Table 7.8 Total numbers of Choughs recorded in flocks in counties of Ireland in 1992 and 2002/03. Sources: *Berrow et al., 1993; **Gray et al., 2003

County	Total Birds in Flocks		Percentage Change
	1992*	2002/03**	
Wexford	31	26	-16%
Waterford	191	161	-16%
Cork	856	765	-11%
Kerry	752	767	+2%
Clare	73	91	+24%
Galway	104	49	-53%
Mayo	196	177	-10%
Sligo	50	53	+6%
Leitrim	8	12	+50%
Donegal	366	326	-11%
Total	2633	2432	-8%

7.3.2.2 Kenmare River SAC

Kenmare River SAC (Plate 7.5) takes in over 43,000ha of the long, narrow, south-west facing Kenmare Bay between the Iveragh and Beara Peninsulas of Counties Kerry and Cork, and open ocean immediately outside the mouth of the bay, including the waters surrounding Dursey Island. The site contains a wide range of marine communities from exposed coast to ultra-sheltered areas. The site contains three marine habitats listed on Annex I to the Habitats Directive, namely reefs, large shallow bay and marine caves. There is also a very high number of rare and notable marine species present and some uncommon communities are represented. The QIs of the site are listed in Table 7.9.

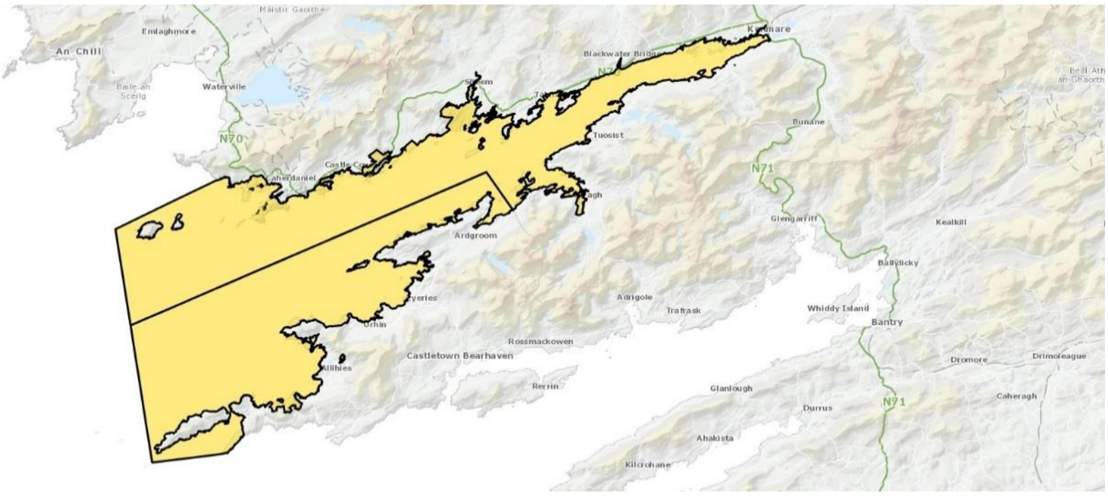

Plate 7.5 Location of Kenmare River SAC (yellow). Source: NPWS Map Viewer

Impacts arising from aquaculture, fishing, dumping of wastes and water pollution are the principal threats to the nature conservation interests of the Kenmare River. There are several resorts for water sports and a number of popular beaches within this large coastal site and impacts associated with such recreational activities may also pose a threat. Housing developments within the areas of dry heath present another possible threat to the integrity of the site.

Table 7.9 Qualifying Interests of the Kenmare River SAC

	Habitat/Species and Scientific Name (Where Applicable)	NPWS Code
Habitats	Large shallow inlets and bays	[1160]
	Reefs	[1170]
	Perennial vegetation of stony banks	[1220]
	Vegetated sea cliffs	[1230]
	Atlantic salt meadows	[1330]
	Mediterranean salt meadows	[1410]
	Marram dunes (white dunes)	[2120]
	Fixed dunes (grey dunes)*	[2130]
	Dry heath	[4030]
	Juniper scrub	[5130]
	Calaminarian grassland	[6130]
	Sea caves	[8330]

	Habitat/Species and Scientific Name (Where Applicable)	NPWS Code
Species	Narrow-mouthed whorl snail (*Vertigo angustior*)	[1014]
	Lesser horseshoe bat (*Rhinolophus hipposideros*)	[1303]
	Otter (*Lutra lutra*)	[1355]
	Harbour seal (*Phoca vitulina*)	[1365]

* = Priority QI

Of the QIs of the site, only 7 are found within or in the vicinity of the Zone of Influence (NPWS, 2016) and may potentially be affected by the proposed development. They are as follows:

- Large shallow inlets and bays [1160]
- Reefs [1170]
- Submerged or partially submerged sea caves [8330]
- Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]
- Otter (*Lutra lutra*) [1355]
- European dry heaths [4030]
- Common harbour seal (*Phoca vitulina*) [1365]

Since there is no potential pathway for negative effects on the other QIs of the SAC, they may be ruled out of this assessment as potential KERs. A description of the 7 QIs which are found within/in the vicinity of the Zone of Influence, their relation to the proposed development and their conservation objectives (Table 7.10) are presented in the following sections.

Large shallow inlets and bays

This habitat is listed in Annex I of the Habitats Directive. It is composed of a host of sub-habitats ('community complexes'). The entire marine area in the vicinity of the proposed development, including the Dursey Sound, corresponds to 'Large shallow inlets and bays'. Within this area, the following communities are represented:

- *Laminaria*-dominated community complex;
- Subtidal reef with echinoderms and faunal turf community complex;
- Fine to medium sand with crustaceans and polychaetes community complex;
- Intertidal reef community complex; and
- Coarse sediment dominated by polychaetes community complex. (NPWS, 2016).

The overall conservation status of this habitat type was considered to be 'Bad' and declining in the most recent national assessment (NPWS, 2019b). Nutrient enrichment, dredging and IAS have been identified as key threats (NPWS, 2019b).

Reefs

This habitat is listed in Annex I of the Habitats Directive. Reefs are characterised as "widespread [intertidal and subtidal] marine features with stable hard substrate available for colonisation by plants and animals" (NPWS, 2013d). Much of the sea bed in the vicinity of the proposed development, including the Dursey Sound, which the proposed cable car crosses, corresponds to 'Reefs' (NPWS, 2016). The overall conservation status of the habitat type was considered to be 'Inadequate' and stable in the most recent national assessment (NPWS, 2019b). Fishing activities have been identified as a key threat (NPWS, 2019b).

Submerged or Partially Submerged Sea Caves

This habitat is listed in Annex I of the Habitats Directive. Sea caves "vary from small indentations to large caverns of 50 – 100m in width" which may be wholly or partially submerged in the sea and typically occur on sandstone or limestone cliff faces (NPWS, 2013d.). The diversity and abundance of fauna in sea caves depends on, among other things, the degree of exposure (NPWS, 2013d). Less exposed sea caves typically support species of anemone, tunicate, bryozoan, sponge, sea cucumber and brittle star (NPWS, 2013d). There are at least eight 'Submerged or partially submerged sea caves' within or adjacent to the Zone of Influence, mostly on Crow Head and Dursey Island, the closest occurrence of this habitat type being circa 1km west of the proposed development. (NPWS, 2016). The overall conservation status of this habitat type was considered to be 'Favourable' and stable in the most recent national assessment, and no significant threats have been identified (NPWS, 2019b).

Vegetated Sea Cliffs of the Atlantic and Baltic Coasts

This habitat is listed in Annex I of the Habitats Directive. Sea cliffs may be characterised as "steep or vertical slope[s] located on the coast […] subject to maritime influence in the form of salt spray and exposure to coastal winds" (NPWS, 2013d). The cliffs on Dursey Island and in the immediate vicinity of the proposed development at Garinish Head and Crow Head correspond to 'Vegetated sea cliffs of the Atlantic and Baltic coasts' (NPWS, 2016). The cliffs in the study area are largely 'hard cliffs' of sandstone but some 'soft cliffs' are also represented at Garinish and Crow Head. Dominant plant species on hard cliffs include fescues (*Festuca rubra* and *F. ovina*), kidney vetch (*Anthyllis vulneraria*), thrift (*Armeria maritima*), common bent (*Agrostis capillaris*), bog pimpernel (*Anagallis tenella*), ling heather (*Calluna vulgaris*), bell heather (*Erica cinereal*) and wild thyme (*Thymus polytrichus*). In the splash zone, there is a well-developed lichen flora, dominated by species such as *Verrucaria maura* and *Ramalina* spp. (NPWS, 2013c). The overall conservation status of the habitat type was considered to be 'Inadequate' and stable in the most recent national assessment (NPWS, 2019b). Trampling by walkers, IAS, gravel extraction, and changes in sea level height and wave exposure due to climate change have been identified as key threats (NPWS, 2019b).

Otter

The Eurasian otter, *Lutra lutra*, is listed on Annexes II and IV of the Habitats Directive. In spite of dramatic declines elsewhere in Europe, the conservation status of the species in Ireland is 'Favourable' and improving (NPWS, 2019b). However, the species has been classified as 'Near Threatened' on the Irish Red List of terrestrial mammals (Marnell *et al*., 2009). The species is a generalist predator which exploits a variety of terrestrial and freshwater and marine aquatic habitats. Key threats include habitat destruction (particularly of riverine and riparian habitats), pollution and traffic strikes (NPWS, 2019b). However, it is considered that none of these is currently impacting significantly upon the conservation status of the species (NPWS, 2019b) Otters potentially commute through the Zone of Influence, along the shoreline, up to 250m offshore and up to 150m inland (NPWS, 2016).

European Dry Heaths

This habitat is listed in Annex I of the Habitats Directive. It may be characterised as "vegetation dominated by ericaceous dwarf shrubs […] usually occur[ing] on well-drained nutrient-poor and acidic mineral soils or shallow peats on sloping ground"

(NPWS, 2013d). Dominant species are ling heather (*Calluna vulgaris*), bell heather (*Erica cinereal*) and bilberry (*Vaccinium myrtillus*), and western gorse (*Ulex gallii*) may also be present in coastal heaths (NPWS, 2013d). The heath habitats in the immediate vicinity of the proposed development potentially correspond to 'European dry heaths' (NPWS, 2016). The overall conservation status of the habitat type was considered to be 'Bad' and stable in the most recent assessment (NPWS, 2019b). Afforestation, agricultural activities (overgrazing, burning, drainage and destocking) and wind farms have been identified as key threats (NPWS, 2019b).

Harbour Seal

The harbour seal (also 'common seal'), *Phoca vitulina*, is listed on Annexes II and V of the Habitats Directive. *P. vitulina* is a marine mammal of estuarine, coastal of offshore waters which utilises intertidal and coastal habitats breeding, moulting, resting and socialising. Individuals are vulnerable to disturbance while spending time in terrestrial habitats or in shallow waters near the shore. Breeding (including birth of pups) occurs at terrestrial haul-out sites. As such, these sites are critical for the conservation of the species. When hauling out to terrestrial habitats, the species favours sheltered sites and, as such, the coastline on Dursey and in the vicinity of the proposed development on the mainland is unlikely to be utilised. Seals are known to frequent the marine area within the likely Zone of Influence while foraging. However, there are no known terrestrial haul-out sites in the area. The nearest known haul-out site is circa 15km northeast, at Eyeries Island. The species predates fish, cephalopods and crustaceans. (NPWS, 2013b). The overall conservation status of the species is 'Favourable' and stable (NPWS, 2019b). Key threats include fishing activities, disturbance due to geophysical seismic studies and human disturbance at haul-out sites (NPWS, 2019b). However, it is considered that none of these threats is of a sufficient magnitude to adversely affect that conservation status of the species (NPWS, 2019b).

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Table 7.10 Conservation objectives of 6 relevant QIs of the Kenmare River SAC. Source: NPWS, 2013a

Qualifying Interest	**Conservation Objective**	**Target**
Large shallow inlets and bays	To maintain the favourable conservation condition of the QI in the SAC	The permanent habitat area is stable or increasing, subject to natural processes
		Maintain the extent of the *Zostera*- and Maërl-dominated communities and the *Pachycerianthus multiplicatus* community subject to natural processes.
		Conserve the high quality of the *Zostera*-dominated community, subject to natural processes
		Conserve the high quality of the *Pachycerianthus multiplicatus* community, subject to natural processes
		Conserve the high quality of the Maërl-dominated community, subject to natural processes
		Conserve the following communities in a natural condition: Intertidal mobile sand community complex; Muddy fine sands dominated by polychaetes and *Amphiura filiformis* community complex; Fine to medium sand with crustaceans and polychaetes community complex; Coarse sediment dominated by polychaetes community complex; Shingle; Intertidal reef community complex; Subtidal reef with echinoderms and faunal turf community complex and *Laminaria*-dominated community complex
Reefs	To maintain the favourable conservation condition of the QI in the SAC	The distribution of reefs remains stable, subject to natural processes
		The permanent habitat area is stable or increasing, subject to natural processes
		Conserve the following community types in a natural condition: Intertidal reef community complex; Subtidal reef with echinoderms and faunal turf community complex; and Laminaria-dominated community complex.
Submerged or partially submerged sea caves	To maintain the favourable conservation condition of the QI in the SAC	The distribution of sea caves is stable, subject to natural processes.
		Human activities should occur at levels that do not negatively affect the ecology of sea caves at this site
Vegetated sea cliffs of the Atlantic and Baltic coasts	To maintain the favourable conservation condition of the QI in the SAC	Habitat area stable, subject to natural processes, including erosion
		No decline of habitat distribution, subject to natural processes.
		No alteration to natural functioning of geomorphological and hydrological processes due to artificial structures.
		Maintain range of sea cliff habitat zonations including transitional zones, subject to natural processes including erosion and succession
		Maintain structural variation within vegetation sward.
		Maintain range of sub-communities with typical species listed in the Irish Sea Cliff Survey (Barron *et al*., 2011)
		Negative indicator species (including non-natives) to represent less than 5% cover

Qualifying Interest	Conservation Objective	Target
		Cover of bracken (*Pteridium aquilinum*) on grassland and/or heath less than 10%. Cover of woody species on grassland and/or heath less than 20%.
Otter, *Lutra lutra*	To maintain the favourable conservation condition of the QI in the SAC	No significant decline in distribution.
		No significant decline in extent of terrestrial habitat.
		No significant decline in extent of marine habitat.
		No significant decline in extent of freshwater (river) habitat.
		No significant decline in extent of freshwater (lake/lagoon) habitat.
		No significant decline in couching sites and holts.
		No significant decline in available fish biomass.
		No significant increase in barriers to connectivity.
European dry heaths	To maintain the favourable conservation condition of the QI in the SAC	Habitat area stable or increasing, subject to natural processes
		No decline of current habitat distribution, subject to natural processes
		No significant change in soil nutrient status, subject to natural processes. No increase or decrease in area of natural rock outcrop
		Cover of characteristic dwarf shrub indicator species, typically heather (*Calluna vulgaris*), bell heather (*Erica cinerea*) and Western gorse (*Ulex gallii*) at least 25%
		Cover of senescent heather (*Calluna vulgaris*), less than 50%
		Long shoots of bilberry (*Vaccinium myrtillus*) with signs of browsing collectively less than 33%
		Cover of scattered native trees and shrubs less than 20%
		At least 2 positive indicator species e.g. bell heather (*Erica cinerea*) and Western gorse (*Ulex gallii*), with combined cover of at least 60%
		At least 2 bryophyte or non-crustose lichen species present
		Cover of bracken (*Pteridium aquilinum*) less than 10%
		Cover of agricultural weed species (negative indicator species) less than 1%
		Cover of non-native species less than 1%
		No decline in distribution or population sizes of rare/scarce species, including protected species Kerry lily (*Simethis planifolia*) and betony (*Stachys officinalis*) and uncommon species juniper (*Juniperus communis*)

Qualifying Interest	**Conservation Objective**	**Target**
		Cover of disturbed bare peat less than 5%
		No signs of burning within sensitive areas
Harbour seal, *Phoca vitulina*	To maintain the favourable conservation condition of the QI in the SAC	Species range is not restricted by artificial barriers to site use.
		Conserve the breeding sites in a natural condition.
		Conserve the moult haulout sites in a natural condition.
		Conserve the resting haulout sites in a natural condition.
		Human activities should occur at levels that do not negatively affect the harbour seal population at the site.

7.3.2.3 Dursey Island pNHA

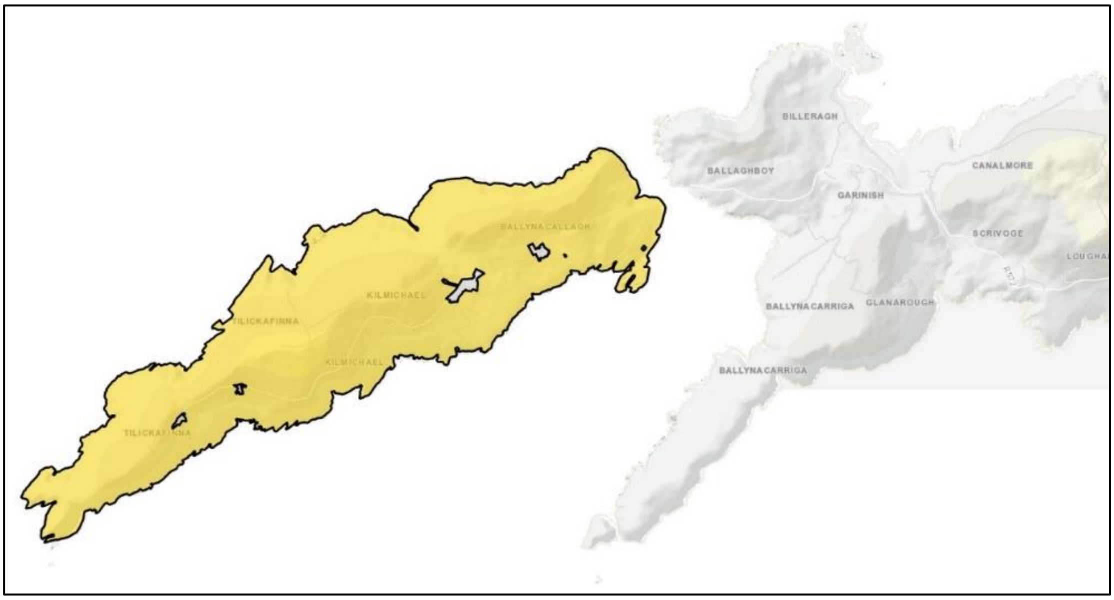

Plate 7.6 Location of Dursey Island pNHA (yellow). Source: NPWS Map Viewer

Dursey Island pNHA (Plate 7.6) comprises almost the entirety of Dursey Island, with the exception of a few small inland areas. Here, heath and and improved/semi-improved grassland are predominant habitat types. Table 7.11 lists the species identified in the site in the NPWS site synopsis and their status in terms of statutory protections. Of these, five are protected species – all of which are birds. Two of these are chough and fulmar, which have been discussed previously. The remaining three are European shag (*Phalacrocorax aristotelis*, 'shag' hereafter), European herring gull (*Larus argentatus*, 'herring gull' hereafter) and great black-backed gull (*Larus marinus*). A description of each follows.

Table 7.11 Species identified in the Dursey Island pNHA Site Synopsis and their statutory statuses. Source: NPWS, 2009

Common Name	Scientific Name	Statutory Status
Plants		
Pearlwort	*Sagina subulata*	Not protected
Autumn gorse	*Ulex gallii*	Not protected
Bell heather	*Erica cinerea*	Not protected
Ling heather	*Calluna vulgaris*	Not protected
Cross-leaved heath	*Erica tetralix*	Not protected
Common bent	*Agrostis capillaris*	Not protected
Heath-grass	*Danthonia decumbens*	Not protected
Carnation sedge	*Carex panicea*	Not protected
Pill sedge	*Carex pilulifera*	Not protected
Green-ribbed sedge	*Carex binervis*	Not protected
Tormentil	*Potentilla erecta*	Not protected
Crowberry	*Empetrum nigrum*	Not protected

Common Name	Scientific Name	Statutory Status
Liverworts	*Scapania* spp.	*Scapania nimbosa* and *Scapania ornithopodioides* protected (FPO). No records of either in the study area in NBDC databases.
Liverworts	*Frullania* spp.	Not protected
Sphagnum mosses	*Sphagnum* spp.	Not protected
Deergrass	*Scirpus cespitosus*	Not protected
Sharp-flowered rush	*Juncus acutiflorus*	Not protected
Star sedge	*Carex echinata*	Not protected
Mat grass	*Nardus stricta*	Not protected
Bog pimpernel	*Anagallis tenella*	Not protected
Lesser spearwort	*Ranunculus flammula*	Not protected
Marsh pennywort	*Hydrocotyle vulgaris*	Not protected
Chamomile	*Chamaemelum nobile*	Not protected
Blinks	*Montia fontana*	Not protected
Brookweed	*Samolus valerandi*	Not protected
Round-leaved crowfoot	*Ranunculus omiophyllus*	Not protected
Yellow centaury	*Cicendia filiformis*	Not protected
Chaffweed	*Anagallis minima*	Not protected
Common knapweed	*Centaurea nigra*	Not protected
Cat's ear	*Hypochoeris radicata*	Not protected
Greater bird's-foot trefoil	*Lotus uliginosus*	Not protected
Eyebright	*Euphrasia* spp	Not protected
Buck's-horn plantain	*Plantago coronopus*	Not protected
Plantain spp.	*Plantago maritimus*	Not protected
Procumbent pearlwort	*Sagina procumbens*	Not protected
Allseed	*Radiola linoides*	Not protected
Birds		
Northern fulmar	*Fulmarus glacialis*	Protected (WA)
European shag	*Phalacrocorax aristotelis*	Protected (WA, BD I; BoCCI Amber)
European herring gull	*Larus argentatus*	Protected (WA, BD II; BoCCI Red)
Great black-backed gull	*Larus marinus*	Protected (BD II; BoCCI Amber)
Red-billed chough	*Pyrrhocorax pyrrhocorax*	Protected (WA, BD I)

Shag

The shag is a BWI BoCCI amber-listed species of bird, which is afforded statutory protections under the Wildlife Acts and the Birds Directive (Annex I). Shags nest in colonies on sea cliffs and forage on small fish (particularly sandeel, *Ammodytes* spp.) by diving at sea (Harris & Wanless, 1991; Mitchell *et al*., 2004; BirdWatch Ireland, 2019c). According to Mitchell *et al*. (2004), the population in the UK and Ireland has declined by 25% since 1985 – 1988. Declines may be as a result of concurrent sandeel declines and 'wrecks' (prolonged periods of gale force wind), both of which are likely to be indirect effects of climate change (Harris & Wanless, 1996; Heubeck *et al*., 2015; Frederiksen *et al*., 2008). In the period 1988 – 2002, Ireland had approximately 3,426 pairs of shag. According to the Site Synopsis for the Dursey Island pNHA, the island has recently supported approximately 10 breeding pairs of the species (NPWS, 2009). Surveys carried out by the NPWS in May 2016 (Heardman, pers. comm., 2019), identified 18 individual shags on Dursey Island (1 on the north coast of the island, 15 on the south coast, and 2 on the west coast). Two individuals were observed on Crow Island (off the tip of Crow Head). One shag was identified in the Dursey Sound area (the only area surveyed) in 2018 (Heardman, pers. comm., 2019).

Herring Gull

The herring gull is a BWI BoCCI red-listed species, which is afforded statutory protections under the Wildlife Acts and the Birds Directive (Annex II). Herring gulls typically nest on islands, on cliff-tops, slopes or flatter ground, but are also known to nest on the rooves of inland buildings (Birdwatch Ireland, 2017). They are generalists, foraging in the intertidal zone, in parks/playing fields and on farmland, taking eggs and young from nests of other seabirds, and scavenging on food discarded by humans and waste from the fishing industry (BirdWatch Ireland, 2017). A dramatic decline of 90% in the 15 years prior to 2004 is attributed to an outbreak of avian botulism and reduced (Mitchell *et al*., 2004). It would appear that the Irish population has been recovering in recent years (BirdWatch Ireland, 2017). According to the Site Synopsis, the Dursey Island pNHA has recently supported approximately 50 breeding pairs of the species (NPWS, 2009). Surveys carried out by the NPWS in May 2016 (Heardman, pers. comm., 2019), identified a total of 36 individual herring gulls on Dursey Island (18 on the north coast of the island and an additional 18 on the south coast). Additionally, a flock of 27 individuals was recorded on Crow Island. The Irish Wetland Bird Survey (2009/10 – 2015/16; Lewis *et al*., 2019) did not identify the Study Area as a key site in Ireland for the species.

Great Black-backed Gull

The great black-backed gull is a BWI BoCCI amber-listed species, which is afforded statutory protections under the Wildlife Acts and the Birds Directive (Annex II). Between 1985 and 1988, the species suffered a 28% decline in Ireland (Mitchell *et al*., 2004). Like herring gulls, this species favours offshore islands for nesting and for its food supply relies somewhat on waste from the fishing industry, whose availability has decreased in recent years (Buckley, 1990; Mitchell *et al*., 2004). According to the Site Synopsis, the Dursey Island pNHA has recently supported approximately 6 breeding pairs of the species (NPWS, 2009). Surveys carried out by the NPWS in May 2016 (Heardman, pers. comm., 2019), identified a total of 5 great black-backed gulls on Dursey Island (1 on the north coast of the island and 4 on the south coast). Additionally, a flock of 24 individuals was recorded on Crow Island. The Irish Wetland Bird Survey (2009/10 – 2015/16; Lewis *et al*., 2019) did not identify the Study Area as a key site in Ireland for the species.

7.3.2.4 Garinish Point pNHA

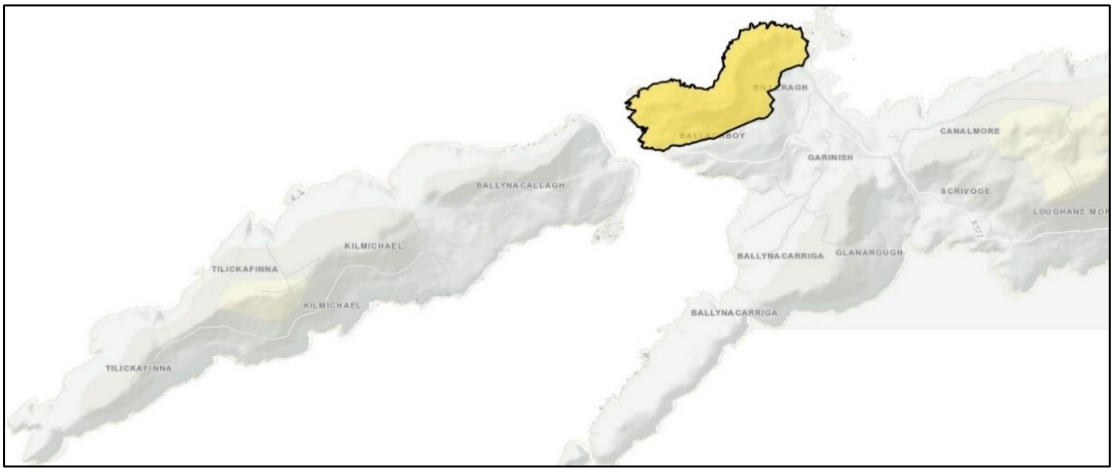

Plate 7.7 Location of Garinish Point pNHA (yellow). Source: NPWS Map Viewer

Garinish Point pNHA (Plate 7.7 above) is situated at the western extremity of the Beara Peninsula. It consists of a low hill (150 m) with fields of permanent pasture to the south and east. For the most part, the vegetation of the site is heath and grassland although there is local development of peat and a strong influence of sea spray and of springs on the north-western side. Grassland forms the other major component of this site and it is found in old fields around Bealaboe and White Strand. Where little reclamation has been done and the ground is still flushed by spring water during wet weather, an interesting community develops which is characterised by Betony (*Betonica officinalis*). The whole area is used by Red-billed Chough (*Pyrrhocorax pyrrhocorax*) for feeding. The main feature of interest in this site the survival of old rough grassland communities and varied heathland. (SEI, n.d.).

7.3.2.5 Firkeel Gap pNHA

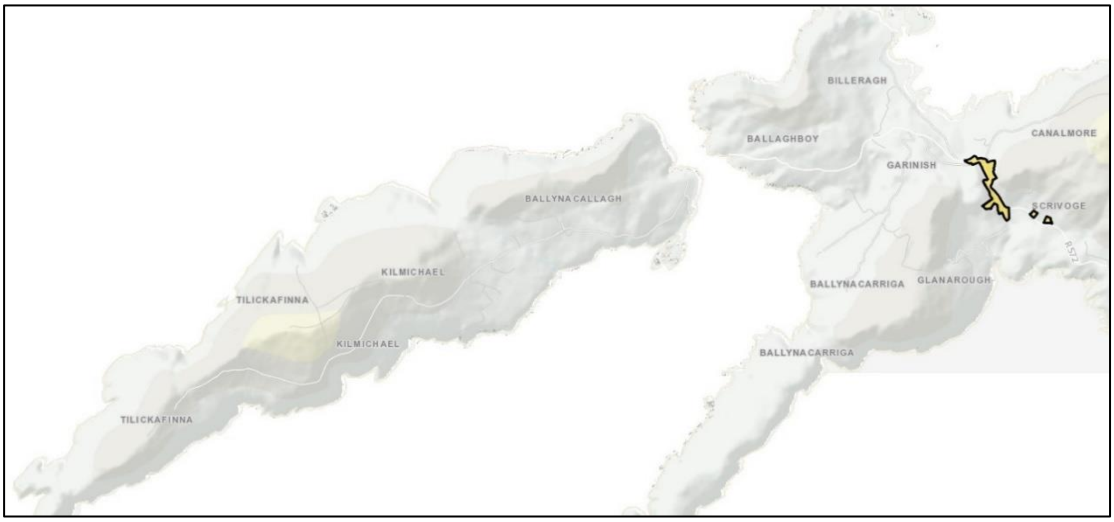

Plate 7.8 Location of Firkeel Gap pNHA (yellow). Source: NPWS Map Viewer

Firkeel Gap pNHA (Plate 7.8 above) is a small, dry valley that runs in a northwest-southeast direction through the end of the Beara Peninsula. There is little drift or soil on the slopes and the slatey sandstone shows as outcrops and in stabilised screes in many places. The sides of the valley are covered by heath vegetation which includes bushes of Eared Willow (*Salix aurita*) or Bramble (*Rubus fruticosus* agg.) around cliffs and other rocks. The main feature of interest, Betony, occurs frequently in this vegetation and near rocks in the purer heath that covers the eastern side. (SEI, n.d.).

7.3.3 Rare and Protected Species

Table 7.12 lists the rare and protected species of flora and fauna recorded in or within 5km offshore of the Zone of Influence, in addition to those discussed in the previous section in the context of designated sites. Since, with the exception of bullfinch (*Pyrrhula pyrrhula*), all wild birds in Ireland are protected under the Wildlife Acts, and since there are records of over 160 different species of birds in the Zone of Influence in the NBDC database, only those avian species which are listed on Annex I of the Birds Directive and/or are Amber- or Red-listed Birds of Conservation Concern in Ireland (BoCCI) have been considered here. The data in this table have been obtained principally from the NBDC record databases for the 2km squares that intersect the Zone of Influence, but also from:

- The Irish Whale and Dolphin Group (IWDG) databases (2019);
- A survey completed on behalf of Fáilte Ireland (CAAS, 2018b)

Table 7.12 Endangered and Protected Species within and up to 5km Offshore of the Zone of Influence (*IWDG, 2019; NBDC, 2019; **CAAS, 2018b). Note: Species discussed in the previous section in the context of designated sites have been excluded.

Common Name	Scientific Name	Statutory Status	Notes on Ecology and Conservation
Marine Mammals			
Bottlenose dolphin	*Tursiops truncatus*	WA; HD II, IV;	Breeds, forages and socializes in marine habitats. Key conservation threats are disturbance due to marine geophysical seismic studies and fishing activities (NPWS, 2019b). Overall conservation status in Ireland 'Favourable' and stable (NPWS, 2019b).
Harbour porpoise	*Phocoena phocoena*	WA; HD II, IV; Ospar; IUCN VU	
Common dolphin	*Delphinus delphis*	WA; HD IV	
Atlantic white-sided dolphin	*Lagenorhynchus acutus*	WA; HD IV	
Striped dolphin	*Stenella coeruleoalba*	WA; HD IV	
Grey seal	*Halichoerus grypus*	WA; HD II, V	Forages in marine habitats. Breeds, rests and socializes at terrestrial haul-out sites. Refer to description of *P. vitulina*, above. Key conservation threats are disturbance due to marine geophysical seismic studies and fishing activities (NPWS, 2019b). Unlikely that there are haul-out sites in Zone of Influence, due to exposed nature of site. Overall conservation status in Ireland 'Favourable' and improving (NPWS, 2019b).
Minke whale	*Balaenoptera acutorostrata*	WA; HD IV	Breeds, forages and socializes in marine habitats. Key conservation threats are disturbance due to marine geophysical seismic studies and fishing activities (NPWS, 2019b). Overall conservation status in Ireland 'Favourable' and stable (NPWS, 2019b).
Risso's dolphin	*Grampus griseus*	WA; HD IV	Breeds, forages and socializes in marine habitats. Key conservation threats are marine geophysical seismic studies, fishing activities and use of sonar at sea (NPWS, 2019b). Overall conservation status in Ireland 'Favourable' and stable (NPWS, 2019b).
Humpback whale*	*Megaptera novaeangliae*	WA; HD IV	Breeds, forages and socializes in marine habitats. Key conservation threats in Irish waters are thought to be disturbance due to marine geophysical seismic studies and fishing activities (NPWS, 2019b). Overall conservation status in Ireland 'Unknown' due to insufficient data (NPWS, 2019b).

Common Name	**Scientific Name**	**Statutory Status**	**Notes on Ecology and Conservation**
Terrestrial Mammals			
Eurasian badger	*Meles meles*	WA	Large terrestrial mammal. Generalist omnivore which feeds on a variety of food items, including earthworms, insects, amphibians, small mammals and berries (NRA, n.d.; Cleary *et al*., 2009). Tends to inhabit lowland farmland, woodland and scrubland (NRA, n.d.). Live in social groups of 2 – 6 adults plus young, and inhabit subterranean 'setts' (NRA, n.d.). Irish Red List status is 'Least Concern' (Marnell *et al*., 2009). May be present in the Study Area but most likely absent from Dursey Island.
Eurasian pygmy shrew	*Sorex minutus*	WA	Small mammal with a broad Irish distribution, found in a variety of habitats with rich ground cover, including woodland, peatland, hedgerows and grassland (Vincent Wildlife Trust, 2019; Grainger & Fairley, 1978). Forages on small invertebrates, including beetles and spiders (Vincent Wildlife Trust, 2019). Nests under logs, rocks and dense vegetation and also in burrows of other animals (Vincent Wildlife Trust, 2019). Irish Red List status is 'Least Concern' (Marnell *et al*., 2009). Study Area contains suitable breeding and foraging habitat.
Irish hare	*Lepus timidus* subspp. *hibernicus*	WA; HD V	Widely distributed endemic lagomorph which utilizes a variety of coastal and inland habitats. Largely nocturnal except when breeding – typically during spring and summer (Irish Wildlife Trust, n.d). Irish Red List status is 'Least Concern' (Marnell *et al*., 2009) and Irish Habitats Directive conservation status is 'Favourable' and stable (NPWS, 2019b). Key conservation threats include agricultural intensification and direct persecution (Marnell *et al*., 2009; NPWS, 2019b). There is one recorded occurrence in the Study Area (at Garinish Point on the mainland) from the 2006/07 Hare Survey of Ireland (Reid *et al*., 2007).
Irish stoat	*Mustela erminea hibernica*	WA	Near endemic sub-species. Primarily carnivorous, feeding on small mammals and birds. Distribution is widespread and a variety of habitat types are utilised, open habitats are generally avoided. Direct persecution by landowners is a threat in some localities. Irish Red List status is 'Least Concern' and there is no evidence of decline. (Marnell *et al*., 2009). There is one recorded occurrence in the Study Area (south-east of Garinish Point, in the townland of Canalmore).
Reptiles			
Leatherback turtle	*Dermochelys coriacea*	HD IV; Ospar; IUCN VU	Breeds in tropics (Doyle, 2007). Forages in marine habitats, particularly in temperate waters, on jellyfish and pelagic tunicates (Doyle, 2007). Key conservation threats in Irish waters include entanglement in fishing nets and plastic pollution (Doyle, 2007). Overall Habitats Directive conservation status in Ireland is 'Unknown' due to insufficient data (NPWS, 2019b). Irish Red List status is 'Least Concern'; although threatened elsewhere, the Irish migrant population is considered to be stable or increasing (King *et al*., 2011).

Common Name	Scientific Name	Statutory Status	Notes on Ecology and Conservation
Common lizard	*Zootoca vivipara*	WA	Hibernates from late October – March; active during the rest of the year. Typically inhabits coastal and heathland habitats. Requires open patches for basking and vegetation cover from predators. Widespread in Ireland with no evidence of a population decline. Irish Red List status is 'Least Concern'. Habitat loss/fragmentation and predation are potential conservation threats. (King *et al*., 2011). Study Area offers plenty of suitable breeding and foraging habitats.
Birds			
Ground-nesting Passerines			
Northern wheatear	*Oenanthe oenanthe*	WA; BoCCI Amber	Summer migrant. Breeds in rocky upland heath and bog and at coastal locations, nesting in drystone walls, rocks, scree and rabbit burrows and on vegetated sea cliffs. Ground-nesting. Forages in grassland tightly grazed by sheep or rabbits and on coastal machair. Subject to drastic declines in recent years. (Nairn & O'Halloran, 2012). Zone of Influence contains optimal breeding and foraging habitat.
Eurasian skylark	*Alauda arvensis*	WA; BoCCI Amber	Typical breeding species of open raised and blanket bog, where it is one of the two dominant avian species (along with meadow pipit) during the summer months. Also dominant breeding bird species of sand dunes and coastal machair. Ground-nesting. Leaves breeding sites for adjacent farmland (arable, set-aside, stubble and grassland) in winter in search of food. (Nairn & O'Halloran, 2012).
Yellowhammer	*Emberiza citrinella*	WA; BoCCI Red	Farmland seed-eating passerine that has experienced significant population declines in Ireland. Forages in agricultural land (arable, cereal, bare earth, stubble). Changing agricultural practice on tillage land (particularly the cessation of cereal cultivation) is the key conservation threat to this species. (Nairn & O'Halloran, 2012). Very little suitable foraging habitat in Zone of Influence but species may breed here in small numbers.
Linnet	*Carduelis cannabina*	WA; BoCCI Amber	Resident seed-eating, flock-forming finch. Characteristic of open, scrubby habitats with elevated vantage points, including bracken, raised bog, fen carr and pre-thicket conifer plantation (Nairn & O'Halloran, 2012). Also utilizes agricultural land such as cereals and stubble (Nairn & O'Halloran, 2012). May also forage on seeds of salt marsh plants in winter flocks (Nairn & O'Halloran, 2012). Breeds on or close to the ground in a variety of scrubby habitats, including coastal areas with gorse and hedgerows (BWI, 2019n; Nairn & O'Halloran, 2012). May potentially breed in the Zone of Influence in small numbers.

Common Name	Scientific Name	Statutory Status	Notes on Ecology and Conservation
Twite	*Carduelis flavirostris*	WA; BoCCI Red	Seed-eating passerine and partial migrant. Irish breeding population of 54 – 110 pairs, with strongholds in Counties Mayo and Donegal (McLoughlin & Cotton, 2008). Nests in upland heath and bracken (Nairn & O'Halloran, 2012). Winters in coastal wetlands (salt marshes and estuaries) and wet grassland (Nairn & O'Halloran, 2012). Agricultural intensification is key conservation threat (Nairn & O'Halloran, 2012). Grassland habitats in Zone of Influence may be used for winter foraging.
Meadow pipit**	*Anthus pratensis*	WA; BoCCI Red; IUCN NT	Resident ground-nesting grassland species. Nests on upland raised bogs, cutaway peatlands, fens, dunes, machair and wet grassland. Favours raised bog and fen, where it is the dominant avian species during the summer months. Like skylark, forms flocks in winter and leaves peatland in search of food on more lowland farmland (tillage, set-aside). (Nairn & O'Halloran, 2012).
Stonechat**	*Saxicola torquatus*	WA; BoCCI Amber	Species nests on or close to the ground, favouring scrubby areas with gorse and/or bracken (Magee, 1965). Insectivorous passerines of agricultural grassland (Magee, 1965; Cummins & O'Halloran, 2002; Revaz *et al*., 2008) which favour warmer coastal areas during the winter months (Nairn & O'Halloran, 2012). The Irish stonechat population is partially migratory, with some birds travelling to the south in winter (Callion, 2002, as read in Cummins & O'Halloran, 2003). The population trend for the species in Ireland is of medium-term increase (+7.66% between 1998 and 2008 (Crowe *et al*., 2010)) and short-term decline (>25% (Colhoun & Cummins, 2013)). Afforestation and maturation (canopy closure) of forest, and human disturbance have been identified as potential conservation threats (Magee, 1965). The mosaic of semi-improved grassland and heathland which dominates the Study Area is well suited to the breeding and foraging requirements of the species.
Western yellow wagtail / Blue-headed wagtail	*Motacilla flava flava*	WA; BoCCI Amber	Very scarce passage migrant, which may breed in Ireland on very rare occasion (BirdWatch Cork, n.d). One occurrence has been recorded in the Study Area (townland of Kilmichael, Dursey Island) from 2000. European IUCN Red List status of *M. flava* is 'Least Concern' but no status is available for the subspecies.
Bluethroat	*Luscinia svecica*	WA; BD I	Rare vagrant. Has been recorded twice on Dursey Island (townland of Kilmichael; 2003 and 2004, respectively). European IUCN Red List status is 'Least Concern'.
Greater short-toed lark	*Calandrella brachydactyla*	WA; BD I	Rare vagrant. Has been repeatedly recorded on Dursey Island (townland of Kilmichael; 1979, 1983, 1986, 1988, 1989, 1993, 1997, 2000, 2004). European IUCN Red List status is 'Least Concern'.

Common Name	Scientific Name	Statutory Status	Notes on Ecology and Conservation
Ortolan bunting	*Emberiza hortulana*	WA; BD I	Occasional passage migrant which does not breed in Ireland. Repeatedly recorded on Dursey Island (townland of Kilmichael; 1979, 1992, 1996, 1998, 2001, 2003, 2005, 2006, 2008, 2011, 2013). European IUCN Red List status is 'Least Concern'.
Red-backed shrike	*Lanius collurio*	WA; BD I	Scarce passage migrant in Ireland, which has been repeatedly recorded on Dursey Island (townland of Kilmichael; recorded in 1989, 1995, 1998, 2001, 2002, 2003, 2006, 2009 and 2013) and at one location in the Study Area on the mainland (townland of Scrivogue; recorded in 1985, 1988, 2006 and 2012). European IUCN Red List status is 'Least Concern'.
Tawny pipit	*Anthus campestris*	WA; BD I	Rare vagrant in Ireland, recorded three times on Dursey Island (in 1978, 2003 and 2011, respectively) (BirdWatch Cork, n.d.). European IUCN Red List status is 'Least Concern'.
Raptors			
Peregrine falcon	*Falco peregrinus*	WA; BD I	Raptor which preys on birds, including pigeons, thrushes, waders, wildfowl, gulls and other seabirds (BWI, 2019e). Breeds on coastal and inland cliffs and high-rise inner-city buildings (BWI, 2019e). Tend to winter at coastal estuaries (Nairn & O'Halloran, 2012). Numbers recovering following declines due to DDT in 1970s (Nairn & O'Halloran, 2012). The Study Area contains suitable breeding and foraging habitat for the species, which is known to breed in the Beara Peninsula SPA (NPWS, 2015).
Merlin	*Falco columbarius*	WA; BD I; BoCCI Amber	Nests on the ground on upland heathland and blanket bog or in trees in woodland (BWI, 2019d). Raptor which preys on small birds such as meadow pipits and skylarks (Lusby, 2016). Little data available on population conservation status but breeding habitat range has declined approx. 50% over preceding 40 years (Lusby, 2016). Afforestation and agricultural intensification believed to be key conservation threats (Lusby, 2016). Unlikely to breed in the Zone of Influence (due to preference for upland habitat) but may occasionally forage in the area during winter months.
Hen harrier	*Circus cyaneus*	WA; BD I; BoCCI Amber; IUCN NT	Ground-nesting in upland heathland, scrubland and pre-thicket forest plantation (BWI, 2016). Raptor which preys on small birds such as meadow pipits and skylarks and small mammals such as bank voles and mice (BWI, 2016). Subject to severe and ongoing population declines (approx. 33.5% overall) (Lusby, 2017). South-west is stronghold, with approx. 60% of population (BWI, 2016). Key conservation threats are loss of breeding and foraging habitat due to commercial afforestation, forest maturation (canopy closure), agricultural intensification and burning of heathland, and illegal persecution (BWI, 2016; Lusby, 2017). Unlikely to breed in the Zone of Influence (due to preference for upland habitat) but may occasionally forage in the area during winter months.

Common Name	Scientific Name	Statutory Status	Notes on Ecology and Conservation
Short-eared owl	*Asio flammeus*	WA; BD I; BOCCI Amber	Species largely a winter visitor of coastal habitats, where it forages on rodents (including pymgy shrews) and birds (principally the wader species dunlin, snipe and redshank) in dunes, rough grassland and machair, occasionally alongside hen harriers (Glue, 1976; Cullen & Smiddy, 2012; Nairn & O'Halloran, 2012; BWI, 2019h). A rare upland breeder in Ireland with similar nesting requirements to hen harriers (Nairn & O'Halloran, 2012). Species unlikely to use any site in the Study Area for nesting but may forage in the area and in nearby dune systems during the winter months (Smiddy, pers. comm., 2019).
Common kestrel	*Falco tinnunculus*	WA; BoCCI Amber	Forages over a variety of habitats including farmland, dunes, coastal machair, shingle beaches, raised bog, fen, reedbeds and public parks. Depredates small birds including seabirds and hirundines and small mammals, including the introduced bank vole. Nests in a variety of locations, including buildings, quarries, cliffs (including sea cliffs), former corvid nests and cavities in trees. The Study Area includes suitable habitats and it is considered possible that the species nests in the Zone of Influence.
Northern goshawk	*Accipiter gentilis*	WA; BoCCI Amber	Very rare vagrant species. Closely associated with woodland habitats. (Nairn & O'Halloran, 2012). Only record of species in the Study Area is from 1990 (NBDC, 2019f). Unlikely to occur with any regularity.
Sparrowhawk	*Accipiter nisus*	WA; BD I; BoCCI Amber	Common raptor, typically of woodland. The species has been recorded throughout the study area. It is unlikely that it breeds on Dursey Island, which is likely to be too exposed – and there are no records of such on the island. However, it may breed in small numbers on the mainland, although it is likely that the Study Area is mainly used for foraging during the winter months.
Montagu's harrier	*Circus pygargus*	WA; BD I	Very rare spring migrant. Two records on Dursey Island (townland of Kilmichael; 2000 and 2006). European IUCN Red List status is 'Least Concern'.

Common Name	**Scientific Name**	**Statutory Status**	**Notes on Ecology and Conservation**
Waders and Waterfowl			
European golden plover	*Pluvialis apricaria*	WA; BD I, II (SII), III (SIII); BoCCI Red	Summer and winter visitor from different ranges. Summer migrants breeds in upland blanket bogs in north-west of Ireland (BWI, 2019g); very unlikely to breed in the Study Area. Forage (often in association with lapwing and black-headed gulls) on soil and surface-dwelling invertebrates (particularly tipulids), berries, seeds and grasses (Pearce-Higgins & Yalden, 2003; BWI, 2019g). Utilise a variety of coastal and inland terrestrial habitats during the winter including floodplains, farmland, lakeshores and coastal mudflats (Nairn & O'Halloran, 2012; BWI, 2019g; Lewis *et al*., 2019). Long-term population decline in Ireland (-43.4% over 22 years prior to 2016) reasons for which not well understood (Lewis *et al*., 2019). Premature egg-laying as a result of warmer springs (an effect of climate change), habitat loss as a result of upland peat extraction, and wind farms have been identified as potential conservation threats (Pearce-Higgins *et al*., 2008; Pearce-Higgins *et al*., 2005; Nairn & O'Halloran, 2012). Zone of Influence not among sites supporting nationally important populations (Lewis *et al*., 2019) and it is very unlikely that the species breeds here, but may occasionally visit while migrating.
Eurasian teal	*Anas crecca*	WA; BD II (SI), III (SII); BoCCI Amber	Dabbling duck which nests in vegetation, typically away from the coast, around oligotrophic lakes but sometimes also in unimproved wet grassland and other lowland wetlands, including fens (Nairn & O'Halloran, 2012). Utilises a variety of coastal and freshwater wetland habitats for winter foraging, particularly floodplains, turloughs, estuaries and coastal lagoons in the winter (Lewis *et al*., 2019; Nairn & O'Halloran, 2012). Forage principally on the seeds of aquatic plants (Nairn & O'Halloran, 2012). Irish population has increased in the long-term (approx. +4.1% in 22 years prior to 2016) but decreased in the short-term (approx. -6% in 5 years prior to 2019) (Lewis *et al*., 2019). Irish population is partially migratory; breeding population has suffered most significant decline (Nairn & O'Halloran, 2012). Study Area not among sites supporting nationally or internationally important populations (Lewis *et al*., 2019). Highly unlikely to breed in the Zone of Influence but may occasionally forage here during the winter months.
Jack snipe	*Lymnocryptes minimus*	WA; BD II (SI), III (SIII); BoCCI Amber	Winter visitor and passage migrant; does not breed in Ireland (Lewis *et al*., 2019). No reliable data on Irish wintering population (Lewis *et al*., 2019) but much scarcer than common snipe. Not recorded at or in the vicinity of the Study Area in the Irish Wetland Bird Survey (2011/12 – 2015/16) (Lewis *et al*., 2019) and highly unlikely to breed in the Zone of Influence but may occasionally forage here during the winter months.

Common Name	**Scientific Name**	**Statutory Status**	**Notes on Ecology and Conservation**
Common snipe	*Gallinago gallinago*	WA; BD II (SI), III (SIII); BoCCI Amber	Partial migrant; breeding population supplemented by migrants in winter months (Nairn & O’Halloran, 2012). Forages and nests (on the ground) in a variety of wet and damp habitats with soft ground, including wet grassland, blanket and raised bog, floodplains, tilled agricultural land, coastal machair and fens (Nairn & O’Halloran, 2012). The softness of the soil is a key habitat requirement of the species, which probes for prey with an elongated bill (Nairn & O’Halloran, 2012). Breeding population subject to a decline of somewhere in the region of 30 – 68% (Nairn & O’Halloran, 2012). Zone of Influence not among most important Irish sites for the species (Lewis *et al*., 2019). May potentially nest in the area in small numbers and may occasionally forage in Study Area during the winter months.
Eurasian woodcock	*Scolopax rusticola*	WA; BD II (SI), III (SIII); BoCCI Red	Partial migrant. Ground-nesting in woodland. In winter, forages in a broader variety of habitats, including woodland, scrub and heathland. (BWI, 2019o). Highly unlikely to nest in the Zone of Influence but may occaisonally forage in heathland in the area/vicinity during winter months.
Northern lapwing	*Vanellus vanellus*	WA; BD II (SII); BoCCI Red; IUCN VU	Resident breeding wader. Ground-nesting in a wide range of habitats, including coastal machair, cereal fields, cutover bogs, and upland rough grassland but favours cattle-grazed grassland with short swards, hummocks, exposed soil and freshwater nearby (Nairn & O’Halloran, 2012). Forages in winter on invertebrates and plant matter on a variety of habitats (typically closer to the coast, where it is warmer), including flooplains, wetlands, wet grasslands, turloughs and playing fields. Trend in Irish population is of long-term decline (-67.6% over 22 years prior to 2016). Predation of eggs and offspring and habitat loss are key conservation threats (Nairn & O’Halloran, 2012). Study Area not among sites supporting nationally or internationally important population (Lewis *et al*., 2019). May occasionally forage in the Zone of Influence during winter months.
Eurasian oystercatcher	*Haematopus ostralegus*	WA; BoCCI Amber; IUCN VU	Breeding wader. Forages in a variety of habitats including intertidal mudflats, rocky coastlines, exposed sandy beaches, playing fields and wet grassland (Nairn & O’Halloran, 2012). Typically nests on stony shores of offshore islands (Nairn & O’Halloran, 2012). Trend in Irish wintering numbers is of long-term increase and short-term decline (Lewis *et al*., 2019). Study Area not known to support a nationally important population (Lewis *et al*., 2019).

Common Name	Scientific Name	Statutory Status	Notes on Ecology and Conservation
Redshank	*Tringa totanus*	WA; BoCCI Red	Partial migrant; *T. totanus robusta* is a winter visitor and does not breed in Ireland, while *T. totanus totanus* breeds in the UK and Ireland (Lewis *et al*., 2019). Both populations are in short-term decline (-13.7% over 12 years prior to 2016) (Lewis *et al*., 2019). Forages on worms in estuaries and on mudflats (BWI, 2019j). Breeds mainly in wet grasslands of Midlands, nesting on the ground in tussocks (BWI, 2019j). Study Area not among sites supporting nationally or internationally important populations (Lewis *et al*., 2019) and offers little to no optimal habitat.
Little ringed plover	*Charadrius dubius*	WA; BoCCI Amber	Occasional passage migrant in spring and autumn, possible breeding in the County. Only one record of the species in the Study Area (townland of Kilmichael, Dursey Island; May 2000).
Eurasian dotterel	*Charadrius morinellus*	WA; BD I	Rare passage migrant in spring and autumn. Has been repeatedly recorded on Dursey Island during autumn/winter months (townland of Kilmichael; 1987, 1992, 1997, 2001, 2008, 2010). European IUCN Red List status is 'Least Concern'.
Great snipe	*Gallinago media*	WA; BD I	Rare vagrant. Only one record of the species in the Study Area (townland of Kilmichael; October 1983). European IUCN Red List status is 'Least Concern'.
Stone-curlew / Euarasian thick-knee	*Burhinus oedicnemus*	WA; BD I	Rare passage migrant, mostly in spring. Only one record of the species in the Study Area (townland of Kilmichael; April 1999). European IUCN Red List status is 'Least Concern'.
Gulls			
Mediterranean gull	*Larus melanocephalus*	WA; BD I; BOCCI Amber	Non-indigenous continental species which has been breeding in Ireland since 1995 and now firmly established (Lewis *et al*., 2019). Study Area not among sites which have supported species in five or more seasons between 2009/10 and 2015/16 (Lewis *et al*., 2019) but may support breeding/foraging individuals.
Lesser black-backed gull	*Larus fuscus*	WA; BoCCI Amber; Ospar	Greater Irish population comprised of wintering and breeding populations (Lewis *et al*., 2019). A third of Irish breeding population breeds inland around lakes (Nairn & O'Halloran, 2012). Nests colonially on cliffs or buildings (Nairn & O'Halloran, 2012). Forage at sea, on beaches and mudflats, and in urban parks (Nairn & O'Halloran, 2012). Study Area not among sites which supported populations in five or more seasons between 2009/10 and 2015/16 (Lewis *et al*., 2019) but may offer suitable breeding/foraging habitat.

Common Name	Scientific Name	Statutory Status	Notes on Ecology and Conservation
Common/mew gull	*Larus canus*	WA; BoCCI Amber	Irish population of species are partial migrants (Lewis *et al*., 2019). Roughly half of breeding population breeds inland by lakes, while others nest at coastal sites, including boulder beaches and sea cliffs (BWI, 2019l; Nairn & O'Halloran, 2012). Forages on terrestrial invertebrates and fish in a variety of habitats including playing fields, urban parks, landfill sites. and shingle and sandy beaches (Nairn & O'Halloran, 2012). Potential conservation threats include avian botulism and predation by mink (Nairn & O'Halloran, 2012). Study Area not among sites which supported populations in five or more seasons between 2009/10 and 2015/16 (Lewis *et al*., 2019), but habitats in the study area may be utilized for foraging.
Black-headed gull	*Larus ridibundus*	WA; BoCCI Red	Ireland's most numerous and widespread wintering gull species. Primarily an inland gull which tends to nest on islands of lakes (Nairn & O'Halloran, 2012). Forages on a wide variety of habitats including playing fields and public parks, lagoons, shingle and sandy beaches, reedy bogs, rivers and turloughs (Nairn & O'Halloran, 2012). Greater Irish population comprised of wintering and breeding populations (Lewis *et al*., 2019). Study Area not among sites which supported populations in five or more seasons between 2009/10 and 2015/16 (Lewis *et al*., 2019) and offers little optimal foraging habitat.
Other Seabirds			
Great northern diver	*Gavia immer*	WA; BD I; BoCCI Amber; IUCN VU	Winter visitor with widespread coastal distribution during winter months; Does not breed in Ireland (BWI, 2019f; Lewis *et al*., 2019). Forages up to 10km offshore (BWI, 2019f). Study Area not among sites supporting nationally or internationally important populations (Lewis *et al*., 2019).
Common guillemot	*Uria aalge*	WA; BoCCI Amber; Ospar; IUCN NT	Nest on sea cliffs (Nairn & O'Halloran, 2012). Forage on fish by diving offshore in shelf waters (Nairn & O'Halloran, 2012). May potentially nest in the Zone of Influence in small numbers.
Northern gannet	*Morus bassanus*	WA; BoCCI Amber	Resident breeding species. There are approx. six Northern Gannet colonies in Ireland, one of which is at the Bull Rock, a small uninhabited island approx. 2.5km west of the western tip of Dursey Island. Birds nest on sea cliffs and rocky slopes. Forage on fish at sea (in shelf waters over a very wide range) by plunging and diving up to 20m. (Nairn & O'Halloran, 2012). May potentially nest in Study Area.
Black guillemot	*Cepphus grylle*	WA; BoCCI Amber	Nest in sea caves, under boulders and in crevices in quaysides, stone walls, piers and lighthouses at coastal locations (Nairn & O'Halloran, 2012). Forage on fish at sea by diving in inshore area (Nairn & O'Halloran, 2012). May potentially nest in the Zone of Influence in small numbers.

Common Name	Scientific Name	Statutory Status	Notes on Ecology and Conservation
Great cormorant	*Phalacrocorax carbo*	WA; BoCCI Amber	Widespread, utilizing a range of coastal and inland wetland habitats (Lewis *et al*., 2019). Wintering numbers in decline in Ireland (-27.7% in 12 years prior to 2016; -5% in 5 years prior to 2016) (Lewis *et al*., 2019). Study Area not known to support nationally important population (Lewis *et al*., 2019). Has been identified as cohort of seabird colony on the Bull and Cow Rocks, with approx. 40 pairs present (NPWS, 2014). May also nest in the Zone of Influence.
Razorbill	*Alca torda*	WA; BoCCI Amber; IUCN NT	Nest on sea cliffs. Forage by surface diving at sea on shelf waters. Migrate southward during winter. (Nairn & O'Halloran, 2012). Has been identified as a cohort (88 pairs) of the seabird colony on the Bull and Cow Rocks (westward of Dursey Island) (NPWS, 2014). May potentially nest on cliffs in Zone of Influence.
Manx shearwater	*Puffinus puffinus*	WA; BoCCI Amber	Summer visitor. Nests in burrows on vegetated slopes of uninhabited offshore islands. Forages by diving over very wide range at sea and quite far offshore. Predation by introduced mammals such as American mink is a potential conservation threat. (Nairn & O'Halloran, 2012). Unlikely to nest in the Zone of Influence.
Kittiwake	*Rissa tridactyla*	WA; BoCCI Amber; Ospar; IUCN VU	Nest on sea cliffs. Forage on zooplankton at sea and, to a lesser degree, on discards from fishing vessels. (Nairn & O'Halloran, 2012). Has been identified as a cohort of the seabird colony on the nearby Bull and Cow Rocks – with approx. 350 pairs recorded (NPWS, 2014). Could potentially nest in small numbers in the Zone of Influence.
Balearic shearwater	*Puffinus mauretanicus*	WA; BoCCI Red; Ospar; IUCN CR	Scarce passage migrant during July – November (BWI, 2019i). Does not breed in Ireland. Forages at sea (BWI, 2019i).
Sooty shearwater**	*Ardenna grisea*	WA; BoCCI Red; IUCN NT	Seasonal migrant in August – September. Does not breed in Ireland. Forages on fish at sea by diving. (Nairn & O'Halloran, 2012).
Fea's / Cape Verde petrel	*Pterodroma feae*	WA; BD I	Rare vagrant. Only one record from the Study Area (townland of Kilmichael on Dursey Island, September 2013). Global IUCN Red List status is 'Near Threatened'.
Hirundines and Swifts			
Barn swallow	*Hirundo rustica*	WA; BoCCI Amber	Summer migrant which breeds in Ireland. Nests in and around farm buildings, old buildings and certain other artificial structures. Forage and roost in large flocks. Roosting sites include artificial structures such as bridges and reedbeds. Foraging habitats are varied and include reedbeds and improved agricultural land. (Nairn & O'Halloran, 2012). May potentially nest/forage in the Study Area.

Common Name	**Scientific Name**	**Statutory Status**	**Notes on Ecology and Conservation**
House martin	*Delichon urbicum*	WA; BoCCI Amber	Summer migrant which breeds in Ireland. Nest principally under eaves of houses and to a lesser degree in caves and under cliff overhangs. Forage on insects over farmland and along cliffs. (Nairn & O'Halloran, 2012). May potentially breed and forage in the Study Area.
Common swift	*Apus apus*	WA; BoCCI Amber	Summer migrant. Entirely reliant on artificial structures, particularly older buildings, for nesting in Ireland and typically found in urban areas (Nairn & O'Halloran, 2012). Forage solely on aerial insects (Nairn & O'Halloran, 2012). Subject to declines of approx. 40% since 2008 (BWI, n.d.). Key conservation threats are loss of nest sites due to refurbishment and demolition of buildings, climate change and declines in insect abundance (BWI, n.d.). May nest in buildings in the Study Area.
Sand martin	*Riparia riparia*	WA; BoCCI Amber	Flock-forming insectivorous hirundine. Summer visitor from March – September (BWI, 2019k). Requires bare sandy banks for nesting, e.g. of soft sea cliffs, sandy riverbanks or quarries. May forage and roost in reedbeds. Also known to forage in public parks. (Nairn & O'Halloran, 2012). May potentially nest in soft cliffs in vicinity of Study Area.
Other Birds			
Common starling	*Sturnus vulgaris*	WA; BoCCI Amber	Widespread generalist which forages in a variety of habitats including gardens, parks, playing fields, landfill sites, cutaway bogs, reedbeds, improved grassland and arable farmland. Nest in buildings and other artificial structures. Form large communal roosts in reedbeds, trees and artificial structures, such as bridges. (Nairn & O'Halloran, 2012). Study area contains suitable breeding and foraging habitats.
House sparrow	*Passer domesticus*	WA; BoCCI Amber	Resident seed-eating, flock-forming passerine. Especially prevalent in urban environment (particularly gardens) and on farmland. Nests in buildings. May nest in buildings in the Study Area.
Greenfinch	*Carduelis chloris*	WA; BoCCI Amber	Widespread resident seed-eating species. Habitats utilized include raised bog and fen, farmland, urban parks and gardens, and salt marshes. Nests in hedgerows.
Mistle thrush	*Turdus viscivorus*	WA; BD II; BoCCI Amber	Resident species, which breeds throughout Ireland. Feeds largely on berries and also invertebrates. Nests in hedgerows and trees. Has been recorded throughout the Study Area, including on Dursey Island.
European robin	*Erithacus rubecula*	WA; BoCCI Amber	Characteristic, widespread garden bird, which utilises a variety of habitats for foraging and breeding. Nests in well concealed spots in trees, hedgerows, ivy, cavities in walls and other artificial structures. Has been recorded throughout the Study Area, including on Dursey Island.

Common Name	Scientific Name	Statutory Status	Notes on Ecology and Conservation
Goldcrest	*Regulus regulus*	WA; BoCCI Amber	Resident, insectivorous species. Woodland specialist which is also found in urban parks and gardens (Nairn & O'Halloran, 2012). Nest in trees. Has been recorded throughout the Study Area, including on Dursey Island. Area does not feature optimal foraging or breeding habitat but species may nest in area (particularly mainland) in small numbers.
Grey wagtail	*Motacilla cinerea*	WA; BoCCI Red	Characteristic insectivore of riparian and riverine habitats. Breeds principally along streams and rivers. Often winters at coastal locations, where tidewrack provides an abundance of insect prey. Species has been repeatedly recorded at a number of locations within the Study Area, particularly on the mainland. Species is likely to use area principally for foraging during winter months but may breed in small numbers on the mainland.
Barred warbler	*Sylvia nisoria*	WA; BD I	Rare vagrant. Has been repeatedly recorded in the Study Area – both on Dursey Island and on the mainland. The European IUCN Red List status of the species is 'Least Concern'.
Common crane	*Grus grus*	WA; BD I	Former resident species; now a rare vagrant. There is only one record of the species from the Study Area (townland of Kilmichael, Dursey Island, December 1978). The Global IUCN Red List status of the species is 'Least Concern' (European status unknown).
Dartford warbler	*Sylvia undata*	WA; BD I	Rare vagrant. There is only one record of the species from the Study Area (townland of Kilmichael, Dursey Island, May 1999). The European IUCN Red List status of the species is 'Near Threatened'.
Red-breasted flycatcher	*Ficedula parva*	WA; BD I	Occasional autumn vagrant. There is only one record of the species from the Study Area (townland of Scrivogue on the mainland, November 2012). The European IUCN Red List status of the species is 'Least Concern'.
Fish			
Basking shark	*Cetorhinus maximus*	Ospar; IECS EN; IUCN EN	Large lamnoid shark which filter-feeds on plankton. Most commonly sighted feeding in surface waters off the coast of Counties Donegal, Mayo, Cork and Kerry. Long-lived species with low productivity whose Irish population is believed to have stabilised at a low density following historic exploitation. Irish Red List status is 'Endangered'. Potential conservation threats include entanglement in fishing nets and collision with marine vessels. (Clarke *et al*., 2016).

Common Name	**Scientific Name**	**Statutory Status**	**Notes on Ecology and Conservation**
Invertebrates			
Kerry slug	*Geomalacus maculosus*	WA; HD II, IV	Indigenous to south-western peninsulas of Counties Cork and Kerry. Utilises a range of habitats underlain by Devonian Old Red Sandstone, including deciduous woodland, blanket bog, heath, wet grassland, conifer plantations and areas of clearfell (McDonnell & Gormally, 2011). Forages on lichens, liverworts and mosses (McDonnell & Gormally, 2011). No major conservation threats identified at present (NPWS, 2019b), but burning of heathland, invasive species (particularly *Rhododendron ponticum*) and afforestation of heathland may pose future threats (Donnell & Gormally, 2011). Overall conservation status in Ireland is 'Favourable' and improving (NPWS, 2019b).
Wall brown	*Lasiommata megera*	IECS EN	Subject to a population decline of >50% over the last ~15 years. Habitats utilized include dry, calcareous grassland, coastal dunes, machair, vegetated sea cliffs, limestone pavement and cutover bog. (Regan *et al*., 2010).
Grayling	*Hipparchia semele*	IECS NT	Habitats utilized include limestone pavement, unimproved calcareous and acid grasslands, dunes and dry heath. Widespread in coastal locations. (Regan *et al*., 2010).
Moss carder-bee	*Bombus (Thoracombus) muscorum*	IECS NT; IUCN VU	Habitats utilized include dunes, meadows and damp areas with moss. Declining across Europe and showing signs of decline in Ireland. (Fitzpatrick *et al*., 2006).
Small heath	*Coenonympha pamphilus*	IECS NT	Habitats utilized include unimproved dry/humid grassland, grey dunes and machair. Feeds on fine-leaved grasses. (Regan *et al*., 2010).
Yellow shell	*Camptogramma bilineata*	IECS NT	Widespread macro-moth of coastal and unimproved grassland, lost from many inland sites as a result of agricultural intensification (Allen *et al*., 2016). Larvae feed on a number of herbaceous perennials (Allen *et al*., 2016). There is only one record of the species from the Study Area (townland of Scrivogue on the mainland, July 2012).
Plants			
Betony	*Betonica officinalis*	FPO; IECS NT	Flowering perennial of open woodland, hedgerows and grassland. Key conservation threat is habitat loss as a result of agricultural intensification. (Curtis & McGough, 1988).
Sea frillwort	*Fossombronia maritima*	IECS NT	Near threatened coastal liverwort with very limited distribution (NBDC, 2019d; Lockhart *et al*., 2012).
Sea pea	*Lathyrus japonicus*	FPO	Perennial plant of sand and shingle beaches (Minchin & Minchin, 1996) with limited coastal distribution. There is only one record of the species occurring in the Study Area (townland of Cloughfune on the mainland, 1991) which is a significant distance from any proposed works.

Acronyms used: HD = EU Habitats Directive (Roman numerals indicate Annex(es)); WA = Wildlife Acts; Ospar = Ospar Convention; BD = EU Birds Directive (Roman numerals indicate Annex(es)/Section(s), S = Section); BoCCI = BirdWatch Ireland - Birds of Conservation Concern in Ireland (Amber = Amber-listed, Red = Red-listed); IECS = Irish Conservation Status (NT = Near threatened, EN = Endangered; Fitzpatrick *et al*., 2006; Marnell *et al*., 2009; Regan *et al*., 2010; NPWS, 2013d; Clarke *et al*., 2016; Wyse Jackson *et al*., 2016); IUCN = European Conservation Status (or Global in cases in which European status unavailable; VU = Vulnerable, NT = Near threatened, EN = Endangered, CR = Critically endangered)

7.3.4 Invasive Alien Species

Table 7.13 lists the Invasive Alien Species (IAS) recorded in the NBDC databases in 2km squares that are wholly or partially within the Zone of Influence.

Table 7.13 Invasive Species Recorded in 2km Squares within the Zone of Influence (NBDC, 2019)

Common Name	Scientific Name	NBDC Invasiveness Risk Rating
Japanese knotweed	*Fallopia japonica*	High Impact
Brown rat	*Rattus norvegicus*	High Impact
European rabbit	*Oryctolagus cuniculus*	Medium Impact

7.3.5 Surface Water Ecological Status

The study areas (excluding Dursey Island) is within the Dunmanus – Bantry – Kenmare Hydrometric Area (No. 21) and the Fanahy Water Framework Directive (WFD) Sub-catchment (ID. 21-9). The Zone of Influence contains two Water Framework Directive Sub-basins – Ballydonegan_010 and Hill Loughanemore_010. According to the EPA Map Viewer (2019), there are at least 13 surface water bodies (all streams) wholly or partially in the Zone of Influence. It is possible that a number of these watercourses are drainage ditches associated with agricultural land. There are no lakes in the Zone of Influence. Since Dursey Island is not included in the Hydrometric Area, detailed data are not available for surface water on the land mass. However, the EPA Map Viewer indicates that there are at least two streams on Dursey Island, and it is known that there are springs on the island. There are no surface water ecological status (i.e. Q Value) data available for waterbodies in the Zone of Influence. The coastal waters of the South Western Atlantic Seaboard are considered to be 'Unpolluted' (EPA, 2019), although no specific coastal water quality data are available for the study area. For in-depth assessment of potential hydrological effects of the proposed development, refer to Chapters 9 and 10 of this EIAR – Hydrogeology and Hydrology, respectively.

7.4 Field Survey Results

7.4.1 Habitats

For details of survey methodology, see Section 7.2.7. This section lists the habitats recorded during the habitat surveys carried out on the 6th and 7th September 2018 and 22nd and 25th of May 2019 (as per Fossitt, 2000), and describes the general character of the habitats in the study area. Table 7.14 lists the habitats recorded on the mainland and island sides of the site of the proposed development. Habitat maps are presented in Figures 7.2 – 7.12 of Volume 3 of this EIAR.

Table 7.14 Habitats recorded at the site of the proposed development (mainland and island sides)

Habitat Type	Fossitt Code (Fossitt, 2000)
Improved agricultural grassland	GA1
Dry meadows and grassed verges	GS2
Dry-humid acid grassland	GS1
Dry siliceous heath	HH1
Exposed siliceous rock	ER1

Habitat Type	Fossitt Code (Fossitt, 2000)
Drainage ditches	FW4
Rocky sea cliffs	CS1
Sea stacks and islets	CS2
Exposed rocky shores	LR1
Mosaic of dry-humid acid grassland and dry siliceous heath	GS1-HH1
Buildings and artificial surfaces	BL3

General Character of Habitats at Site of Proposed Development

Dry-humid acid grassland (GS1) and dry siliceous heath (HH1), or a mosaic of the two, are the dominant habitat types in the study area, on both island and mainland. Sward heights are low, particularly on Dursey Island. The coastline is rocky and highly indented. At the mainland, the land rises abruptly from the exposed rocky coast to more gently sloping ground around the car park and along the approach road, R572. To the east of the road, the land continues to rise with numerous rock outcrops forming an undulating profile and giving rise to a considerable mixture of gradients and depths of soil which is reflected in the vegetation. On the island, the cableway pylon is located at the top of a low broken cliff, and thereafter to the terminal building the land rises gently with a similar variation in rock outcrop and soil depth.

The mainland site is comprised of a mosaic of habitats associated with its rural, coastal location and the existing infrastructure at the site. There is a considerable element of buildings and artificial surfaces (BL3) associated with the access road which terminates in a car park at the cableway line station and the pylon footprint. In addition, there is a small pier (CC1) located to the southeast of the cable car with a steep access track leading from the road. A chain-link fence has been recently erected around the boundary of the CCC land parcel on which the cableway is situated, and a low earth berm has been built along the seaward side of the carpark which has resulted in some disturbance and recolonising bare ground (ED3). These areas support a mixture of species associated with dry meadows and grassy verges (GS2) including cock's-foot (*Dactylis glomerata*), thistle (*Cisium* sp.), nettle (*Urtica diocia*) and yarrow (*Achillea milefolium*).

To the south-east and at the boundary of the Council lands, a small drainage ditch (FW4) flows into the sea in a steep sided cut which is heavily vegetated with a mixture of briar (*Rubus fruticosus* aggr.), bracken (*Pteridium aquilinum*), lady fern (*Athyrium felix-femina*) and royal fern (*Osmunda regalis*), along with the non-native species montbretia (*Crocosmia x crocosmiflora*) and New Zealand flax (*Phormium tenax*).

The majority of the lands to the east of the access road, within the Council lands, are a mixture of dry-humid acid grassland (GS3) with dry siliceous heath (HH1), with scattered exposed siliceous rock (ER1) outcrops. This community extends beyond the fence-line and northwards towards Garinish Point, and also extends to the west of the road/car park to the top of a low cliff finding the coast. The vegetation within the fenced enclosure is mainly ungrazed and is resultantly much more luxurious than that outside the enclosure, which is heavily grazed by sheep.

The dominant species in the dry-humid acid grassland are fescues (*Festuca rubra* and *Festuca ovina*), bents (*Agrostis* spp.), sweet vernal (*Anthoxanthum odoratum*), Yorkshire fog (*Holcus mollis*), yarrow (*Achillea millefolium*), mouse-ear (*Cerastium tomentosum*), hawkweed (*Hieracium pilosella*), tormentil (*Potentilla erecta*), birdsfoot trefoil (*Lotus corniculatus*), selfheal (*Prunella vulgaris*), clovers (*Trifolium* spp.), and sheep sorrel (*Rumex acetosella*).

The heath elements are dominated by western gorse (*Ulex gallii*), bell heather (*Erica cinerea*), ling heather (*Calluna vulgaris*), green-ribbed sedge (*Carex binervis*), along with many of the species associated with the dry humid acid grassland. Purple moor-grass (*Molina caerulea*) occurs occasionally mainly associated with damper areas where drainage lines occur, along with small amounts of Sphagnum mosses (*Sphagnum* spp.) and the non-native willowherb (*Epilobium brunnescens*).

The coastline in the vicinity of the site is comprised of low cliffs with a wave-cut platform in the intertidal zone. The habitat conforms to Fossitt's description of exposed rocky shores (LR1), dominated by barnacles (*Semibalanus* and *Chthalmus* spp.) and mussels (*Mytilus edulis*), while the subtidal element is dominated by kelps (*Laminaria* spp.) and red seaweeds.

The vegetation on the island is also comprised primarily of a mosaic of dry siliceous heath and dry-humid acid grassland habitats. The vegetation here, however, is heavily grazed and, consequentially, quite stunted. The species composition of these habitats is similar to that of the mainland, though no evidence of betony was found. There is some grassland along a drainage line to the north of the line station which is intermediate with wet grassland and includes jointed rush (*Juncus articulatus*), black bog rush (*Schoenus nigircans*), blue sedge (*Carex flacca*), spear wort (*Ranunculus flammula*), lousewort (*Pedicularis sylvatica*) and lesser skullcap (*Scutellaria minor*).

The low cliffs along the coast, especially at Foilnamuck (the small bay immediately north of the line station) supports a typical coastal cliff community including thrift (*Armeria maritima*), buck's-horn plantain (*Plantago coronopus*), samphire (*Crithmum maritimum*), sea beet (*Beta vulgaris*), orache (*Atriplex patula*) and sea spurrey (*Spergularia rubicola*). Vegetation is confined primarily to the cliff top and large crevices.

7.4.1.1 Significance of Habitats at Site of Proposed Development

The heathland on both the mainland and island sites conforms in places to the description of European dry heath [4030], a QI of the Kenmare River SAC. However, the boundary of the SAC only extends to the high-water mark at this location. The loss of this habitat at the site will therefore not constitute an impact on the SAC. Dry siliceous heath and dry-humid acid grassland are foraging habitats for Chough, which is a QI of the Beara Peninsula SPA, while rocky sea cliffs are roosting/nesting habitat for same, as well as a number of other rare and/or protected avian species that have been recorded in the Study Area (Table 7.9).

7.4.2 Fauna

7.4.2.1 Bats

For details of survey methodology, see Section 7.2.9. Table 7.15 provides an overview of the bat surveys conducted.

Table 7.15 Bat survey details

Survey	Date	Time	Temp.	Conditions
Daytime Bat Suitability Assessment	29/09/18	-	3°C	Overcast, dry, breezy Sunset: 19:20
Dusk Bat Activity Survey	29/09/18	19:00 – 21:00		

Survey	Date	Time	Temp.	Conditions
Night-time Bat Activity Survey	29 – 30/09/18	19:00 – 07:00		

The bat suitability assessment (a walkover of the site during the daytime) found that there were no trees located in the vicinity of the proposed development. The open, treeless, coastal nature of the landscape in the study area is not optimal bat foraging habitat. While there are a number of buildings and artificial structures on the site, no bat roosts were identified within any of these structures. However, it was concluded that these structures could be used as night-time or satellite roosts at times of inclement weather conditions.

The dusk bat activity survey recorded common pipistrelles (*Pipistrellus pipistrellus*) feeding along the coastline in the vicinity of the site at 20:03hrs and 20:37hrs. Otherwise, no other bat activity was recorded during the dusk survey.

The bat passes recorded by the static recording devices employed for the night-time bat activity survey are listed in Table 7.16. Two species were recorded – common pipistrelle and soprano pipistrelle (*Pipistrellus pygmaeus*). A much higher level of bat activity was recorded on the mainland than on Dursey Island. The activity recorded is indicative of bats commuting to the study area to forage. While many passes were recorded of common pipistrelle on the mainland, these results are likely to reflect a small number of individuals travelling back and forth in the vicinity of the recording device. Considering the foraging behaviour of the common pipistrelle, it is likely that a small number of individuals were foraging around the lighting of the cableway line station building. On sonograms, just two individuals were detected at a time. No roosting sites were identified and it was considered that the probability of bats roosting in buildings associated with the existing Dursey Island Cable Car site is low.

Both the common and soprano pipistrelle are of 'least [conservation] concern' in Ireland, Europe and globally and are considered to be Ireland's commonest bat species. However, as with all bat species, both are legally protected under Annex IV of the Habitats Directive. Both have Irish populations that are stable and increasing. The distribution of both covers much of Ireland. Their habitat preferences are similar, with both favouring broadleaf woodland, riparian woodland and low density urban areas. (Roche *et al*., 2014).

Table 7.16 Bat passes recorded by static recording devices during night-time bat activity survey

Location of Static Recording Device	Time	Bat Passes Recorded
Dursey Island (roof of line station)	21:00	4 passes of common pipistrelle (2 individuals)
	22:00	4 passes of common pipistrelle
Mainland (adjacent to line station)	20:00	1 pass of common pipistrelle
	21:00	4 passes of common pipistrelle
	22:00	184 passes of common pipistrelle 19 passes of soprano pipistrelle
	23:00	168 passes of common pipistrelle
	00:00	25 passes of common pipistrelle

Location of Static Recording Device	Time	Bat Passes Recorded
	01:00	1 pass of common pipistrelle
	06:00	1 pass of common pipistrelle

7.4.2.2 Breeding Birds

For details of survey methodology, see Section 7.2.8. Numerical data related to breeding season surveys are presented in Appendix 7.4. Key findings thus far are as follows:

Chough – Abundance

The largest flock of choughs recorded during the surveys was 32. This flock was comprised of adults and juveniles and was observed on the western end of Dursey Island in early July. This number is greater than that of the 1992 survey (20; Berrow *et al.,* 1993) and less than that of the 2002/03 survey (46; Gray *et al.,* 2003). Plate 7.9 illustrates the population trend over time.

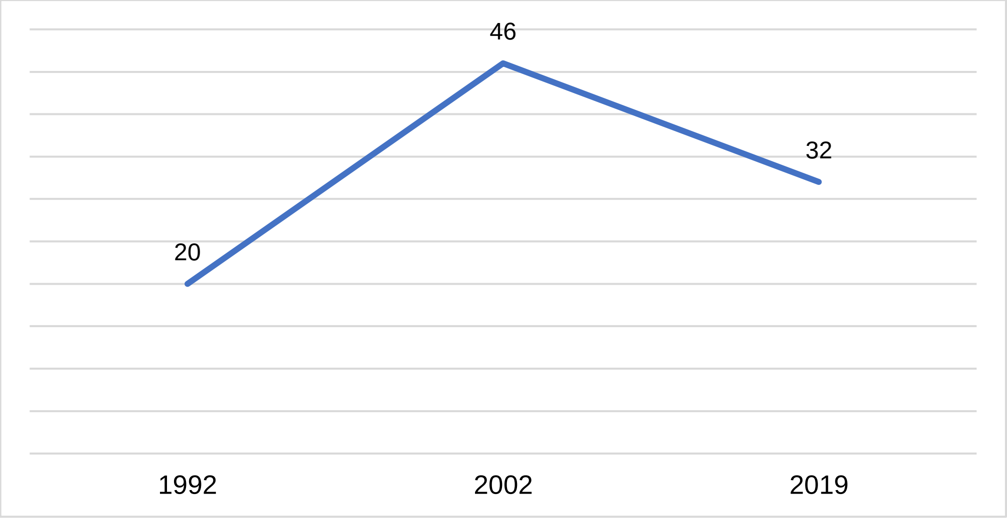

Plate 7.9 Total number of chough recorded on Dursey Island, 1992 – 2019 (Source: Berrow et al., 1993; Gray *et al*., 2003; ROD surveys, 2019)

Chough – Breeding

Since chough are known to exhibit site fidelity when nesting, certain passages of text in this Section specifying the locations of potential/confirmed chough nest sites have been redacted in order to protect the sites and population in question. Six confirmed breeding pairs and their respective nest sites were identified (Table 7.17). [Redacted]. Five out of the six nests were located on Dursey Island. None of these were in the vicinity of the site of the proposed development, although a potential nest site at [redacted] was prospected by a pair who did not go on to breed (potentially a pair of non-breeders simulating breeding). No nest sites were identified on Garinish Head, although chough were observed to forage here in small numbers. A single confirmed nest site was recorded at [redacted]. Most nest sites recorded are too remote to be at risk of human disturbance. However, the three known nest sites at the western end of the island are potentially vulnerable in this respect.

Table 7.17 Details of chough nest sites with confirmed breeding in the Study Area

No.	Location	No. Juveniles Fledged	Date First Recorded
1	Dursey Island [redacted]	2	17/05/2019
2	Dursey Island [redacted]	2	03/06/2019
3	Dursey Island [redacted]	4	05/06/2019
4	Dursey Island [redacted]	3	03/06/2019
5	Dursey Island [redacted]	4	13/06/2019
6	Crow Head [redacted]	2	24/05/2019

All six known breeding pairs successfully fledged 2 – 4 young (mean = 3). A total of 17 juveniles were fledged in the Study Area.

Chough – Foraging and Disturbance

On Dursey Island, foraging during the breeding season has been concentrated on areas of unenclosed acid and maritime grassland, with occasional forays into heathland. Virtually all the unenclosed parts of the island are grazed by sheep and, in combination with the shallow soils and maritime influence, much of the habitat on the island (a mosaic of heath and acid grassland) provides suitable foraging habitat for chough. The enclosed fields, some of which are cattle grazed or cropped for silage, are also likely to provide foraging habitat during the winter period. It is considered that, with the exception of artificial structures, roads/paths and bracken (of which there is a negligible area), almost the entire area of the island (5.98km^2) is suitable habitat for chough at one time of the year or another. That being said, the western end of the island (which takes in the hills of *Maoil, Maoil Mhór and Maoil Bheag*) has an open short grassland sward, and supported the greatest density of nesting pairs (three nests recorded consistently across all studies) and the highest levels of foraging activity. This may be regarded as a key area for foraging and flocking for the population (Plate 7.10). While no nesting was observed on Garinish Head, foraging was observed here, particularly on acid grassland-heath mosaic on the steep ground to the north of the established walking trail. Foraging activity on Crow Head has been recorded mostly along the northern fringes of the land mass, where there is a strip of grassland. Much of the headland is covered with heath, and it appears that grazing of the area has reduced significantly in recent times, which has likely reduced its suitability for foraging chough. Choughs were observed to fly between the island and mainland on a number of occasions.

The average flush distance observed in the Study Area was 31.6m (N = 49 observations; min. = 10m; max. = 150m; median = 30m). Choughs were observed to call more frequently when within 50m of walkers. Applying a 50m buffer (30m flush distance + 20m as a precautionary buffer) to the established paths and road on Dursey Island (Plate 7.12), it has been estimated that approx. 1.33km^2 of potential chough foraging habitat (22% of total area) could be subject to human disturbance at peak times (assuming walkers are well distributed across the island's network of roads and paths) (Plate 7.11). This is substantially lower than the equivalent area on Ouessant Island; Keribiou *et al*. (2009) calculated that, during peak times, 97% of chough foraging habitat on Ouessant could be affected by human disturbance.

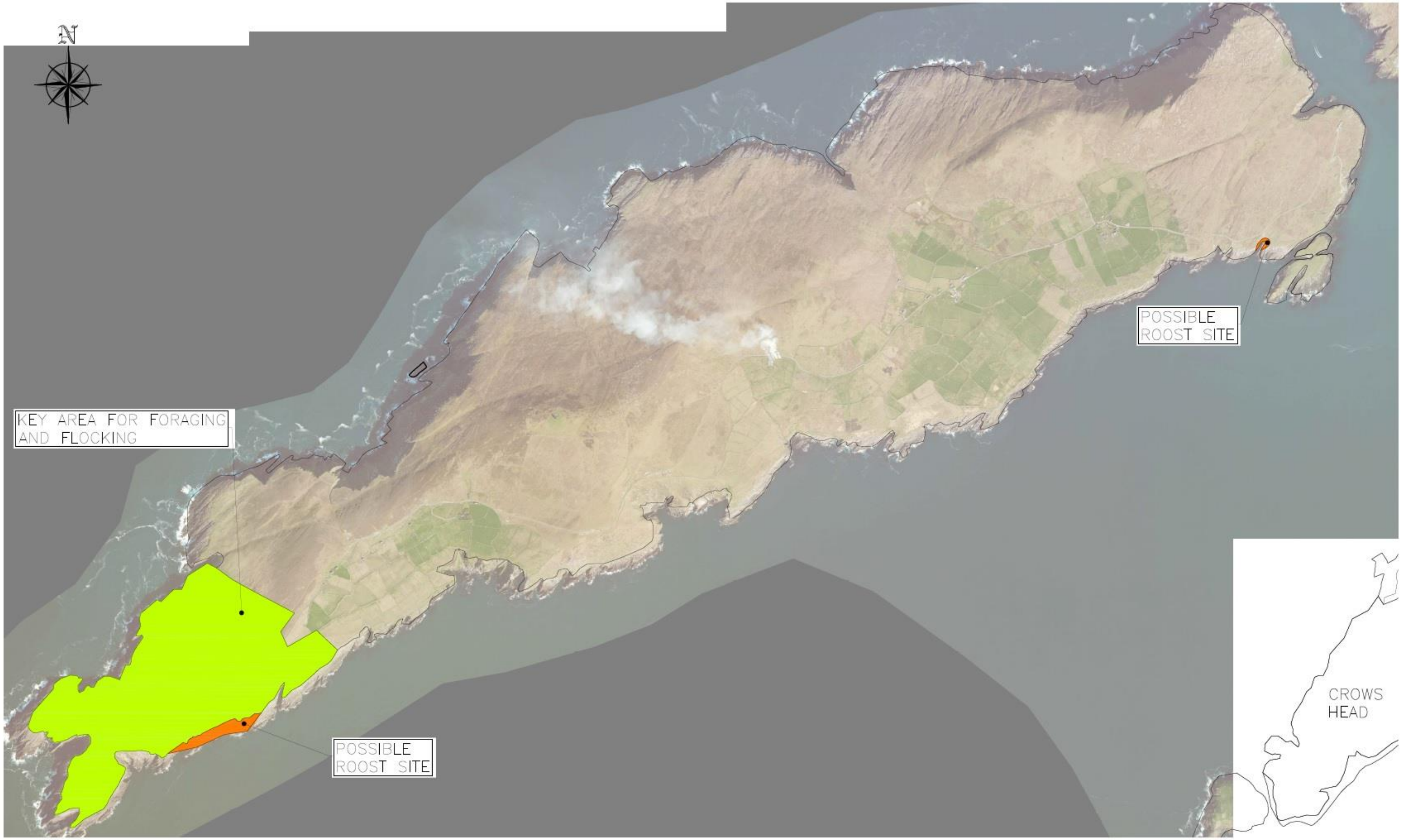

Plate 7.10 Map depicting locations of key areas of chough habitat on Dursey Island [locations of nest sites removed]

Plate 7.11 **Map illustrating area of chough foraging habitat on Dursey Island likely to be affected by human disturbance during peak times**

During the daytime, when there is plenty of visitor activity at the site, chough have been observed feeding in the grassland adjacent to the existing station on the mainland, within approx. 15m of the car park. On the western end of Dursey Island, there are no defined pathways for walkers and visitors tend to 'spill out' across the open habitat, potentially disturbing foraging and nesting birds. Birds have been observed foraging in the vicinity of roads and paths elsewhere on the island and while there is a risk of disturbance at these locations also, the visitors typically remain on the road or path limiting the disturbance to a linear strip. Contrary to the case of Keribiou et al. (2009), while human disturbance of foraging choughs was observed, this disturbance did not appear to lead to any mortality of juveniles in the Study Area – all known pairs successfully fledged two or more offspring. This is potentially since the scenario with respect to chough conservation on Ouessant Island is substantially different to that on Dursey. On Ouessant, there is an extensive network of roads and paths criss-crossing the land mass, there are cliff-side walking trails running along the entirety of the coastline (Plate 7.14), and chough foraging habitat is largely restricted to the coastline (Keribiou *et al*., 2009). By comparison, the road and walking trails on Dursey Island are largely restricted to the central high elevation spine of the land mass, and the vast majority of the terrestrial area constitutes suitable chough foraging habitat. Furthermore, the choughs of Dursey Island (unlike those of Ouessant) are not geographically isolated to the island, which is just 200m from the Beara Peninsula (Plate 7.15). Indeed, choughs were often seeing flying between island and mainland during surveys. The Ouessant choughs, on the other hand, rely on habitats on the island for the entirety of their lifecycle. In short, the environmental context on Dursey Island may be considered to be more favourable in terms of chough conservation than that of Ouessant Island, France.

Chough – Flock-forming and Roosting

From late June to early July, choughs were increasingly observed to gather in one or more flocks to forage at the western end of the island – especially around the hills *Maoil* and *Maoil Mhór*. Around this time, surveyors were less likely to observe chough activity elsewhere on the island. This underlines the status of the western end of the island as a chough 'hotspot'.

The Site Synopsis for the Beara Peninsula SPA (NPWS, 2015) lists two regularly used roosting sites for chough at (i) Dursey Sound (maximum of 17 roosting birds) and (ii) Allihies copper mines (maximum of 37 roosting birds). The precise location of the roost within Dursey Sound is not recorded, but Foilnamuck, the inlet on Dursey Island c. 120m north-west of the island side of the site of the proposed development, is thought to be the site which is referred to. Surveys were conducted of this area and no evidence of it being used for roosting was found. *Cuas na gColúr* (an inlet on the south-eastern side of the island) and the cliffs of *Brann Righe* (on the south-western side of the island) were identified as potential communal roost sites (Plate 7.10). Largely, however, birds were observed to roost at dusk in family groups near their respective nest sites. Since communal roosting occurs towards the end of the summer, ongoing post-fledging bird surveys (August – November 2019) should serve to confirm the location of roost sites in the Study Area.

Other Breeding Birds

Dursey Island is on a major migratory flyway for birds and receives many unusual as well as more common species over the main migration periods in autumn and spring. Some of these birds are recorded in flight only, while others stop over briefly before resuming their migration.

Fulmar were observed nesting at various locations on steep and isolated cliffs on the north, west and southern sides of Dursey Island, as well as on the southern side of Crow Head and the northern side of Garinish Head. These birds are not considered to be vulnerable to disturbance by virtue of the isolated locations of their nests and their confinement to foraging at sea.

No evidence of breeding peregrine falcons (*Falco peregrinus*) was found during the surveys. However, individual peregrine(s) were observed flushing choughs and being mobbed by choughs in the Study Area on a number of occasions and it is likely that at least one individual is foraging in the area/vicinity.

Choughs were observed to interact regularly with other corvids, particularly ravens (*Corvus corax*), which were frequently mobbed by adult choughs. Antagonistic interactions with hooded crows (*Corvus cornix*) and magpies (*Pica pica*) were also observed.

Table 7.18 presents a list of avian species observed breeding in the Study Area during the breeding bird surveys. Additionally, it is considered (in light of observations made during the surveys) that the species of birds listed in Table 7.19 may possibly breed in the Zone of Influence in small numbers (although no evidence of such was observed).

Table 7.18 Species of birds confirmed breeding in the Zone of Influence during 2019 breeding bird surveys

Common name	Scientific Name
Rock pigeon	*Columba livia*
Pheasant	*Phasianus colchicus*
Eurasian oystercatcher	*Haematopus ostralegus*
Barn swallow	*Hirundo rustica*
Northern wheatear	*Oenanthe oenanthe*
Eurasian skylark	*Alauda arvensis*
Common starling	*Sturnus vulgaris*
Great cormorant	*Phalacrocorax carbo*
House sparrow	*Passer domesticus*
Meadow pipit	*Anthus pratensis*
Rock pipit	*Anthus petrosus*
Stonechat	*Saxicola torquatus*
Pied wagtail	*Motacilla alba*
Fulmar	*Fulmarus glacialis*
Herring gull	*Larus argentatus*
Greater black-backed gull	*Larus marinus*
Shag	*Phalacrocorax aristotelis*
Magpie	*Pica pica*
Robin	*Erithacus rubecula*
Dunnock	*Prunella modularis*
Wren	*Troglodytes troglodytes*
Hooded crow	*Corvus tristis*

Table 7.19 Species of birds considered to possibly breed in the Zone of Influence

Common name	Scientific Name
Peregrine falcon*	*Falco peregrinus*
Wood pigeon	*Columba palumbus*
Common snipe	*Gallinago gallinago*
Black guillemot	*Cepphus grille*
House martin	*Delichon urbicum*
Linnet	*Carduelis cannabina*
Common kestrel	*Falco tinnunculus*
Razorbill	*Alca torda*
Yellowhammer	*Emberiza citronella*
Kittiwake	*Rissa tridactyla*
Raven**	*Corvus corax*

*One solitary female was observed on Garinish Head in October 2018. In view of the lack of sightings during all surveys undertaken during the breeding season, it is considered unlikely that any peregrines nested in the Study Area during the 2019 season.

**Species appears to have nested on Dursey Island and on Garinish Head, although no nest sites were confirmed.

Other Notes

Evidence of illegal dumping of household waste was observed on the southern cliffs of Crow Head. Surveyors observed that the majority of walkers stayed on existing, established paths.

7.4.3 Flora

7.4.3.1 Betony

For details of survey methodology see Section 7.2.10. During the survey carried out on the 25th of October 2018, a total of five clusters of betony were recorded in the vicinity of the mainland side of the site of the proposed development (Table 7.20). These were mainly situated at the north-eastern boundary of the mainland side of the site, near to a fence. No evidence of the plant was found on grassland surrounding the site on the mainland, probably as a result of intensive grazing in the area.

In order to prevent negative effects on the protected species, these clusters of betony were translocated in February 2019. Sods of 30×50cm containing plants were excavated using a spade and transferred in boxes to suitable reception sites outside of the footprint of the proposed development under the supervision of Paul Murphy, who was licenced by NPWS for the translocation of the species (FL01/2019). The depth of sods (approx. 20×30cm) was sufficient to contain the root systems of the betony clusters. The reception site was cleared of topsoil in preparation for the translocation. Any gaps were filled with local topsoil. The translocation site was fenced to exclude animals/people from interfering with it. Inspections of the status of the translocated plants will continue until October 2019, to ensure the establishment of the plants at their new location.

Table 7.20 Records of betony from mainland side of site of proposed development

Grid Reference	No. Plants	Location
V50821 41882	1	In grassland, close to north-eastern boundary fence
V50837 41869	3	In grassland, close to north-eastern boundary fence
V50838 41867	1	In grassland, close to north-eastern boundary fence
V50847 41869	3	In grassland, close to north-eastern boundary fence
V50836 41858	4	In grassland, in middle of site

7.4.4 Visitors to Dursey Island – Numbers and Activities

A survey of visitors to Dursey Island was carried out during June and July of 2019. Survey sheets were distributed to visitors upon returning to the mainland after their trip to Dursey by the cableway operator. Key findings are as follows:

- 537 surveys were completed.
- Of these, 68% of respondents stated that they left the established path/road at some point on the island.
- 68% of respondents (365 persons) marked their route on the island on the map provided. Of these:
  - Approximately 50% of respondents walked in and around the eastern half of the island only, in the Ballynacallagh and Kilmichael areas;
  - A further 23% walked as far as the signal tower and/or Tillickafinna area, but not onto the extreme western end of the island; and
  - Approximately 26% of respondents reported walking to the extreme western end of the island. This group typically spent the longest amount of time on the island (≥3 hours).
  - Of the 95 respondents who reported walking to the western end of the island, 42% stated that they left the established path at this point. In other words, of the 537 persons who participated in the visitor survey, 40 (or 7%) reported wandering onto open habitat in this chough 'hotspot'.
  - Plate 7.12 presents a 'heat map' of visitor movements on the island.
- The average group size visiting the island is 3, and the median is 2.
- The average time spent on the island is 3 and a half hours, and the median is 2 and a half hours.
- Comments written by certain respondents on their survey forms indicate that:
  - Visitors are being allowed to bring dogs and bicycles onto the island.
  - A small proportion of visitors are camping overnight on the island.
  - Key complaints of visitors to the island are
    - (i) The lack of information regarding walking routes and duration of walks on the island;
    - (ii) The duration of queuing times on island and mainland; and
    - (iii) The lack of shelter/facilities on the island.
- Visitors to the site also visit a number of other sites in the area during their trip, principally the Beara Way, Garinish Loop and the town of Allihies (Table 7.21).

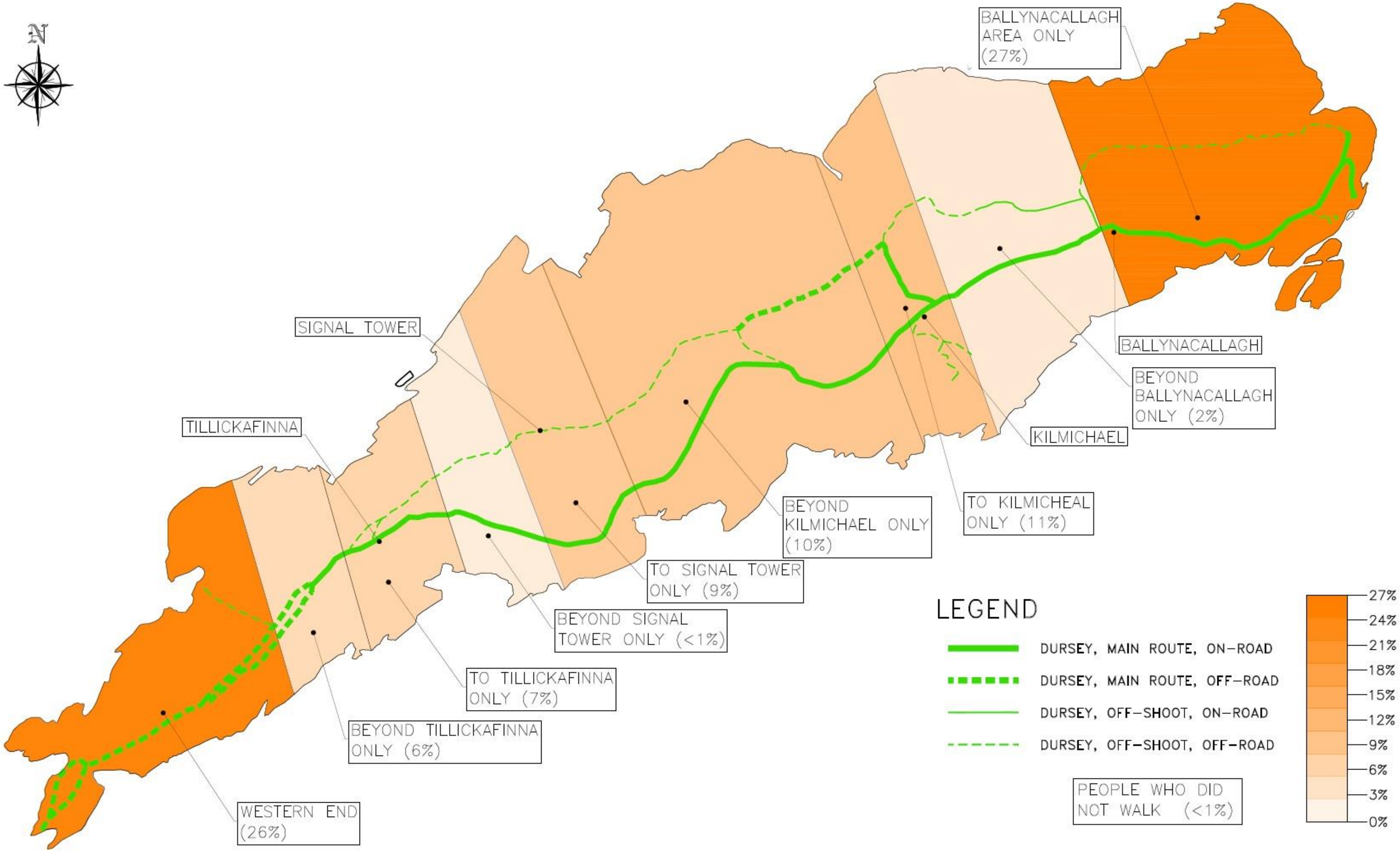

Plate 7.12 **'Heat map' illustrating end point of walking routes taken by visitors to Dursey Island during June and July 2019.**

Table 7.21 Other sites visited by visitors to the Dursey Island Cable Car on the same trip/excursion

Place	Number of Respondents
Beara Way	158
Garinish Loop	65
Allihies	38
Castletownbere	16
Eyeries	15
Crow Head	15
Garinish Island	15
Bere Island	13
Glengarriff	11
Kenmare	10
Allihies Copper Mines	9
Ring of Kerry	8
Kerry	7
Dzogchen Beara	7
Mizen Head	7
Beara Region	7
Healy Pass	6
Whiddy Island	6
Sheep's Head Peninsula	5
Bantry	5
Wild Atlantic Way	4
Ballydonegan Beach	4
Dingle	3
Hungry Hill	2
Adrigole	2
Ardgroom	2
Dereen Gardens	2
Lough Hyne	1
Skellig Michael	1
Skibbereen	1
Ballylickey	1
Coorycommane Loop	1
Killarney National Park	1
Dingle Peninsula	1
Loop Head	1

Place	Number of Respondents
Cape Clear	1
Baltimore	1
Schull	1
White Strand	1
E8 European Long Distance Walking Trail	1
Rodeen	1
Derrynane	1
Waterville	1
Barleycove	1
Crookhaven	1

7.4.5 Invasive Alien Plant Species

Table 7.23 presents the compiled results of the IAPS surveys carried out in the study area in October 2018 and May 2019. A total of five IAPS were identified in the study area, all of which are included in the Third Schedule of the *European Communities (Birds and Natural Habitats) Regulations 2011*. Subsequent field surveys carried out by Paul Murphy in July 2019 identified a further occurrence of *Fallopia japonica* in a private garden on Dursey Island (Table 7.18). Table 7.22 presents the IFI-NBDC NAPRA (**N**on-native Species **Ap**plication Based **R**isk **A**nalysis) and NBDC Invasiveness Risk Ratings for each of the species identified.

Table 7.22 NBDC Risk Ratings for IAPS identified in the study area.

Species	IFI-NBDC NAPRA Overall Risk Rating	NBDC Invasiveness Risk Rating
Rhododendron ponticum	Major - Massive	Risk of High Impact
Japanese knotweed, *Fallopia japonica*	Not assessed	Risk of High Impact
Giant rhubarb, *Gunnera tinctoria*	Major	Risk of High Impact
Three-cornered leek, *Allium triquetrum*	Moderate	Risk of Medium Impact
Hottentot-fig, *Carpobrotus edulis*	Major	Risk of High Impact

7.4.5.1 Hottentot-fig

Hottentot-fig has a very limited distribution in Ireland and it was tentatively believed that the IAPS had been eradicated from the country until recently (W. Earle, pers. comm., 2019). This confirmed record on Dursey Island reveals that this is not the case. However, it is possible that this occurrence is one of a very small number of occurrences in Ireland. Additionally, it is the first record of the species on the west coast of Ireland. As such, it is imperative that every effort is made to eradicate this localised occurrence, in agreement with the private landowner. This record provides an opportunity to contribute to the national eradication of a High Impact IAPS before colonisation reaches a stage when eradication is much more challenging or no longer feasible.

Hottentot-fig can be effectively removed off site via physical removal, and chemical means can be employed for control in cases in which physical removal is not practical (e.g. on inaccessible sea cliffs). In this case, since the occurrence in question is quite localised and is situated in a fully accessible location (on a stone wall in a private garden at Kilmichael; Plate 7.13), it is considered that physical removal would be practical and effective and should be undertaken in agreement with the landowner in question. The situation of the occurrence on a public roadside creates the risk of dispersal by tourists who may pick the attractive flowers or foliage or inadvertently transport plant fragments or seeds on boots/clothing. Seabirds may also disperse the species to sensitive habitats (especially Vegetated Sea Cliffs [1230]) when gathering nesting materials. Therefore, every effort should be made to treat the occurrence at the earliest possible convenience. Early, appropriate treatment of this species will avoid medium to long-term ecological impacts and financial costs.

Plate 7.13 Occurrence of hottentot fig (*C. edulis*) on Dursey Island (marked in white)

Table 7.23 Compiled findings of IAPS surveys carried out in study area in October 2018 and May 2019

Species	Location	Coordinates	Details	Survey
Rhododendron ponticum	R572	466915;545345	Large stand	10/2018
	R572	466915;545345 – 465995;544699	Series small stands/individual plants	10/2018
	R572	465995;544699 – 465959;544645	Large linear stand	10/2018
	R572	465750;544498 – 465704;544492	Large linear stand	10/2018
	R572	465504;544489 – 465456;544456	Long linear stand	10/2018
	R572	465206;544374 – 464694;544480	Series of stands/individual plants	10/2018
	R572	464109;544294	Mature stand	10/2018
	R572	453442;544048	Mature stand	10/2018
	R572	461261;541846	Mature stand	10/2018
Japanese knotweed, *Fallopia japonica*	R572	463057;543661	Mature stand	10/2018
	R572	463044;543566	Several related stands	10/2018
	R572	461345;541912 – 461269;541856	Series of stands	10/2018
	R572	461221;541790	Single stand at stream	10/2018
	R572	460075;541314 – 460011;541269	Series of stands	10/2018
	R572	459586;541266 – 459551;541267	Large stand and linear stand at stream	10/2018
	R572. Outside passing bay site no. 4	454471;541018	Large stand. Subject to treatment; still extant.	06/2019
	R572	452796;541814	Single stand	10/2018

Species	**Location**	**Coordinates**	**Details**	**Survey**
	R572-L4901 junction	451700;541861	Extensive stand	06/2019
	Garinish Loop	452120;542644	Small stand	06/2019
	Garinish Loop	452077;542054	Moderate stand. Subject to treatment; still extant.	06/2019
	R572	451924;541841	Small amount of stems.	06/2019
	Dursey Island	449459;541927	Stands at front and back of house. Being cut by landowner on an ongoing basis.	07/2019
Giant rhubarb, *Gunnera tinctoria*	R572. Within passing bay site no. 5	453141;541445	Single young plant	06/2019
	R572. Within passing bay site no. 11	451300;541798	Two stands – one large, other smaller – in vicinity	06/2019
Three-cornered leek, *Allium triquetrum*	R572	451924;541841	Abundant in garden.	06/2019
	Dursey Island	448999;541065	Stems recently dumped on grass verge along road	06/2019
Hottentot-fig, *Carpobrotus edulis*	Dursey Island	448999;541065	Single plant in garden, cascading onto roadside	06/2019

7.4.6 Ecological Corridors

Article 10 of the Habitats Directive recognises the importance of ecological networks as corridors and stepping stones for wildlife, including for migration, dispersal and genetic exchange of species of flora and fauna. The Directive requires that ecological connectivity and areas of ecological value outside the Natura 2000 network of designated ecological sites are maintained and it recognises the need for the management of these areas through land use planning and development policies.

Ecological corridors are important in connecting areas of local biodiversity with each other and with nearby designated sites to prevent isolated islands of habitat from being created. Ecological corridors include linear features such as treelines, hedgerows, disused railway lines, rivers, streams, canals and ditches as stepping stones for wildlife moving within their range. They are particularly important for mammals, especially bats, and small birds.

Streams, rivers and drainage ditches, as well as hedgerows on roadsides and field margins are examples of potential ecological corridors in the Zone of Influence. However, the landscape in question is very open and, relatively speaking, exiguous of such features.

7.5 Key Ecological Receptors

This section of the report provides details of the Key Ecological Receptors (KERs). The following section (7.6) identifies KERs from the long list of protected habitats and protected/invasive species identified in the Zone of Influence during the desk study and/or field-based surveys.

7.5.1 Selection of Key Ecological Receptors

The following Table (7.24) presents a compiled list of all protected habitats and protected/invasive species identified in the Zone of Influence during the desk study and/or field-based surveys. On the basis of a description of the habitat/species in question and its relation to the proposed development, it has been determined whether the habitat/species in question is to be considered a Key Ecological Receptor (KER) for the purposes of this biodiversity impact assessment.

Table 7.24 List of protected habitats/species identified in the Zone of Influence during desk study and/or field-based surveys and reasons for classifying each as a KER (or not).

Species/Habitat	Description	KER? (Y/N)
Eurasian otter, *Lutra lutra*	Otters potentially commute through the Zone of Influence, along the shoreline, up to 250m offshore, and up to 150m inland. However, given the nature of the habitats present, there are few opportunities for the establishment of holts, particularly within 500m of the proposed development and no such sites have been identified (although a regularly used sprainting site was recorded by the Project Ecologist 150m north of the site of the proposed development on Garinish Head). Furthermore, the presence of otters in urban environments demonstrates that they habituate to human presence and, as such, any otters present in the Zone of Influence are unlikely to be subject to significant disturbance impacts as a result of the proposed development. No likely negative effects anticipated.	N
Eurasian badger, *Meles meles*	While the species has been recorded in the Zone of Influence, no evidence of setts was identified during field surveys and that suitability of the Study Area in terms of foraging habitat is poor. No likely negative effects anticipated.	N
Eurasian pygmy shrew, *Sorex minutus*	While the species has been recorded in the Zone of Influence, no evidence of *S. minutus* was found during field surveys. Since the area of habitat lost as a construction of the proposed development is quite small and the species has a broad distribution, it is considered that no significant negative effects are not likely.	N
Irish hare, *Lepus timidus hibernica*	There is only one record of the species in the Zone of Influence (at Garinish Point, Garinish Head, on the mainland), and no evidence of the species breeding or otherwise was observed during field surveys. This is a widespread species and it is not considered that the construction or operation of the proposed development will result in negative effects on a population of the species.	N
Irish stoat, *Mustela erminea hibernica*	There is only one record of the species in the Zone of Influence (at Canalmore, on the mainland, which is not in the immediate proximity of any proposed works), and no evidence of the species breeding or otherwise was observed during field surveys. This is a widespread species, which is secretive in its nature, and it is not considered that the construction or operation of the proposed development will result in negative effects on a population of the species.	N
Bats	Soprano pipistrelle (*Pipistrellus pygmaeus*) and common pipistrelle (*Pipistrellus pipistrellus*) have been recorded foraging in the Zone of Influence. While the bat survey concluded that the probability of bats roosting in the buildings associated with the existing cable car site was low, roosting at the site of the proposed development cannot be ruled out. Since bats are sensitive to lighting, the lighting design of the proposed development could negatively affect roosting and foraging bats. As such, it is considered that there is a small likelihood of significant negative effects accruing to bat species.	Y
Marine Mammals	No in-stream/marine works are proposed as part of the proposed development. Additionally, there are no known terrestrial haul-out sites for seals in the Zone of Influence, and the exposed nature of the area is not well suited to establishment of such sites. Thus, activities of marine mammals are restricted to the marine environment in the vicinity of the Zone of Influence. Since there is a very high dilution factor and there are rapid currents in the Dursey Sound,	N

Species/Habitat	Description	KER? (Y/N)
	severe pollution events of a scale which might result in significant negative effects accruing to marine mammals or their habitats are considered to be highly unlikely.	
Basking shark, *Cetorhinus maximus*	Activities of these species in Ireland are restricted to the marine environment, and no in-stream/marine works are proposed as part of the proposed development. Since there is a very high dilution factor and there are rapid currents in the Dursey Sound, severe pollution events of a scale which might result in significant negative effects accruing to these species or their habitats are considered to be highly unlikely.	N
Leatherback turtle, *Dermochelys coriacea*		
Common lizard, *Zootoca vivipara*	There are several records of the species in the Zone of Influence, although no lizards were identified during the field surveys. Lizards are known to utilise walking paths and adjacent habitat elsewhere in Ireland (e.g. at the Ballycotton Cliffs, Co. Cork). However, the species is not susceptible to human disturbance and there are no other likely pathways for significant negative effects on the species.	N
Fulmar, *Fulmarus glacialis*	The site supports a nationally important breeding population of the species. However, since the species nests at inaccessible locations on sea cliffs, and forages entirely at sea, it is considered that there is no likely pathways which would allow significant negative effects to accrue to the population.	N
Red-billed chough, *Pyrrhocorax pyrrhocorax*	The site supports an internationally important breeding population of the species, which forages in terrestrial habitats in the Zone of Influence. The area of potential foraging habitat lost as a result of the construction of the proposed development is considered to be not significant. It is proposed to execute the noisiest elements of the works during the winter months (i.e. outside of the breeding season, when birds are most susceptible to disturbance). Extant primary literature indicates that species is vulnerable to human disturbance while foraging and, as such, it is considered that potential negative effects may occur as a result of the proposed development.	Y
European shag, *Phalacrocorax aristotelis*	While the site supports a resident breeding population of European shag, the species nest at inaccessible locations on sea cliffs and forages entirely at sea. As such, it is considered that there is no likely pathway which would allow significant negative effects to accrue to the population.	N
European herring gull, *Larus argentatus*	The site supports a resident breeding population of the species. Herring gulls tend to nest on sea cliffs but may also nest at more accessible locations (e.g. on sloping ground near sea cliffs). The occurrence of substantial numbers of nesting herring gulls in urban areas would indicate that the species can become well habituated to human disturbance and it is not considered that the species will be negatively affected in this respect. Herring gulls typically forage at sea but may also take eggs of other seabirds and exploit food scraps left by humans. As such, substantial growth in the resident population (as a result of increased availability of food scraps as an indirect result of the proposed development) may potentially result in greater predation of eggs of more sensitive populations of seabird, such as chough. For this reason,	Y

Species/Habitat	**Description**	**KER? (Y/N)**
	potential significant negative effects (not on this species but potentially as a result of the foraging ecology of this species) as a result of the proposed development cannot be ruled out at this stage.	
Great black-backed gull, *Larus marinus*	The site supports a resident breeding population of the species. Similar ecology to *L. argentatus* Similarly, it is considered that potential growth of this population as a result of the proposed development could potentially give rise to indirect significant negative effects on more sensitive seabird populations.	Y
Ground-nesting Passerines	A number of species of ground-nesting passerine have been recorded in the Zone of Influence, some of which (Northern wheatear, Eurasian skylark, meadow pipit and stonechat) have been observed breeding in the area during field surveys. Others (yellowhammer and linnet) possibly breed in the Zone of Influence in small numbers, although no evidence was found during field surveys. Others (twite, grasshopper warbler) are not thought to breed in the Zone of Influence but may occasionally forage there. Others (bluethroat, blue-headed wagtail, great short-toed lark, Ortolan bunting, red-backed shrike and tawny pipit) are rare vagrants or passage migrants which are not expected to breed in the Study Area and are only expected to occur very briefly. Loss of habitats used by these species as a result of the proposed development will be minimal and any associated effects will be imperceptible. However, since these species all nest on or near to the ground, increased visitor numbers as a result of the proposed development may result in significant negative effects related to disturbance/destruction of nests.	Y
Montagu's harrier, *Circus pygargus*	Very rare migrant, unlikely to breed in the Study Area or be negatively affected by the proposed development	N
Other Raptors	While certain raptors which have been recorded in the Zone of Influence are likely to use the site for occasional foraging only (e.g. sparrowhawk, merlin, hen harrier and short-eared owl) and are unlikely to be affected by the proposed development, others may also breed in or near the Zone of Influence (e.g. kestrel and peregrine, the latter of which is known to breed in the Beara Peninsula SPA). While significant negative effects are unlikely, they cannot be ruled out.	Y
Common snipe, *Gallinago gallinago*	It is possible that the species breeds in the Zone of Influence in small numbers. Since this is a ground-nesting species, increased visitor numbers as a result of the proposed development may result in significant negative effects related to disturbance/destruction of nests.	Y
Eurasian oystercatcher, *Haematopus ostralegus*	Species has been observed breeding in the Zone of Influence (on a cliff-top at Tillickafinna). Since this is a ground-nesting species, increased visitor numbers as a result of the proposed development may result in significant negative effects related to disturbance/destruction of nests.	Y
Other Waders and Waterfowl	While there are records of a number of breeding and migrant wader birds and waterfowl in the Zone of Influence, the exposed nature of the area is poorly suited to such species, which generally favour wet/intertidal habitats with shallow, slow-moving water (e.g. estuaries, coastal mudflats, shingle/sandy beaches) and floodplains. Such species are highly unlikely to breed in the Zone of Influence, and are more likely to be occasional visitors or rare migrants/vagrants (e.g.	N

Species/Habitat	Description	KER? (Y/N)
	little ringed plover, Eurasian dotterel, great snipe, stone-curlew). The situation of the Zone of Influence on a flight path may account for a number of records of species which are largely unsuited to the habitats in the area.	
Other Gulls	While there are records of these species in the Zone of Influence, none were observed breeding in the area during the breeding bird survey. Furthermore, these species can be largely expected to breed on isolated sea cliffs and can exploit a variety of habitats for foraging. No likely significant negative effects anticipated.	N
Other Seabirds	These species nest at isolated locations on sea cliffs or offshore islands and forage at sea. Some are migrants who do not breed in Ireland (e.g. great northern diver, Fea's petrel and the three species of shearwater). Others nest on the nearby Bull and Cow Rocks (e.g. gannet, great cormorant). While it is considered possible that black guillemots and razorbills could nest in the Zone of Influence, none were observed doing so during the breeding bird surveys. As such, it is considered that there are no likely pathways for significant negative effects to accrue to populations of these seabird species.	N
Hirundines	Barn swallow (*Hirundo rustica*) observed breeding in the Zone of Influence but not using any buildings that will be demolished as part of the proposed development. House martin (*Delichon urbicum*) not observed breeding but it is considered possible that the species also breeds in the Zone of Influence. Both species nest in buildings and forage while flying. Any loss of habitat associated with the proposed development will be minimal and insignificant. No evidence of sand martin (*Riparia riparia*) breeding in Zone of Influence. It is not considered likely that any significant negative effects will accrue to any species of hirundine.	N
Common swift, *Apus apus*	No evidence was found of the species nesting in the Zone of Influence (or in the buildings which will be demolished during the construction of the proposed development) during the breeding bird survey. It is considered unlikely that the proposed development will give rise to any significant negative effects on the species.	N
Rock pigeon, *Columba livia*	This species has been observed breeding in the Zone of Influence. It nests on and forages in the vicinity of sea cliffs. It is a widespread species which, in urban environments, exhibits a high degree of tolerance for human presence/disturbance. It is not considered that the proposed development will give rise to any significant negative effects on the species.	N
Common wood pigeon, *Columba palumbus*	It is considered possible that the species breeds in the Zone of Influence, although no evidence of breeding has been observed. This is a widespread species which, in urban environments, exhibits a high degree of tolerance for human presence/disturbance. It is not considered that the proposed development will give rise to any significant negative effects on the species.	N
Common pheasant, *Phasianus colchicus*	This species has been observed breeding in the Zone of Influence. It is a widespread non-native species. It is not considered that the proposed development will give rise to any significant negative effects on the species.	N

Species/Habitat	Description	KER? (Y/N)
Common starling, *Sturnus vulgaris*	This species has been observed breeding in the Zone of Influence (but not in structures that will be demolished during the construction of the proposed development). It is a widespread, generalist species which is capable of exploiting a variety of habitats and will take food scraps left by humans. It is not considered that the population in question will be subject to any significant negative effects as a result of the proposed development.	N
House sparrow, *Passer domesticus*	This species has been observed breeding in the Zone of Influence (but not in structures that will be demolished during the construction of the proposed development). It is a widespread, seed-eating species which is capable of exploiting a variety of habitats. It is not considered that the population in question will be subject to any significant negative effects as a result of the proposed development.	N
Greenfinch, *Carduelis chloris*	Species is widespread and Study Area does not constitute an important site for it. Area of potential habitat expected to be lost is very small and insignificant. Hedgerow removal shall be carried out outside of the breeding season. Species are abundant in urban areas and highly habituated to human disturbance. It is not considered that the species will be significantly negatively affected as a result of the proposed development.	N
Mistle thrush, *Turdus viscivorus*		
Robin, *Erithacus rubecula*		
Goldcrest, *Regulus regulus*	Species is widespread and Study Area does not constitute an important site for it. Study Area does not contain optimal foraging/nesting habitat (i.e. broadleaf or coniferous woodland). Area of potential habitat expected to be lost is very small and insignificant. Hedgerow removal shall be carried out outside of the breeding season. It is not considered that the species will be significantly negatively affected as a result of the proposed development.	N
Grey wagtail, *Motacilla cinereal*	Unlikely to breed in the Study Area, which offers little in terms of riparian and riverine habitats. However, it is possible that the small stream/ditch to the south of the mainland side of the site of the proposed development is used. Study Area likely to be used for foraging outside of the breeding season. It is not anticipated that the proposed development will result in significant negative effects on any habitat likely to be used by the species.	N
Barred warbler, *Sylvia risorii*	Rare vagrant which does not breed in the Study Area. It is considered highly unlikely that the species will be significantly adversely affected by the proposed development.	N
Dartford warbler, *Sylvia undata*		
Red-breasted flycatcher, *Ficedula parva*		

Species/Habitat	Description	KER? (Y/N)
Common crane, *Grus grus*	Very rare vagrant which does not breed in Ireland anymore and which has not been sighted in the Study Area in approx. 40 years. It may be stated with a fair degree of certainty that the species will not be significantly adversely affected by the proposed development.	N
Invertebrates	Area of habitat/vegetation loss as a result of the proposed development will be minimal. As such, it is unlikely that these invertebrate species will be significantly negatively affected by the proposed development.	N
Betony, *Betonica officinalis*	The Zone of Influence is a refuge for this rare plant species. Clusters of the plant which may have been destroyed as a result of construction of the proposed development have been translocated and no other plants have been identified in the area. However, it is possible that the plant does or will occur in other sensitive areas in the Zone of Influence and may be damaged or destroyed as a result of the construction or operation of the proposed development.	Y
Sea frillwort, *Fossombronia maritima*	There is only location in the Zone of Influence where the species has been recorded (NBDC, 2019). It is at Garinish Head (approx. coordinates: 51.618250, -10.137099). Since no development will occur in this area, and since the Garinish Loop walk does not pass in the immediate vicinity of the location, it not considered likely that the proposed development will give rise to any significant negative effects on the occurrence of the species.	N
Sea pea, *Lathyrus japonicus*	Species has only been recorded at only one location within the Study Area, which is a substantial distance from any proposed works, and was not sited in the site of the proposed development during ecological field surveys. Areas of optimal habitat will not be affected, and it is considered highly unlikely that the species will be negatively affected as a result of the proposed development.	N
Invasive Alien Species	There are a number of IAPS with potentially very high negative ecological impacts in the Zone of Influence, including on Dursey Island, which, as an island, is especially vulnerable to the negative effects of IAS. The potential introduction and distribution of IAS cannot be ruled out. As such, there are potential significant negative effects associated with these species. The presence of hottentot-fig is noteworthy, since this species is at a very early stage of invasion in Ireland, and, as such, there is an opportunity to contribute to the eradication/prevent the broader establishment of this relatively novel IAPS.	Y
Large shallow inlets and bays [1160]	The entire marine area in the vicinity of the cableway, including the Dursey Sound, corresponds to this habitat classification. As such, potential negative effects as a result of the proposed development cannot be ruled out.	Y
Reefs [1170]	Much of the seabed in the vicinity of the proposed development, including the Dursey Sound, which the proposed cableway would traverse, corresponds to this habitat classification. Owing to the proximity of the proposed development to this habitat type and the sensitivity of the latter to water quality impacts, which may arise during construction, there is considered to be a risk of significant negative effects on this habitat type arising from the proposed development.	Y
Vegetated sea cliffs of the	The cliffs in the immediate vicinity of the cableway correspond to this habitat classification. Owing to the proximity of the proposed development to this habitat type and the potential for increased erosion due to walkers and the risk of import	Y

Species/Habitat	Description	KER? (Y/N)
Atlantic and Baltic coasts [1230]	of IAS to the area, there is considered to be a risk of significant negative effects on this habitat type arising from the proposed development.	
European dry heaths [4030]	The heath habitats in the immediate vicinity of the site of the proposed development potentially correspond to this habitat type. As such, there is a potential for negative effects on the habitat as a result of the proposed development.	Y
Submerged or partially submerged sea caves [8330]	There are at least eight such sea caves within or adjacent to the Zone of Influence, mostly on Crow Head (north-west of the mainland side of the site) and Dursey Island. The nearest known occurrence of this habitat type is c. 1 km west of the existing cableway. As such, it is unlikely to be significantly negatively affected by the proposed development.	N

7.6 'Do Nothing' Scenario

Were the proposed development not to proceed, the existing Dursey Island Cable Car would continue to operate as it does at present in the short to medium-term. The number of visitors to Dursey Island would continue to be limited by the capacity of the existing infrastructure to somewhere in the region of 22,000 visitors annually. Thus, the level of direct human effects on biodiversity on Dursey would not be likely to increase substantially in the 'do nothing' scenario.

However, it is unlikely that the existing cableway infrastructure (which is already substantially corroded and non-compliant with European Union safety standards) could be maintained in safe working order in the medium to long-term. Closure of the Dursey Island Cable Car for safety reasons would significantly impair access to the island, since seafaring conditions in the Dursey Sound are not permissive of the establishment of a dedicated ferry service. Depopulation has been identified as an existing threat to the island (RPS & West Cork Islands Interagency, 2010) and a small amount of land abandonment is already in evidence. Any development (or lack thereof) which negatively affects access to the island for residents and/or farmers is likely to contribute to further land abandonment, which in turn would result in a decrease in the available area of suitable chough foraging habitat. Thus, failure to upgrade the cableway infrastructure might conceivably result in indirect negative effects on the resident chough population.

The mainland side of the site, meanwhile, would continue to be subject to unmanaged visitor footfall – and potentially a greater volume of unmanaged visitor footfall, considering the anticipated growth trend in the Irish tourist sector in the short to medium term. If appropriate mitigation measures were not put in place in the coming years, soil compaction, erosion and de-vegetation (already in evidence (Crushell *et al*., 2015; CAAS Ltd., 2016; 2018)) would continue as a result of visitors wandering from paved areas onto open grassland and heathland in the environs of the mainland side of the site. IAS along the R572 approach road (*Rhododendron* and Japanese knotweed) would most probably spread laterally along the road in both directions (due to traffic). IAS on Dursey Island (particularly Japanese knotweed) would potentially increase in cover on the island.

7.7 Description of Likely Effects (Unmitigated)

7.7.1 Effects on Natura 2000 Sites

The Zone of Influence overlaps with two Natura 2000 sites – the Beara Peninsula SPA and the Kenmare River SAC. As likely significant effects on these sites could not be excluded at the screening stage, an Appropriate Assessment (AA) was deemed necessary and a Natura Impact Statement (NIS) has been prepared for the proposed development. This NIS presents all of the predicted effects on these sites and their Qualifying Interests and also provides a detailed analysis and evaluation of these effects in the context of the relevant Conservation Objectives. The NIS also prescribes mitigation measures to address any negative effects identified. As such, there is some overlap between this EIAR Chapter and the NIS for the proposed development. However, both the EIAR and NIS for the proposed development are standalone documents which do not rely on each other.

7.7.2 General Impacts on Key Ecological Receptors

General impacts on biodiversity that are typical of development are described in this section. Negative effects on specific KERs are discussed thereafter in Table 7.25.

7.7.2.1 Habitat Loss

The construction of the proposed development will lead to the permanent loss of small areas of grassland and heathland, neither of which has been deemed to constitute Annex I habitat. On the mainland, the extension of the footprint of the cable car site will result in the loss of some small areas of dry-humid acid grassland, dry siliceous heath and dry meadows and grassed verges. The total area of habitat loss has been estimated at 0.8ha (7,936m^2). There is an abundance of these habitat types in the Zone of Influence and the broader study area. As such, it is not considered that this small loss of habitats will constitute a significant negative effect on biodiversity in the Study Area.

The proposed development will not result in habitat fragmentation.

7.7.2.2 Disturbance due to Construction Phase Noise and Vibration

Some disturbance may occur during construction and operation as a result of noise, lighting and vibration. Noise and vibration generated by activities carried out during the construction of the proposed development (including earthworks and the use of marine vessels to transport materials to-and-from Dursey Island) may result in some moderate, temporary disturbance of wildlife in the vicinity. However, since the most disruptive elements of the proposed works will be carried out outside of the breeding season, when populations of wildlife tend to be less susceptible to disturbance, it is not considered that the generation of noise/vibration associated with the proposed works will result in significant negative effects on any resident/regularly occurring species.

7.7.2.3 Human Disturbance

Disturbance of fauna may occur during operation as a result of the presence of humans. Disturbance of species of fauna in their natural habitats may result in reduced time spent foraging and/or elevated levels of stress – both of which might directly or indirectly threaten the viability of the population in question. Since the proposed development will increase the number of visitors on Dursey Island and (potentially) also on walking routes in the vicinity of the proposed development on the mainland, human disturbance of certain species of fauna may also occur at levels that have significant negative effects. Additionally, research has shown that the walking of dogs in natural recreation areas has negative effects on biodiversity (a 35% reduction in avian species diversity and a 41% reduction in abundance (Banks & Bryant, 2007)).

7.7.2.4 Reduction in Water Quality

Construction and operational activities within and adjacent to surface waters can negatively impact on water quality in a variety of ways. Key pathways for negative ecological effects are discussed below. Specific pathways for negative effects on KERs identified above are discussed in Table 7.23, below.

Surface water run-off from construction areas has the potential to contain high levels of suspended sediments and other pollutants. Such run-off, if not attenuated and treated prior to discharge, has the potential to cause significant ecological impacts. Large amounts of fine sediment deposition can smother benthic habitats, leading to changes in biological composition.

During construction, concrete, grout or other pollutants may spill directly into the local environment or be washed into the water in construction site run-off. These materials are highly alkaline and, consequently, can drastically alter the pH of the receiving water body. This can lead to profound ecological impacts and can affect the condition of habitats by causing damage to pH-sensitive species.

Vehicles, marine vessels, plant and equipment which will be used during construction rely on hydrocarbons such as diesel, petrol and lubricating oils. Leaks from poorly maintained vehicles, plant, equipment or storage tanks provide for a risk of input of hydrocarbons into the environment. In the absence of appropriate mitigation, hydrocarbons from the construction site may spill directly into sea or be washed into the adjacent drainage ditch/stream in construction site run-off – and thereby, ultimately enter the sea also. This has the potential to cause negative ecological impacts on coastal and marine habitats present. Hydrocarbons can have direct toxic effects, including reducing the ability of organisms to absorb water and nutrients. Hydrocarbons can also alter the nutrient balance and microbiota in soil and water, which can benefit some species while detrimentally affecting others. Such changes have the potential to alter the ecological community structures and ecological integrity of habitats.

Inadequate treatment of wastewater from on-site toilets and washing facilities also provides for potential water quality impacts which could lead to ecological effects. Faecal contamination can alter the nutrient balance in soils and water, causing significant changes in microbial communities and reductions in oxygen levels. This can have significant effects on the biological composition of receiving habitats.

7.7.2.5 Direct Mortality

The operation of the proposed development, specifically the use of glass facades and windows, has the potential to lead to bird mortality through collision. However, since the scale of the buildings and associated glass facades in question is relatively small, and the buildings are low-rise, it is not considered that this aspect of the proposed development will present a significant negative effect for any of the identified KERs.

Direct mortality is also possible as a result of demolition works, particularly where nesting birds and roosting bats are concerned. However, no birds have been identified nesting in any structures proposed to be demolished. The presence of occasional bat roosts, however, cannot be ruled out. Potential impacts on bats are discussed in Table 7.23, below.

Increased traffic as a result of the proposed development will also increase likelihood of vehicular collisions with wildlife. It is not considered, however, that this presents a significant negative effect for any of the KERs identified.

The new cableway may potentially pose an increased collision risk for resident species of birds, particularly as a result of the increased number of cable cars (two cars as opposed to one, at present), the increased maximum speed of the cable cars (maximum speed = 6 m/s as opposed to approx. 0.9 m/s at present), and the presence of two (as opposed to just one) ropeway. These potential risks have been considered and it has been concluded that the proposed cableway does not present a significantly greater risk to birds. This is because (i) the cable cars will be clearly visible to birds (i.e. they will not be entirely composed of reflective glass, for instance, which is known to pose a collision risk (Klem, 2009)), (ii) the cable cars will still travel at a relatively slow speed (max. operating speed of 6 m/s or 21.6 km/hr), which birds are expected to be able to avoid, and (iii) the two ropeways will be in the same horizontal plane and, as such, will not pose a greater collision risk than the single ropeway does at present. With respect to the existing cableway, there is only one known occurrence of a bird strike – an incident involving a gannet. Besides this incident, according to the regional NPWS Conservation Ranger and one of the cable car operators, there have been no known bird strikes. While it is not possible to be certain that additional such strikes have not occurred – since if a bird were to collide with the cableway outside of the normal operating hours, it would likely fall into the sea – it is considered that the occurrence of such strikes at present is very rare. It should also be noted that, although the max. operating speed of the proposed cableway is 6 m/s, in order to maintain the experiential qualities of the cable car journey, the outbound cable car will continue to operate at the existing speed (excluding when there are only residents in the cable car, or in case of emergency). Additionally, the key avian species of conservation concern in the area – red-billed chough – is a highly intelligent corvid species which is very unlikely to fly into the cableway. Furthermore, the Study Area is not known to support important populations of heavy-bodied avian species which are especially sensitive to collision with ski-lifts/overhead lines, such as species of the Order Galliformes (e.g. grouse, ptarmigan) (Miquet, 1990; Bevanger & Brøseth, 2004; Watson & Moss, 2004; Buffet & Dumont-Dayot, 2013). Nor is it on a flyway for geese or swans which are also prone to collision with overhead lines.

7.7.3 Impacts on Key Ecological Receptors

Impacts on the Key Ecological Receptor as defined in the preceding sections are described in Table 7.25.

Table 7.25 Impact characterisation for Key Ecological Receptors based on EPA (2017) and TII (2009)

KER	Construction	Operation	Significance if Unmitigated
Bats	There is a low likelihood that demolition of structures during the construction of the proposed development could result in the destruction of occasional bat roosts. Furthermore, if demolition were to occur during the summer months, when bats are using the area for foraging, there would be a greater probability of direct mortality of roosting bats during works.	Lighting at the proposed development may have detrimental effect on bat species, particularly if UV lighting is used and/or if lighting is situated near to potential roost sites.	Moderate, negative
Red-billed chough, *Pyrrhocorax pyrrhocorax*	Disturbance due to proposed construction works unlikely since disruptive aspects of works will be confined to off-season months (i.e. outside of chough breeding season) no confirmed nesting or roosting sites were identified in the immediate vicinity of the site of the proposed development during breeding bird surveys. Significant negative effects, therefore, unlikely at this stage.	If visitor numbers to Dursey Island during the operation of the proposed development were uncontrolled, it is considered that harmful levels of human disturbance of chough could occur. The western end of Dursey Island (a chough 'hotspot') and the potential roost sites at *Cuas na gColúr* and *Brann Righe* (Plate 7.9) are especially sensitive to human disturbance. Visitors' dogs and cyclists also pose a potential source of disturbance and it is likely that the number of dogs/bicycles being taken to the island would increase. Furthermore, if visitor movements on the island were unmanaged, greater numbers of visitors could wander over open habitat, causing degradation and destruction of potential foraging habitat.	Significant, negative
European herring gull	Significant negative effects unlikely.	Food scraps (litter) left outdoors by visitors to the proposed development could attract species of gulls and/or facilitate growth in resident gull populations. Since certain gull species are known to predate other seabirds and their eggs/offspring, litter could indirectly lead to significant negative effects on sensitive seabird populations at the site (including chough, for example).	Slight, negative

KER	Construction	Operation	Significance if Unmitigated
Great black-backed gull	Significant negative effects unlikely.	Food scraps (litter) left outdoors by visitors to the proposed development could attract species of gulls and/or facilitate growth in resident gull populations. Since certain gull species are known to predate other seabirds and their eggs/offspring, litter could indirectly lead to significant negative effects on sensitive seabird populations at the site (including chough, for example).	Slight, negative
Ground-nesting Passerines	Significant negative effects unlikely.	If visitor numbers to Dursey Island and the movement of visitors during the operation of the proposed development were unmanaged, it is considered that harmful levels of human disturbance of ground-nesting birds and/or destruction of nests could occur.	Moderate, negative
Raptors	Significant negative effects unlikely.	If potential significant negative effects on prey items (e.g. ground-nesting passerines) were unmitigated, population declines in these species could result in indirect negative effects on species of raptors foraging in the Zone of Influence.	Slight, negative
Common snipe,	Significant negative effects unlikely.	If visitor numbers to Dursey Island and the movement of visitors during the operation of the proposed development were unmanaged, it is considered that harmful levels of human disturbance of ground-nesting birds and/or destruction of nests could occur.	Slight, negative
Eurasian oystercatcher,	Significant negative effects unlikely.	If visitor numbers to Dursey Island and the movement of visitors during the operation of the proposed development were unmanaged, it is considered that harmful levels of human disturbance of ground-nesting birds and/or destruction of nests could occur.	Slight, negative
Betony, *Betonica officinalis*	It is conceivable that plants/clusters of plants of betony not already identified and translocated could be destroyed during construction works.	It is conceivable that plants/clusters of plants of betony not already identified and translocated could be destroyed during the operation of the proposed development, particularly as a result of increased visitor footfall in open grassland.	Moderate, negative

KER	Construction	Operation	Significance if Unmitigated
Invasive Alien Species	IAS, particularly IAPS, could be introduced and/or distributed by the movement of marine vessels/plant/equipment used during construction works and/or by the importing of construction materials into the site. It is not considered that there is an increased risk of dispersal of hottentot-fig at this stage.	IAS, particularly IAPS, could be introduced and/or distributed by the movement of traffic/visitors/equipment (e.g. fishing and watersports gear). Dursey Island is especially vulnerable to the introduction of IAPS. There will be an increased risk of dispersal of hottentot-fig as a result of increased visitor footfall in the immediate vicinity of the occurrence.	Significant, negative
Large shallow inlets and bays [1160]	Potential run-off of pollutants (including cement-based products, hydrocarbons, and untreated wastewater) and sediment loading to sea could occur during construction works, potentially negatively affecting the ecological integrity of the habitat. Marine IAS (such as leathery sea-squirt (*Styela clava*), carpet sea-squirt (*Didemnum vexillum*), slipper limpet (*Crepidula fornicata*) and Japanese wireweed (*Sargassum muticum*)) could be introduced and/or dispersed by the movement of marine vessels/plant/equipment in the marine environment during construction works. Colonisation of the habitat by marine IAS would likely negatively alter community structures.	During the operation of the proposed development, run-off of pollutants (e.g. hydrocarbons, salt), sediment loading, and discharge of improperly treated wastewater or spillage of untreated/partially treated wastewater into habitat (unlikely to occur but possible) could negatively affect the ecological integrity of the habitat.	Moderate, negative
Reefs [1170]	Potential run-off of pollutants (including cement-based products, hydrocarbons, and untreated wastewater) and sediment loading to sea could occur during construction works, potentially negatively affecting the ecological integrity of the habitat. Marine IAS (such as leathery sea-squirt (*Styela clava*), carpet sea-squirt (*Didemnum vexillum*), slipper limpet (*Crepidula fornicata*) and Japanese wireweed (*Sargassum muticum*)) could be introduced and/or dispersed by the movement of marine vessels/plant/equipment in the marine environment during construction works. Colonisation of the habitat by marine IAS would likely negatively alter community structures.	During the operation of the proposed development, run-off of pollutants (e.g. hydrocarbons, salt), sediment loading, and discharge of improperly treated wastewater or spillage of untreated/partially treated wastewater into habitat (unlikely to occur but possible) could negatively affect the ecological integrity of the habitat.	Moderate, negative

KER	Construction	Operation	Significance if Unmitigated
Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	There is a potential risk of introduction/dispersal of IAPS due to the movement of marine vessels/plant/equipment used during construction works and/or by the importing of construction materials into the site. Introduction/dispersal of IAPS would negatively alter the plant community structures of vegetated sea cliffs and certain species could potentially increase the rate of erosion of cliffs. Management of established IAPS on sea cliffs would be very challenging.	There is a potential risk of introduction/dispersal of IAPS due to the movement of traffic/visitors/equipment (e.g. fishing and watersports gear). Introduction/dispersal of IAPS would negatively alter the plant community structures of vegetated sea cliffs and certain species could potentially increase the rate of erosion of cliffs. Management of established IAPS on sea cliffs would be very challenging. Unmanaged increased visitor footfall in the vicinity of cliffs could also give rise to de-vegetation and soil erosion. However, much of the area of this habitat is inaccessible to visitors.	Moderate, negative
European dry heaths [4030]	There is a potential risk of introduction/dispersal of IAPS due to the movement of marine vessels/plant/equipment used during construction works and/or by the importing of construction materials into the site. Introduction/dispersal of IAPS would negatively alter the plant community structures of this habitat type.	There is a potential risk of introduction/dispersal of IAPS due to the movement of traffic/visitors/equipment (e.g. fishing and watersports gear). Introduction/dispersal of IAPS would negatively alter the plant community structures of this habitat type. Unmanaged increased visitor footfall on open heathland could also give rise to de-vegetation and soil erosion.	Moderate, negative

7.7.4 Impacts on Population and Human Health

There is a growing body of research indicating that there are causative relationships between positive psychosocial health/wellbeing and (i) recreation in the natural environment (Coon *et al*., 2011; Hartig *et al*., 2014) and (ii) exposure to biodiversity (Sandifer *et ai*., 2015; Prescott *et al*., 2016). Thus, it is conceivable that biodiversity loss and/or habitat destruction/degradation can have negative implications for human health. Additionally, since the Study Area is a popular destination for nature-based recreation, particularly fishing, whale and dolphin watching and birdwatching, significant biodiversity loss (particularly of species of fish, marine mammals and birds) in the Zone of Influence will almost certainly diminish the recreational value of the area.

It is considered that, provided the mitigation measures set out in this Chapter are adhered to, no negative effects on population and human health related to biodiversity will occur.

7.8 Mitigation

This section describes the measures that are in place to mitigate any harmful or negative impacts associated with the proposed development and the identified Key Ecological Receptors, as described in the preceding sections. General mitigation measures included within the design of the proposed development are described first, with more specific measures to prevent or minimise impacts on the individual receptors provided subsequently.

7.8.1 Establishment of a Numerical Carrying Capacity for Dursey Island

As part of the mitigation measures for the operation of the proposed development set out in this Chapter (see Section 7.8.4), a monthly numerical visitor carrying capacity ('carrying capacity' hereafter) is prescribed for Dursey Island in order to conserve the resident chough population. This section explains how the carrying capacity has been calculated and why it is considered appropriate for the environmental context in question.

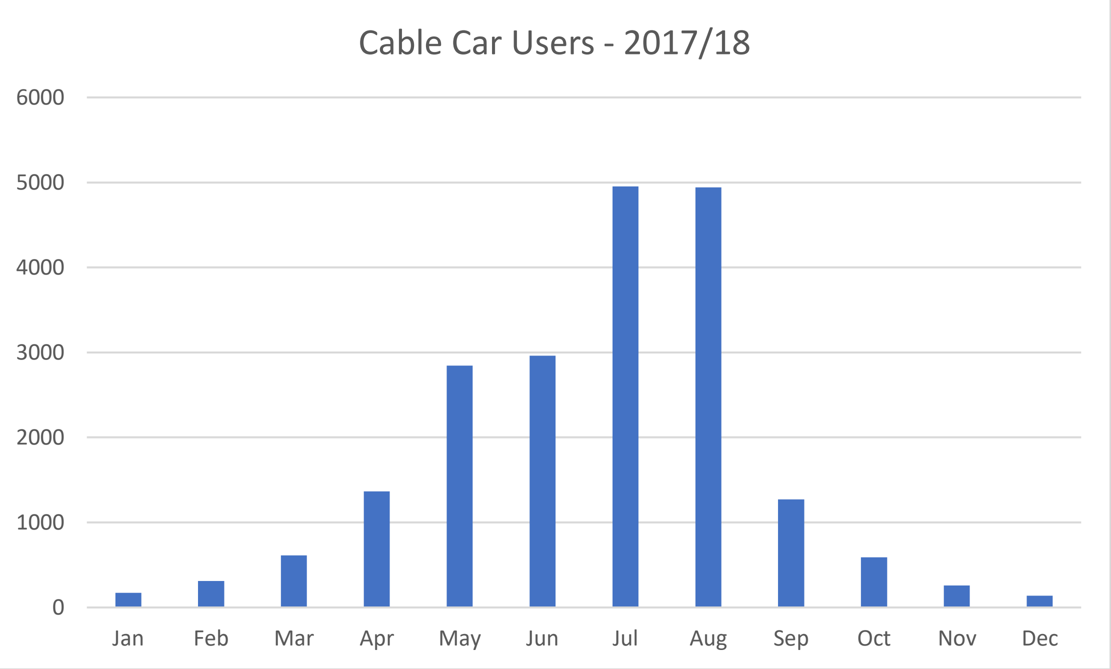

Plate 7.14 **Monthly visitor profile for Dursey Island Cable Car (based on 2017/18 ticket sales)**

Current visitor numbers (2017/18) to Dursey Island are approximately 20,424 per year (Table 7.28; Plate 7.14). Visitor numbers are highly seasonal, with between 140 and 313 visitors per month during the winter months (November – February; 2017/18) and 4,954 and 4,943 per month during the peak months of July and August, respectively – when the cableway operates continuously, at capacity, between the opening hours of 9.30am – 7.30pm Monday – Sunday[1] (Plate 7.14). Thus, over the two peak months of the year, Dursey receives approximately 50% of its annual visitor numbers. If it were not for the existing limited capacity and turnover of the cableway, it is highly likely that substantially more people would travel to the island during these peak months.

The proposed development will increase the capacity and turnover of the Dursey Island Cable Car substantially, allowing a greater number of annual visitors to the island. At the commencement of the Design Stage, CCC decided that the proposed development should be designed to accommodate no more than 100,000 annual visitors with no more than 80,000 of these being permitted to make the cable car journey to Dursey Island, in spite of the fact that the cableway infrastructure could potentially accommodate significantly more[2]. Assuming the monthly profile of visitor numbers (Plate 7.14) were to remain the same, there would be a fourfold increase in visitor numbers during each month of the year (including during the chough breeding and fledging season). However, it is unlikely that this increase in visitor numbers would be distributed proportionately across the year. Rather, it is most likely that demand would continue to be concentrated during the summer months of July and August. Thus, without control measures in place, the number of visitors on the island during July and August (when choughs are breeding, nesting and fledging) could be over four times greater than it is at present.

In their longitudinal study of the chough population of Ouessant Island, France, Keribiou *et al*. (2009; Appendix 7.3) estimated a numerical carrying capacity for the island in terms of human disturbance of chough. They did so by developing a numerical model based on data for chough breeding success and visitor numbers over 8 years. The study concluded that in order to sustain a viable chough population on Ouessant, the number of visitors to the island should not exceed 16,500 in August – the most sensitive period for the population in question.

The scope and breadth of data employed by Keribiou *et al*. (2009) to calculate a carrying capacity for Ouessant is not available for Dursey Island. Thus, the exact same methodology cannot be applied to calculate a carrying capacity for Dursey Island. It is possible, however, to extrapolate a carrying capacity based on one key variable – area of chough foraging habitat (km²)[3]. Dursey Island has an area of 5.98km². The habitats on the island have been mapped and it is considered that, with the exception of roads, paths and artificial structures (which have a negligible area), the vast majority of land on the island constitutes suitable foraging habitat. Ouessant Island is approximately 2.6 times the size of Dursey, with an area of 15.41km². However, on Ouessant, suitable chough foraging habitat is restricted to 7.7km² of coastal habitat (Keribou *et al*., 2009, S1; Keribiou, pers. comm., 2019). Thus, Ouessant Island has about 1.3 times the area of chough foraging habitat as Dursey. Extrapolating accordingly, we

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[1] 9.30am – 9.30pm on 5th – 7th of July and 2nd – 5th August

[2] Each carrier cabin in the proposed cableway will accommodate approx. 15 persons. Depending on the velocity of the cabins and the cabin layout, the cableway will be able to convey approx. 170 – 330 p/h in each direction, and there are two carrier cabins in the proposed design. Given typical operating hours (10h/day), the cableway could transport approx. between 3,400 – 6,600 persons to the island per day.

[3] This variable – rather than the absolute area of the island – was considered to provide a more accurate picture of the scenario on Dursey Island (in terms of chough conservation) relative to Ouessant, since only a proportion of the total area of Ouessant Island (approximately half) provides suitable chough foraging habitat.

can conclude that Dursey should accommodate no more than 12,835 visitors per month. A breakdown of the corresponding calculations are presented in Table 7.26 and 7.27, below.

Table 7.26 Information used to calculate numerical carrying capacity for Dursey Island in terms of human disturbance of chough

Information Available	Figure	Source
Carrying capacity of Ouessant Island, France, for month of August	16,500 people	Keribiou *et al*., 2009
Area of Ouessant Island	1541ha = 15.4100km²	Keribiou *et al*., 2009
Area of chough foraging habitat on Ouessant Island	7.6875km²	Keribiou *et al*., 2009
Area of Dursey Island	5.9800km²	Google Maps, 2019
Area of chough foraging habitat on Dursey Island	~ 5.9800km²	2019 habitat mapping of Dursey Island

Table 7.27 Extrapolation of numerical carrying capacity for Dursey Island in terms of human disturbance of chough, following Keribiou et al. (2009)

Calculations
$\frac{7.6875}{5.9800} = 1.2855351171$
→ Hence, Ouessant Island has 1.2855351171 times the area of chough foraging habitat of Dursey Island
$\frac{16{,}500}{1.2855351171} = 12{,}835.121950788$
→ Hence, the CC of Dursey Island for August = 12,835 people

It is considered that this carrying capacity constitutes a conservative number, since Ouessant Island differs substantially from Dursey Island in a number of respects which have negative implications in terms of human disturbance of chough in Ouessant, including the following:

(i) Unlike the chough population on Dursey Island, the population on Ouessant Island is essentially geographically restricted to the island and this isolation means birds are reliant on habitats on the island for their entire life cycle. Dursey Island is approx. 200m from the mainland and baseline studies (2003-04) conducted on the Beara Peninsula indicated that there is movement between Dursey Island and the mainland; especially during the post-fledging period in July and August when large post-fledgling flocks were recorded foraging on the western gorse (*Ulex galli*) dominated dry heaths of the interior spine of the peninsula (Trewby *et al*. 2005). During the 2019 breeding season survey, choughs were observed to fly back-and-forth between island and mainland. Ouessant, in contrast, is located 20km from the French coastline; and this distance combined with the absence of a chough population on the adjacent mainland means the Ouessant choughs are essentially isolated to the island (Plate 7.16).

(ii) The existing network of paths/roads on Ouessant Island is much more extensive than that on Dursey Island (Plate 7.15). On Dursey, walking routes used by visitors are largely situated inland, along the high elevation spine of the island

and immediately south of it, while on Ouessant, there are cliff-side walking trails along the entire coastline. As such, a much greater proportion of chough foraging habitat is affected by human disturbance on Ouessant (up to 97% (Keribiou *et al*., 2009)) than on Dursey (22%). However, it should be noted that, while the current walking routes on the island are geographically fairly restricted, it cannot be guaranteed that visitors to Dursey Island will not forge new paths on the island in future.

Plate 7.15 **Satellite image of Ouessant Island, France, showing extent of roads and paths. Source: Google Maps**

(iii) Ouessant has much more developed transport infrastructure than Dursey. The island has an airport and an extensive network of roads. Noise generated by cars and airplanes may cause some degree of disturbance of the Ouessant choughs. On Dursey, there is only one public road, which is restricted to the inland high elevation spine of the island and used only by residents and one private bus which operates seasonally.

(iv) Results from breeding bird surveys indicate that the average flush distance of choughs on Dursey Island during the breeding season (31.6m (N = 49 observations; min. = 10m; max. = 150m; median = 30m)) is less than that of choughs on Ouessant (147 ± 23m for flocks with juveniles and 75 ± 9m for flocks without juveniles), suggesting that the Dursey choughs may be more tolerant of or habituated to the presence of humans.

Plate 7.16 **Satellite image of Dursey Island (top) and Ouessant Island (bottom) showing comparative distances from the mainland (185m and 18km, respectively). Source: Google Maps**

It should also be noted that, while the environmental context on Ouessant differs substantially from that on Dursey Island, there are similarities between the two cases which have permitted the extrapolation of a numerical carrying capacity:

- Both are offshore islands with resident breeding populations of red-billed chough; and,
- Both are popular destinations for walkers with increasing visitor numbers over time.

Thus, it is considered that, if visitors numbers to Dursey Island are capped at 12,835 per month, the viability of the resident chough population will not be threatened by human disturbance. This is assuming that (i) mitigation measures are implemented to minimise human disturbance (particularly to keep visitors on waymarked walking routes), and (ii) the existing grazing regime is maintained.

Assuming the current annual visitor number growth rate (24.67%; Plate 7.17) is maintained and that this growth rate is distributed evenly throughout the year, with the exception of months when the capacity is limited by (a) the capacity of the existing cable car or (b) the proposed monthly carrying capacity, visitor numbers in the first and second year of operation would be approx. 51,825 and 58,803, respectively (Table 7.28). Since it is anticipated that the proposed development will generate fresh interest in the site, and because enhanced facilities at the proposed development (e.g. toilets, shelter, café) are expected to 'broaden the peak' of the current visitor profile (i.e. there will likely be more visitors outside of the traditional peak months of July and August), it is possible that annual growth will exceed 25% in the first few years of the operation of the proposed development. Resultant growth, however, is inestimable. Either way, visitor numbers can be restricted to 12,835 per month in each month of the year and (on Dursey Island) will not be allowed to exceed 80,000 in any one year – a level at which it is considered human disturbance will not jeopardise the viability of the chough population.

Since the cable car constitutes the only feasible means for visitors to access Dursey Island, and a web-based ticketing system will be employed, constraining visitor numbers will be straightforward.

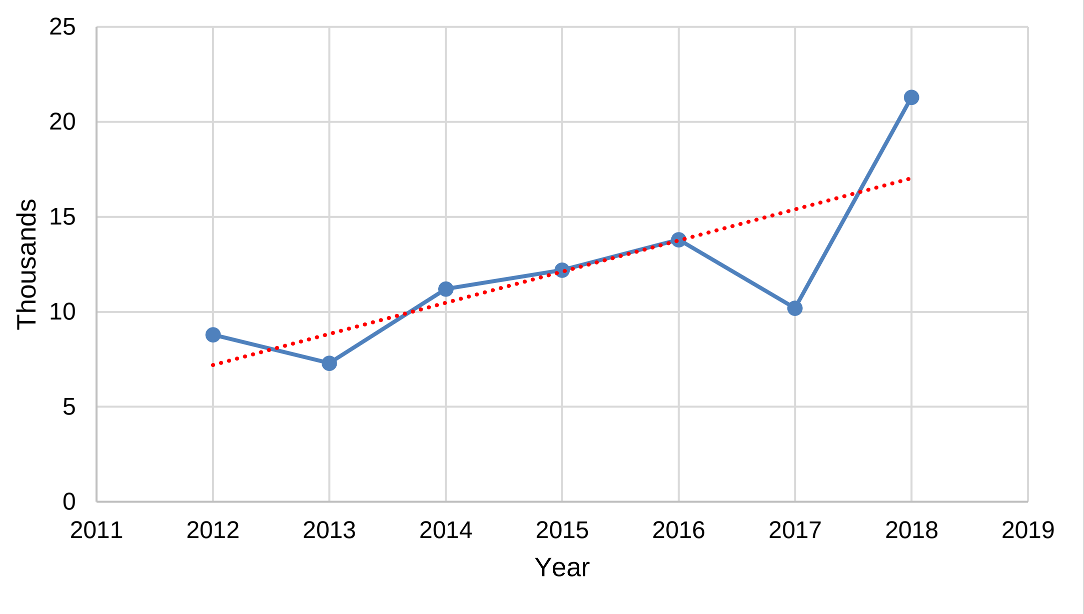

Plate 7.17 **Annual number of trips made on Dursey Island Cable Car (2011 – 2019)**

Table 7.28 **Current and projected visitor numbers on Dursey Island with the proposed monthly carrying capacity imposed during the operation of the proposed development, assuming annual growth of 24.67% distributed evenly across months.**

Month	Existing Cable Car – Year of Operation					Proposed Cable Car – Year of Operation	
	2017/18	2019 Projections (2017/18 + 24.67%)	2020 Projections (2019 + 24.67%)	2021 Projections (2020 + 24.67%)	2022 Projections (2021 + 24.67%)	2023 Projections [First Year of Operation] (2022 + 24.67%)	2024 Projections [Second Year of Operation] (2023 + 24.67%)
Jan	172	214	267	333	416	518	646
Feb	313	390	486	606	756	943	1,175
Mar	613	764	953	1,188	1,481	1,846	2,302
Apr	1,366	1,703	2,123	2,647	3,300	4,114	5,129
May	2,844	3,546	4,420	4,954*	4,954*	6,176	7,700
Jun	2,960	3,690	4,601	4,954*	4,954*	6,176	7,700
Jul	4,954*	4,954*	4,954*	4,954*	4,954*	12,835**	12,835**
Aug	4,943	4,954*	4,954*	4,954*	4,954*	12,835**	12,835**
Sep	1,271	1,585	1,975	2,463	3,070	3,828	4,772
Oct	589	734	915	1,141	1,423	1,774	2,212
Nov	259	323	403	502	626	780	972
Dec	140	175	218	271	338	422	526
Total	**20,424**	**23,032**	**26,270**	**28,968**	**31,225**	**51,825**	**58,803**

* = Numbers constrained by existing cable car capacity and would otherwise be higher

** = Numbers constrained by carrying capacity and would otherwise be higher

*** = 24.67% growth in each month of the year, excl. in months when numbers are

7.8.2 Mitigation by Design

The proposed development has been developed having regard to EU and Irish legislation and all relevant guidelines in relation to ecology and engineering best practice for the planning and construction of proposed developments. These guidelines provide practical measures that can be incorporated into the design to minimise impacts and protect the receiving environment. The following is an overview of the design measures that will be employed to minimise and avoid significant impacts on the ecological receptors within the Zone of Influence:

- It is proposed to carry out the most disruptive (i.e. noisy) elements of the construction works during the winter months. This will minimise associated disturbance on resident or regularly occurring breeding populations of wildlife.
- The lighting plan has been designed to minimise impacts on biodiversity and nature-related recreation. Low level bollard lighting has been selected for outdoor areas. No roadside lighting has been included in the design. Lighting design of the proposed development has been executed in accordance with *'Guidance Notes For The Reduction Of Obtrusive Light'* (Institution of Lighting Engineers, 2011) and '*Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations'* (Pollard *et al*., 2017). Use of low level lighting will minimise potential negative effects on bats and prevent any potential light pollution or visual intrusion at the nearby Kerry Dark Sky Reserve, an important site for star-gazing.
- The drainage and wastewater treatment system has been designed to provide a high level of attenuation and water quality controls. The surface water drainage system is comprised predominantly of Sustainable Drainage Systems (SuDS) technology. The proposed drainage system of the retaining wall includes a hydrocarbon interceptor. After passing through these elements, run-off will percolate through soil before being discharged to sea.
- Of the design options considered for the proposed development at Options Stage (detailed in Chapter 3 of this EIAR), the smallest scale design has been chosen so as to minimise the area of natural habitat lost. Any areas of natural habitat degraded or destroyed as a result of the construction phase, that are not within the footprint of the proposed buildings/structural elements, will be restored to grassland/heathland.

7.8.3 Construction Phase Mitigation

The following general mitigation measures will be employed to minimize potential significant negative effects on biodiversity which might arise during the construction of the proposed development.

- A Construction Environmental Management Plan (CEMP) shall be developed by the Contractor prior to the commencement of works. This document serves to ensure that the construction of the proposed development does not lead to any unanticipated negative impacts on the environment. It shall be developed in accordance with the description of the CEMP set out in Chapter 4 of this EIAR – Description of the Proposed Development – and based on the Outline CEMP which has been included in Appendix 4.1 of this EIAR.
- An Environmental Operating Plan (EOP) shall be developed by the Contractor prior to the commencement of works. This document sets out the protocol for addressing environmental issues which may arise during the construction phase. This document shall be developed in accordance with the TII (formerly NRA) guidelines, '*Guidelines for the Creation and Maintenance of an Environmental Operating Plan*' and based on the Outline EOP which has been included in Appendix 4.2 of this EIAR.

- The Contractor will appoint a Site Environmental Manager (SEM) prior to the commencement of works. This person shall be responsible for carrying out environmental monitoring of the works and ensuring that the mitigation measures proposed in this EIAR (as well as the CEMP and EOP) are adhered to.
- An Ecological Clerk of Works (ECoW) shall be appointed by CCC prior to the commencement of works. It shall be their responsibility to supervise and provide recommendations on the execution of any and all works which have the potential to give rise to negative effects on biodiversity/ecological integrity.
- In order to prevent/minimise potential negative effects as a result of the introduction and/or spread of terrestrial and aquatic IAS during the construction of the proposed development:
    - An IAS Management Plan [Appendix 7.1] has been developed and shall be implemented, as required, during the construction of the proposed development.
    - Landscaping of the proposed development shall use native species of plants of national provenance only and, insofar as possible, soil reused from on-site excavations. If soil/substrate needs to be imported to the site for the purposes of the proposed development, the Contractor shall ensure that the imported soil/substrate is free from IAS.
    - All land-based construction works shall be executed in accordance with the TII guidelines, '*Guidelines on the Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads'* (2010). The Contractor shall ensure that the hull of the vessel(s) used during proposed works is not fouled with any IAS prior to its arrival at the site. Efforts shall also be made to ensure that any plant/equipment (including PPE equipment) is not carrying seeds or plant materials from IAS. The Contractor shall refer to the Invasive Species Ireland '*Marina Operators Code of Conduct'* (Kelly & Maguire, 2009).
- In order to prevent any potential destruction of betony (Betonica officinalis) as a result of the construction of the proposed development, a pre-construction survey shall be carried out of the site of the proposed development, and any plants/clusters of plants of the species identified in vulnerable locations (i.e. where they are at risk of destruction as a result of the proposed works) shall be translocated under NPWS license by a suitably qualified, competent professional to area(s) where the destruction of the plants will be avoided. Additionally, if individual plants or clusters of betony (in addition to those already identified and translocated) are identified by the ECoW at vulnerable location(s) during the construction phase, they shall be translocated as described previously. If necessary, works at the location(s) in question shall be suspended until such time that it is considered ecologically appropriate (by the ECoW) to carry out translocations.
- In order to prevent significant, negative effects on bats as a result of the construction of the proposed development:
    - Demolition of existing buildings at the site of the proposed development shall be completed either during the autumn or spring months in order to minimise the risk of disturbance of roosting bats. Care shall be taken during the removal of rooves. If bats are identified in structures during demolition works, the local NPWS Conservation Ranger shall be contacted to facilitate safe translocation.
    - Bat boxes shall be erected in association with buildings/structures on the mainland side of the site of the proposed development. These shall be of a design and placement that is in accordance with the Bat Conservation

Ireland guidelines, '*Bat Boxes: Guidance Notes for: Agri-environmental Schemes*' (Bat Conservation Ireland, 2015) and the NRA guidelines, '*Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*' (TII, n.d.). Bat boxes shall be inspected, maintained and relocated (if required) in accordance with the TII guidelines. Boxes shall be incorporated into or onto external walls away from artificial lighting. Recommended units (all available at nhbs.com) are as follows:

  - 8 no. 2FE Schwegler Wall-mounted Bat Shelter (to be hung on external walls), or
  - 6 no. 1FE Schwegler Bat Access Panel (with back plate) (to be hung on external walls), or
  - 4 no. 2FR Schwegler Bat Tube (to be built into external walls), or
  - 4 no. 1FQ Schwegler Bat Roost (to be hung on external walls).

- In order to prevent pollution of the marine environment and surface-groundwater during the construction of the proposed development, which could potentially give rise to negative effects on biodiversity in marine and freshwater aquatic habitats, all of the mitigation measures outlined in Chapters 8, 9 and 10 of this EIAR – Soils & Geology, Hydrogeology and Hydrology, respectively – shall be implemented.

7.8.4 Operational Phase Mitigation Measures

The following general mitigation measures will be employed to minimize potential significant negative effects on biodiversity which might arise during the operation of the proposed development.

In order to prevent/minimise potential negative effects as a result of the introduction and/or spread of terrestrial and aquatic IAS during the operation of the proposed development:

- CCC shall commit to undertaking treatment by a competent professional, in accordance with the recommended physical treatment set out in Appendix 7.1, with a view to eradicating the occurrence of hottentot-fig on Dursey Island prior to the commencement of operation of the proposed development (subject to agreement with the landowner). Monitoring shall be carried out by a competent professional for five years to ensure no re-growth occurs.
- An IAS Management Plan [Appendix 7.1] has been developed and shall be implemented during the operation of the proposed development, with the objectives of, (i) where possible, eradicating IAS (especially on Dursey Island), (ii) preventing the introduction of new IAS to the area (especially Dursey Island), and (iii) in all other instances, managing existing occurrences of IAS with a view to preventing their spread.

In order to prevent/minimise (i) terrestrial habitat degradation/destruction and (ii) disturbance of chough and ground-nesting species of birds as a result of increased numbers of visitors walking on open habitat, the following mitigation measures shall be implemented:

- Three looped, waymarked walking trails (as set out in Plate 7.17) shall be formalised on Dursey Island prior to the commencement of the operation of the proposed development. This approach is widely used in outdoor recreation areas (Slaymaker, 2017). According to the National Trails Office (NTO) '*Guide to Planning and Developing Recreational Trails in Ireland*', (2012, p.4), "*Developing recreational trails is a very effective way of managing recreational* *activity in the outdoors and protecting the natural environment*". Indeed, research indicates that walkers tend to stick to established paths, even when they have the 'right to roam' (Keirle & Stephens, 2004; Synge, 2004; Kuba *et al*., 2018).

Formalisation of these trails shall not involve the creation of new paths, but rather the formal waymarking of routes on existing roads and paths. Formalisation of these paths shall involve the following:

1. Placement of suitably spaced colour-coded waymarker posts of recycled plastic, featuring directional arrows, at appropriate locations along the existing routes set out in Plate 7.18;
2. Erection of a mapboard at a clearly visible location at the trailhead (i.e. on CCC lands near the island-side cable car station) displaying a map of colour-coded routes with:
    i. approximate length (km),
    ii. duration (hours/minutes),
    iii. a conservative estimate of difficulty level from 'Easy' to 'Moderate' to 'Strenuous' to 'Very Difficult' (according to the NTO guidelines, '*Classification and Grading for Recreational Trails*' (2008)), and
    iv. a message instructing walkers to stay on the trails (according to the recommendations set out in Appendix 7.2, '*Design of Outdoor Signage*').;
3. Erection of 'minimum impact behaviour' (MIB) signage at key sensitive locations for chough and/or habitat conservation along trails. Research from Portugal has shown that erection of such signage can effectively reduce the impact of human disturbance on breeding little tern (*Sterna albifrons*), with a 34-fold greater likelihood of breeding success at nest sites with such protective measures in place (Medeiros *et al*., 2007). At a minimum, this MIB signage shall include:
    i. a note on the trailhead mapboard instructing visitors to stay on the trails; and
    ii. a sign at the western end of the Tillickafinna/Signal Tower Loop instructing walkers not to venture any further westward onto the chough 'hotspot'. The design of this signage shall be in accordance with the recommendations set out in Appendix 7.2, '*Design of Outdoor Signage*'.

Research conducted on Bear Island, Maryland, U.S.A. (Hockett *et al*., 2010), found that principle reasons for visitors to leave the established trail were:

i. to view and/or photograph a scenic vista;
ii. to pass other walkers on the trail;
iii. to avoid challenging trail conditions; and also
iv. because of poor waymarking.

Accordingly, trails should offer opportunities for scenic vistas/photos, should be well marked and should not be too challenging. The direction of all three looped trails shall be anticlockwise, with walkers travelling along the established off-road trails on the outbound journey, and returning to the trailhead via the public road on the return journey. Travelling in this direction, walkers undertaking the Tillickafinna/Signal Tower Loop will have had plenty of 'photo opportunities', and will have completed the most strenuous portion of the trail (the 'high route') by the time they reach Tillickafinna and, for these reasons, may feel less inclined to venture further westward. As stated previously, formalisation of these trails shall not involve the creation of any new paths but rather, will serve to encourage walkers to stay on existing, established paths/roads, and provide options for walkers of varying abilities. Provision of complete (and conservative) information on the nature and duration of routes, coupled with the provision of two shorter options, may discourage certain walkers from attempting the full loop and travelling to the western end of the island. Any existing signage which contradicts these trails shall be removed, as required. CCC shall be responsible for the maintenance of these trails for the duration of the operation of the proposed development.

Additionally, an existing informal walking trail on Crow Head shall be more clearly marked using recycled plastic waymarkers. However, no sign (or other indicator which might draw attention to the walk) should be erected. Responses to the visitor survey indicate that this is not a very popular walk and no undue attention should be drawn to it. Instead, efforts should be made to control the movements of those few walkers who do venture onto the headland. This approach is supported by success elsewhere. In the Hohe Tauern National Park in Austria, for example "*Staff have found that without a trail, people wander in all directions, but if there is a clear and unmistakable path, nearly all stick to it*" (Synge, 2004). CCC shall be responsible for the maintenance of this trail.

- An education campaign shall be launched to inform visitors of the sensitivity of (i) species (i.e. choughs and ground-nesting bird species) to human disturbance and (ii) habitats to degradation as a result of visitor footfall. The objective of the campaign is to discourage visitors from wandering off the established walking routes on the island, particularly at sensitive locations for chough (i.e. at the western end of the island and potential roost sites). The campaign shall have the following characteristics:
    - It shall be three-tiered in that it will be featured in:
        1. Exhibition materials in the Visitor Centre;
        2. An audiovisual presentation in the outbound journey of the cable cars; and
        3. Outdoor signage on Dursey Island.
    - The educational materials used shall be aesthetically pleasing and emotionally engaging to encourage buy-in from visitors. The design of outdoor signage shall be in accordance with the recommendations set out in Appendix 7.2

    All outdoor signage shall be designed for the exposed and corrosive nature of the site.
- Not including island residents/farmers, no more than 12,835 persons shall be permitted to travel to Dursey Island in any month of the year during the operation of the proposed development (see Appendix 7.2). This numerical carrying capacity shall be implemented using a strictly enforced CCC ticketing system.
- Not including guide dogs, pets and/or working dogs of island residents and farmers, dogs shall be prohibited from travelling to Dursey Island. This restriction will be clearly displayed on the Dursey Island Cable Car and Visitor Centre website and promotional materials.
- Not including bicycles for the personal use of island residents/farmers, visitors shall be prohibited from bringing bicycles to the island in the cable cars. This restriction will be clearly displayed on the Dursey Island Cable Car and Visitor Centre website and promotional materials.

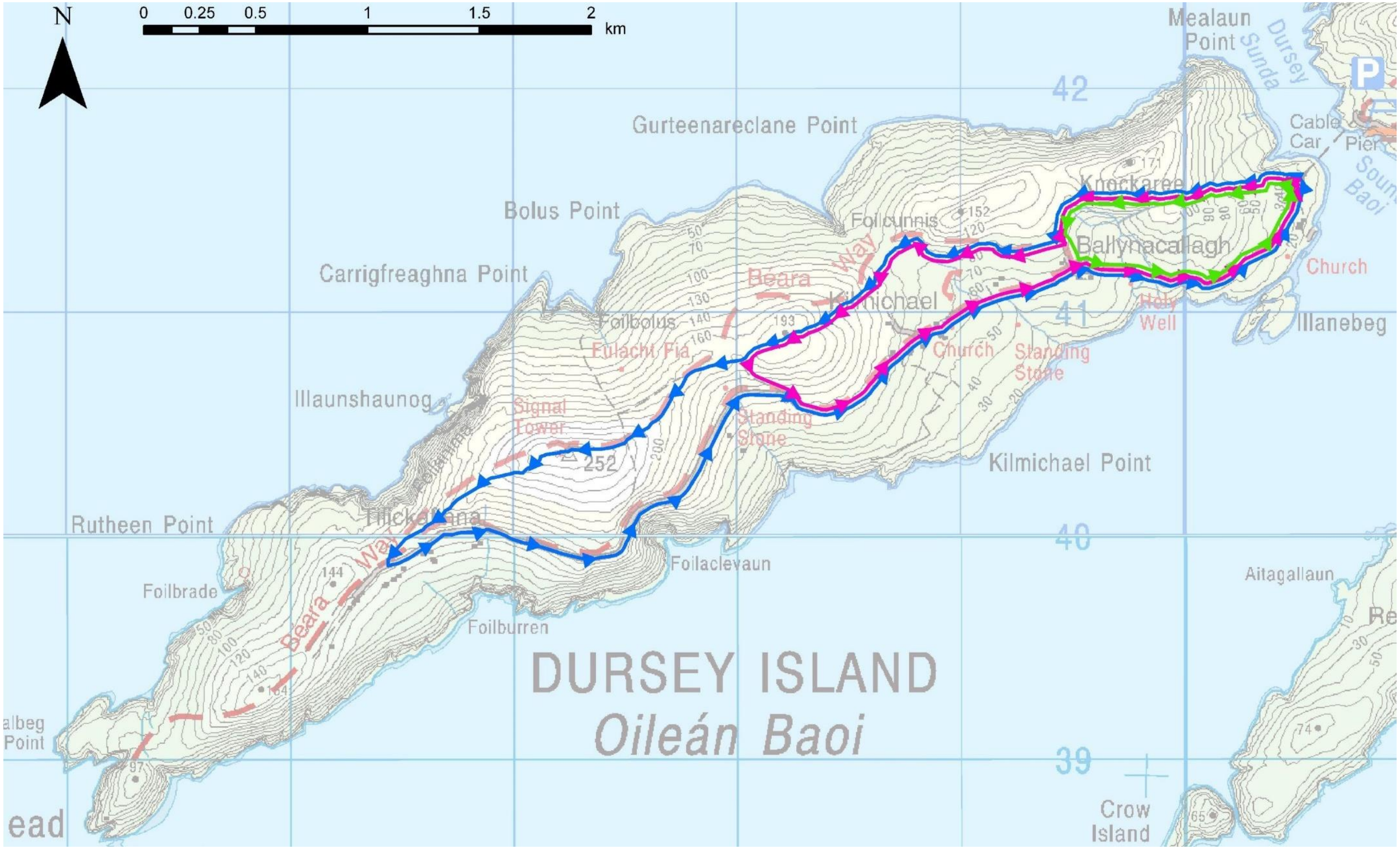

Plate 7.18 Three waymarked loop walks for Dursey Island. Ballynacallagh Loop (green) = 2.7km; Kilmichael Loop (pink) = 6km; Tillickafinna/Signal Tower Loop (blue) = 10km

In order to prevent/minimise any potential negative effects on bats as a result of the operation of the proposed development:

- Insofar as is possible in view of safety requirements, lighting shall be turned off at the closure of the proposed development each night (i.e. once all visitors have left).
- Bulbs used in outdoor lighting shall be of a type which does not emit ultraviolet (UV) light. No spotlights shall be used.

In order to prevent pollution of the marine environment and surface-groundwater during the operation of the proposed development, which could potentially give rise to negative effects on biodiversity in marine and freshwater aquatic habitats, all of the mitigation measures outlined in Chapters 8, 9 and10 of this EIAR – Soils & Geology, Hydrogeology and Hydrology, respectively – shall be implemented.

In order to minimise the volume of litter being discarded on Dursey Island and in the vicinity of the proposed development on the mainland, segregated waste bins (at a minimum, separate recycling and residual waste bins) shall be provided in the mainland-side Visitor Centre, café and at the island station. To prevent overflow, these bins shall be emptied regularly. An appropriate waste collection service shall be arranged by CCC.

7.9 Residual Impacts on Key Ecological Receptors

Table 7.29 Assessment of the Residual Impacts Scale and Significance based on EPA (2017) and TII (2009)

Key Ecological Receptor	Pre-Mitigation Impacts	Ecological Significance Following Mitigation
Bats	• Potential destruction of roosts during demolition works • Potential direct mortality of roosting bats during demolition works • Potential detrimental effects associated with lighting during operation	Since it is uncertain whether bats are using the existing structures for roosting (but cannot be ruled out) and existing outdoor lighting uses bulbs which emit UV light, provision of several bat boxes and use of bat-friendly lighting (along with other mitigation measures for bats) will result in a **Slight, Positive effect** on bats overall.
Red-billed chough, *Pyrrhocorax pyrrhocorax*	• Potential disturbance due to humans and dogs during operation • Potential destruction of foraging habitat due to visitor footfall during operation	By limiting monthly visitor numbers in accordance with best available scientific research, strongly encouraging visitors to stay on waymarked trails, discouraging visitors from wandering into chough 'hotspots', repeatedly informing visitors of the sensitivity of the species to human disturbance and prohibiting visitors from taking their dogs or bicycles to the island, it is considered that the degree of disturbance affecting choughs will not exceed **Imperceptible Negative effect** levels.
European herring gull, *Larus argentatus*	Food scraps left by visitors during operation potentially leading to population growth and potentially indirectly resulting in increased predation of other seabird species	By implementing litter prevention measures, occurrence of food scraps in the natural environment will be minimised. Thus, it is considered that the proposed development will have an **Imperceptible Negative effect** or **No effect** on this KER.
Great black-backed gull, *Larus marinus*	Food scraps left by visitors during operation potentially leading to population growth and potentially indirectly resulting in increased predation of other seabird species	By implementing litter prevention measures, occurrence of food scraps in the natural environment will be minimised. Thus, it is considered that the proposed development will have an **Imperceptible Negative effect** or **No effect** on this KER.
Ground-nesting Passerines	• Potential disturbance due to humans and dogs during operation • Potential destruction of nests due to visitor footfall during operation	By strongly encouraging visitors to stay on waymarked trails and prohibiting visitors from taking their dogs to the island, it is considered that the degree of disturbance and nest destruction affecting ground-nesting birds will not exceed **Imperceptible Negative effect** levels.
Raptors	Unmitigated negative effects on prey species potentially leading to reduction in availability of food items during operation	**Imperceptible Negative effect** or **No effect**

Key Ecological Receptor	**Pre-Mitigation Impacts**	**Ecological Significance Following Mitigation**
Common snipe, *Gallinago gallinago*	• Potential disturbance due to humans and dogs during operation • Potential destruction of nests due to visitor footfall during operation	By strongly encouraging visitors to stay on waymarked trails and prohibiting visitors from taking their dogs to the island, it is considered that the degree of disturbance and nest destruction affecting *G. gallinago* (if it does breed in the Zone of Influence) will not exceed **Imperceptible Negative effect** levels.
Eurasian oystercatcher, *Haematopus ostralegus*	• Potential disturbance due to humans and dogs during operation • Potential destruction of nests due to visitor footfall during operation	By strongly encouraging visitors to stay on waymarked trails and prohibiting visitors from taking their dogs to the island, it is considered that the degree of disturbance and nest destruction affecting *H. ostralegus* will not exceed **Imperceptible Negative effect** levels.
Betony, *Stachys officinalis*	• Potential destruction of plants due to construction works • Potential destruction of plants due to visitor footfall during operation	Monitoring of the site of the proposed development for the species, and execution of translocations under licence (as required) will prevent negative effects on the species during construction. By strongly encouraging visitors to stay on waymarked trails during the operation of the proposed development, it is considered that the proposed development will result in an **Imperceptible Negative effect** or **No effect**.
Invasive Alien Species	• Potential introduction and/or dispersal of IAPS during construction • Potential introduction and/or dispersal of IAPS due to visitor traffic during operation	It is considered that the implementation of best practice biosecurity protocols during the construction phase, and implementation of an IAS Management Plan during operation will result in the proposed development having an **Imperceptible or Slight Negative effect** in respect of this KER.
Large shallow inlets and bays [1160]	• Potential loss of ecological integrity due to run-off of pollutants during construction works • Potential loss of ecological integrity due to run-off of improperly treated/untreated wastewater during operation • Potentially altered community structures due to introduction/dispersal of marine IAS during construction and/or operation	While best practice pollution prevention measures will be implemented during the construction phase, and wastewater and surface run-off will be treated to a high standard prior to emission to the marine environment, wastewater emissions during operation will still serve to increase slightly the volume of organic matter in the marine environment in the vicinity of the Study Area. However, considering the high dilution factor and fast rate of movement of water in the Dursey Sound, it is considered that, with mitigation measures implemented, this aspect of the proposed development will have **No effect** on this KER. It is considered that the implementation of best practice biosecurity protocols during the construction phase, and implementation of an IAS Management Plan during operation will result in the proposed development having an **Imperceptible effect** or **No effect** on this KER.

Key Ecological Receptor	Pre-Mitigation Impacts	Ecological Significance Following Mitigation
Reefs [1170]	• Potential loss of ecological integrity due to run-off of pollutants during construction works • Potential loss of ecological integrity due to run-off of improperly treated/untreated wastewater during operation • Potentially altered community structure due to introduction/dispersal of marine IAS during construction and/or operation	While best practice pollution prevention measures will be implemented during the construction phase, and wastewater and surface run-off will be treated to a high standard prior to emission to the marine environment, wastewater emissions during operation will still serve to increase slightly the volume of organic matter in the marine environment in the vicinity of the Study Area. However, considering the high dilution factor and fast rate of movement of water in the Dursey Sound, it is considered that, with mitigation measures implemented, this aspect of the proposed development will have **No effect** on this KER. It is considered that the implementation of best practice biosecurity protocols during the construction phase, and implementation of an IAS Management Plan during operation will result in the proposed development having an **Imperceptible effect** or **No effect** on this KER.
Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	Potentially altered plant community structure and erosion regime due to introduction/dispersal of terrestrial IAPS during construction and/or operation	It is considered that the implementation of best practice biosecurity protocols during the construction phase, and implementation of an IAS Management Plan during operation will result in the proposed development having an **Imperceptible effect** or **No effect** on this KER.
European dry heaths [4030]	Potentially altered plant community structure due to introduction/dispersal of terrestrial IAPS during construction and/or operation	It is considered that the implementation of best practice biosecurity protocols during the construction phase, and implementation of an IAS Management Plan during operation will result in the proposed development having an **Imperceptible effect** or **No effect** on this KER.

7.10 Monitoring

In order to support environmentally sustainable development and management of future developments on the west coast – particularly of tourism and recreation-related developments – CCC shall commit to implementing a 10-year monitoring scheme at the site of the proposed development, including the following:

1. Monitoring of visitor movements and activities in the vicinity of the proposed development, involving the following methods:
   - Trail counters shall be installed at suitable locations on walking trails on Dursey Island, on the Garinish Loop walk and on the walk at Crow Head. On Dursey Island, a trail counter shall be placed at an appropriate location on the western end of the island, so as to record approximately how many visitors leave the established trail (disregarding the MIB sign) to wander onto this key area for chough. CCC shall be responsible for the maintenance of these counters.
   - A visitor survey shall be carried out on an annual basis, to establish approximately how visitors respond to MIB signage, what proportion of visitors follow each of the three looped trails, and what proportion of visitors remain on established trails and vice versa.
2. The conservation status of the Dursey Island chough population shall be monitored on an annual basis (during the breeding season). The monitoring programme in question shall, at a minimum, involve the measurement (by a suitably qualified and competent ecologist) of the following parameters:
   - Number of breeding pairs (confirmed, probable and possible);
   - Locations of nest sites; and
   - Productivity of population.
3. The conservation status of the habitats on Dursey Island shall be monitored on an annual basis. The monitoring programme in question shall, at a minimum, involve identification (by a suitably qualified and competent ecologist) of any areas where the ecological integrity of habitats is being negatively affected by land use (especially grazing regime) and/or any other pressures/threats.

The data gathered as a result of all monitoring undertaken shall be shared with Fáilte Ireland so that it can feed into their WAW Environmental Surveying and Monitoring Programme, and can inform the development and management of similar/related developments, plans and projects. Information should also be shared with NPWS and, upon request, and as appropriate, with research institutions and state authorities. Results of monitoring shall be analysed and conclusions drawn in terms of management implications for developments of a similar nature/environmental context.

7.11 Assessment of Cumulative Effects

Cumulative effects are those which accrue to KERs as a result of incremental changes caused by other existing or proposed plans or projects together those caused by the proposed development. For the purposes of this Chapter, the cumulative impact assessment considers cumulative impacts on biodiversity which are:

(a) Likely;
(b) Significant; and
(c) Relating to a future event, reasonably foreseeable.

None of the developments identified during the cumulative assessment were determined to result in significant negative cumulative effects with regard to biodiversity, as defined in Chapter 17 of this EIAR – Interactions, Major Accidents and Cumulative Impacts.

Chapter 17 of this EIAR – Interactions, Major Accidents and Cumulative Impacts – presents an in-depth assessment of potential cumulative effects.

7.12 Conclusion

It is considered that provided the mitigation measures set out in this Chapter, in the Outline CEMP in Chapter 4 and in the NIS for the proposed development are adhered to, the construction and operation of the proposed development will not have a significant negative impact on the biodiversity in the Zone of Influence.

7.13 References

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Appendix 7.1 Invasive Alien Species Management Plan

Cork
County Council
Comhairle Contae Chorcaí

Fáilte Ireland
National Tourism Development Authority

ROD
ROUGHAN & O'DONOVAN

APPENDIX 7.1
IAS Management Plan

Statement of Purpose

The Invasive Alien Species (IAS) Management Plan outlines the management measures to be followed to manage and control the spread of identified IAS during construction and operation phase of the proposed development. The primary objectives of this Plan are to facilitate the (i) prevention of the spread of the IAS as a result of the construction and operation of the proposed development, and (ii) eradication of High Risk IAPS, where possible. CCC is the authority responsible for the implementation of this Plan.

Legislative Context

In the course of devising and implementing the most effective eradication methods, the Invasive Alien Species (IAS) Management Plan must comply with all legislation regulating the treatment and management of IAS. The relevant standards and legislation that will dictate how eradication is undertaken include:

- *European Communities (Plant Protection Products) Regulations, 2012 (SI No. 159/2012);*
- *European Communities (Sustainable Use of Pesticides) Regulations, 2012 (SI No. 155/2012);*
- *Waste Management Acts, 1996 to 2013, and related legislation;*
- *Safety, Health and Welfare at Work Act, 2005;*
- *Safety, Health and Welfare at Work (Construction) Regulations, 2013;*
- *Safety, Health and Welfare at Work (General Application) Regulations, 2007;*
- *Safety, Health and Welfare at Work (Chemical Agents) Regulations, 2001;*
- *European Communities (Birds and Natural Habitats) Regulations, 2011 to 2015; and,*
- *Wildlife Acts 1976-2012.*

To comply with Sustainable Use of Pesticides Legislation, the application of herbicide should only be undertaken by registered professional users. Only a Registered Pesticide Advisor (RPA) should approve procedures prior to Works commencing. All professional users should demonstrate proper use, ensuring only authorised products are used and all treatments are catalogued and documented pursuant to the requirement of Plant Protection Products Regulations.

In scenarios where disturbance, movement and disposal of IAS material is required, the RPA will review applications submitted to the relevant licensing authorities prior to the commencement of such disturbance, movement and disposal.

Introduction

In October 2018, Invasive Plant Solutions were appointed by CCC, through Roughan & O'Donovan Consulting Engineers (ROD), to carry out an Invasive Alien Plant Species (IAPS) survey for the purposes of the Environmental Impact Assessment for the proposed Dursey Island Cable Car and Visitor Centre development. A survey was undertaken on the R572 approach road between the junction with the R572 (Bealbarnish Gap) and the site, and on the CCC lands in the vicinity of the mainland side of the site, in October 2018. EirEco Environmental Consultants were also appointed through ROD and carried out further IAPS surveys on Dursey Island in May 2019.

Site Description

The study area comprises the R572 between Castletownbere and the mainland side of the existing Dursey Island Cable Car Station on the mainland at Ballaghboy and the landing station at Ballylean East, on Dursey Island. The topography of the lands surveyed mainly comprised public lands and paths. All lands associated with the survey were sufficiently accessible to enable the undertaking of the survey.

Survey Results

A walkover survey was conducted within the study area, including a drive through inspection of the R572 approach road, as well as areas immediately beyond the defined boundaries, where these could be identified and where the areas were either easily or safely accessible from the study area. This survey confirmed the presence of five Third Schedule S.I. 477/2011 invasive alien species; Japanese knotweed (*Fallopia japonica*), Rhododendron (*Rhododendron ponticum*), Three-cornered leek (*Allium triquetrum*), Giant-rhubarb (*Gunnera tinctoria*), and Hottentot-fig (*Carpobrotus edulis*).

Japanese Knotweed

Japanese knotweed (*Fallopia japonica*) is a fast growing, perennial, herbaceous plant, with a vast underground rhizome system, originating from East Asia. It was introduced to Ireland as an ornamental plant in mid to late 1800s and is now well established in the natural/semi-natural environment. Although there are only female plants in Ireland, the species is able to successfully reproduce at a rapid rate by rhizome extension and vegetative propagation (new plants can grow from small fragments of rhizomes and stems). The species is known to colonise a wide range of habitats in Ireland, including riparian habitats, low-lying and disturbed areas, roadsides, and coastal shores and islands. The species is particularly harmful in riparian habitats, where it outcompetes native species by forming dense stands, creating shade and reducing species diversity.

In total, thirteen sites within the study area were found to contain stands of Japanese knotweed (Table 7.30).

Table 7.30 Details of identified sites with Japanese Knotweed in the Study Area

Japanese Knotweed	X Co - ordinates	Y Co- ordinates	Description
JK1	463057	543661	Mature stand (10 x 5m) growing within roadside hedgerow on eastern side of R572, extending eastwards down steep sloping ground.
JK2	463044	543566	Several related stands (15 x 3m) growing on both sides of stone walls forming northern and eastern sides of viewing point, on east side of R572. Growing from field into lay-by area, through stone walls.
JK3	461345 / 461269	541912 / 541856	Series of stands (1km in length) on north side of R572. Main easterly stand set back form roadside on fringe of woodland and extending northwards along stream. Central stand being cut as part of management of residential boundary. Westerly stand interspersed amongst native vegetation of hedgerow.
JK4	461221	541790	Single stand (8 x 2.5m) on north side of R572, at stream crossing. Growing on eastern side of stream, directly behind bridge wall. Likely to be spreading downstream and potentially present upstream.

Japanese Knotweed	X Co - ordinates	Y Co-ordinates	Description
JK5	460075 / 460011	541314 / 541269	Series of stands (stretching for 75m) on both sides of R572. Main stand on north side of road on rough ground adjacent to house entrance. Southerly stand very extensive, encroaching onto roadway and spreading south towards stream. Secondary growth within and above stone boundary wall of house. Also likely to be present in stream.
JK6	459586 / 459551	441266 / 541267	Stands (30m in length) on both sides of R572. Stand on north side of road at stream crossing and extending almost continuously northwards along stream. Southerly stand very extensive and spreading south towards related stream. Both stands encroaching onto roadway, with evidence of cutting and re-growth, particularly on south side. Full extent likely to be much greater, with further presence downstream. Significant spread risk from cutting.
JK7	452796	541814	Single strand (8 x 7m), growing within native scrub on elevated ground along southern side of R572. Northern limit of stand currently set back approx. 2m from roadside. Evidence of spread northwards towards roadway, with potential for encroachment in future growing seasons.
JK8	454471	541018	Large stands around cottage to south of road. Outside of parking bay location. Subject to treatment but still extant.
JK9	451700	541861	Extensive stand in vicinity of derelict cottage immediately west of junction.
JK10	452120	542644	Small stand alongside drain downstream of road culvert at White Strand.
JK11	452077	542054	Moderate stand around farm buildings at top of laneway (Garinish Loop Walk) leading from Garinish to R572. Subject to treatment but still extant.
JK12	451924	541841	Small amount of stems in edge of garden on north side of road.
JK13	449459	541927	Stands in garden on Dursey Island, just outside Ballynacallagh. Present both at front and rear of house. Not very well established and may be of recent origin.

Rhododendron

Rhododendron (*Rhododendron ponticum*) is a large perennial evergreen shrub, which originates from the Iberian Peninsula and Asia. It was introduced to Ireland as an ornamental plant during the 1700s due to its brightly coloured flowers. The species has become established in the natural/semi-natural environment and is invasive in the west, north-west and south-west of the country. The species is typically found in areas with acidic soil conditions; mild, moist climatic conditions; and may be present in a variety of habitats, including urban areas, agricultural land, grasslands, wastelands and roadsides. Plants outcompete native flora by forming large, dense thickets which shade a wide area underneath, preventing growth. *Rhododendron* is capable of reproducing by seeds and by vegetative means via suckering of roots and layering where its branches touch the ground.

In total, nine sites within the study area were found to contain stands of Rhododendron (Table 7.31).

Table 7.31 Details of identified sites with Japanese Knotweed

Rhododendron	X Co - ordinates	Y Co- ordinates	Description
RHO 1	466915	545345	Mature stand (5 x 8m) on northern side of R572, immediately west of Castletownbere, growing within native hedgerow by town identification sign. Some spread westwards along and behind roadside margin.
RHO 2	4669 / 465995	545345 / 544699	Series of small stands and individual plants interspersed amongst 1km of native hedgerows and grass margins, scattered mainly along northern roadside on R752, between larger, established stands of RHO 1 and RHO 3.
RHO 3	465995 / 465959	544699 / 544645	Large, linear, mature stand (70 x 2m) on northern side of R572, west of Castletownbere. Interspersed with and growing within native hedgerow and roadside margin.
RHO 4	465750 / 465704	544498 / 544492	Large, linear, mature stand (75 x 2m) on northern side of R572, interspersed with and growing within native hedgerow and roadside margin. On roadside, rock outcrops, and in woodland on southern side of roadway.
RHO 5	465504 / 465456	544489 / 544456	Long, linear, mature stand (50 x 2m) on northern side of R572, interspersed with and growing within native hedgerow and roadside margin.
RHO 6	465206 / 464694	544374 / 544480	Series of stands and individual plants interspersed amongst 1km of native hedgerows and grass margin, scattered along northern side of R572. Also a significant presence to south of road, spreading across open ground.
RHO 7	464109	544294	Single mature stand (3m in diameter) on northern side of R572, immediately east of driveway entrance to cottage.
RHO 8	453442	544048	Single mature stand (8 x 6m) on north-eastern side of R572, growing amongst native upland scrub on fringe of nearby woodland. Located approx. 4m in from roadside. Evidence of new plants spreading southwards.
RHO 9	461261	541846	Single mature stand (9 x 2m) on northern side of R572, immediately west of driveway entrance to a bungalow.

Three-cornered Leek

Three-cornered leek (*Allium triquetrum*) is a spring-flowering, bulbous, perennial herb originating from the west and central Mediterranean. It is a garden plant and often found in long grasses, and in the natural environment can be found along roadsides, hedgerows and disturbed ground. The species is capable of reproducing by both seed, and via its long-lived bulbs.

In total, two sites within the study area have been found to contain Three-cornered leek (Table 7.32).

Table 7.32 Details of identified sites with Three-cornered leek

Three-cornered leek	X Co - ordinates	Y Co-ordinates	Description
TCL 1	451924	541841	Reasonably abundant within garden.
TCL 2	448999	541065	Stems recently dumped on grass verge on opposite side of road

Giant-rhubarb

Giant-rhubarb (*Gunnera tinctoria*) is a large, perennial plant originating from Argentina and Chile. It was introduced to Ireland in the 1800s as an ornamental plant due to its exotic features. However, this species is now very prominent along the west coast of Ireland. It proliferates in constantly moist environments, often occupying grassland areas, waterways, coastal cliffs, heaths and bogs. It outcompetes native flora by forming large, dense stands which shade a wide area underneath, preventing growth Giant-rhubarb can spread by both sexual and asexual reproductive methods, and can also regenerate from root fragments, leaf cuttings and rhizomes.

In total, two sites within the study area have been found to contain Giant-rhubarb (Table 7.33).

Table 7.33 Details of identified sites with Giant-rhubarb

Giant - rhubarb	X Co - ordinates	Y Co-ordinates	Description
GR 1	453141	541445	Single young plant on southern roadside within passing bay site.
GR 2	451300	541798	Small number of young plants along northern side of road in footprint of passing bay. Larger stand to south of road adjacent to boundary wall of Coast Guard houses.

Hottentot-fig

Hottentot-fig (*Carpobrotus edulis*) is a ground-creeping plant originating from South Africa. It was introduced to Ireland as an ornamental plant and as a dune stabiliser and is often found in coastal habitats. It outcompetes native species due to its aggressive growth and ability to propagate both vegetatively from fragments and via seed production. One site within the study area was found to contain Hottentot-fig. The occurrence is in a private garden on Dursey Island (coordinates: 448999; 541065), where the plant may be seen growing on a roadside stone wall and spilling out onto the road.

Distribution of the species in Ireland is quite limited and it was believed that the species had been eradicated in Ireland following a concerted eradication effort (W. Earle, pers. comm., 2019); however, this record on Dursey Island reveals that, regrettably, this is not the case. It is not known whether the IAPS occurs elsewhere in Ireland at present, but every effort should be made by CCC and the landowner in question to eradicate this occurrence. The localised occurrence of the species on Dursey Island should facilitate complete and successful eradication.

Brief Description of Invasive Alien Species (IAS) Management Plan

The measures to be implemented in the management plan are based on '*The Knotweed Code of Practice: Managing Japanese knotweed on development sites'* (EA, 2013), '*Best Practice Management Guidelines for Japanese Knotweed'* (Kelly *et al*., 2008) and '*Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads'*

(TII, 2010b). These documents provide very detailed information on the control of Japanese knotweed and Rhododendron, and Giant–rhubarb, including instructions for chemical treatment and non-chemical control. They have been developed by experts in the control of IAPS and informed by the successes and failures of hundreds of IAS management plans, and are widely accepted to represent the current best practice in the management of such species.

The Knotweed Code of Practice provides some general guidance on the preferred treatment options that should be used:

> "*Unless an area of Japanese Knotweed is likely to have a direct impact on the development, you should control it in its original location with herbicide over a suitable period of time, usually two - five years.*
>
> *You should only consider excavating Japanese Knotweed as a last resort, and if so you should keep the amount of knotweed excavated to a minimum.*
>
> *Soil containing Japanese Knotweed material may be buried on the site where it is produced to ensure that you completely kill it. In this case, you must bury material at least 5m deep, or at 2m if enclosed in a root barrier membrane*
>
> *Where local conditions mean you cannot use burial as an option, it may be possible to create a Japanese Knotweed bund. The purpose of the bund is to move the Japanese Knotweed to an area of the site that is not used. This 'buys time' for treatment that would not be possible where the Japanese Knotweed was originally located.*
>
> *Sometimes, due to shortage of time and location, landfill is the only reliable option, but it should be treated as a last resort. Landfill is very expensive for the development industry, and needs haulage, which increases the risk of Japanese Knotweed spreading.*
>
> *When you transport soil infested with Japanese Knotweed to landfill, it is essential to carry out strict hygiene measures. If you do not follow these standards, this may lead to Japanese Knotweed spreading. Japanese Knotweed is a particular problem along transport corridors, where it interferes with the line of vision and can cause accidents*."

The following sections contain descriptions of the most suitable control measures for the IAPS identified in the Study Area.

Japanese Knotweed

Construction Phase Management Measures

Management measures that should be implemented for Japanese Knotweed for the construction phase of the proposed development are as follows:

- The location of the stands should be circulated to all construction workers and involved parties, with their positions incorporated into relevant drawings and specifications, to ensure that the risk of disturbance as a result of project enabling works and design development is mitigated.
- With the nature of the locations, the absence of existing mitigation measures, and current encroachment onto the public road, the stands should be fenced off, incorporating recommended safe buffer zones, and with advisory / warning signage put in position.
- Discussions should be held with affected land and property owners, to ensure that any future actions on their part do not contribute to the further spread of viable plant material along the route.
- Where the Japanese Knotweed sites extend into the broader environment, further survey work should be carried out to establish the full extent of the Japanese Knotweed infestations.

- At these sites, ecological assessment and screening of the wider environment should be carried out, to identify the ecological sensitivities present, and to assess them in the context of any proposed Japanese Knotweed management programme.
- All land-based construction works shall be executed in accordance with the TII guidelines, '*Guidelines on the Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads*' (2010). The Contractor shall ensure that the construction machinery during proposed works is not fouled with any IAS prior to its arrival at the site. Efforts shall also be made to ensure that any plant/equipment (including PPE equipment) is not carrying seeds or plant materials from IAS. The Contractor shall refer to the Invasive Species Ireland '*Marina Operators Code of Conduct*'
- the Contractor shall prepare a Biosecurity Method Statement and Invasive Species Management Plan detailing his/her proposed approach to ensuring that invasive species are not imported or spread during construction. These documents will be approved by the Project Ecologist prior to their acceptance and implementation.
- A construction stage inspection / monitoring programme should be put in place, to assess the identified locations for potential disturbance, and to inspect the works route for new infestations

Operational Phase Management Measures

Management measures that should be implemented for Japanese Knotweed for the operation of the proposed development are as follows:

- The relevant authorities and their contractors should be formally notified, to ensure that routine operations and maintenance at the locations do not contribute to the further spread of Japanese Knotweed.
- A multi-phase Japanese knotweed Management Plan should be developed and implemented by CCC prior to the operation of the proposed development. This Plan should consider:
    - The immediate management measures required to mitigate particular risks associated with the proposed development works at the site; and
    - Longer term management proposals, which would include broader habitat and catchment management measures, to ensure the effective control of the full extent of Japanese Knotweed present in the environment

Long-term Management Programme Options

Options for long-term management of Japanese knotweed are as follows:

- Chemical Control
- Excavation and burying;
- Excavation and disposal to licensed landfill/incinerator; and,
- Bunding and treatment.

The appropriate management strategy will be determined by site conditions and in consultation with NPWS in terms of the most suitable management strategy from a programme and cost perspective. There are a number of issues that will affect the management strategy on the site, including the following:

- Accessibility and space available;
- Proximity to open water;
- Land ownership and cooperation of private landowners;

- Proximity to designated sites and environmentally sensitive areas; and,
- Proximity to areas used by the general public and/or defined vulnerable groups.

Chemical Control Option

This option involves application of herbicides *in situ* until there is no re-growth of plant material. This may take c. 3-5 years and would require repeated survey and re-treatment each year until the occurrence has been eradicated from the location. If highly persistent herbicides are used, it may be possible to eradicate the plant within one or two years. However, since this will not be appropriate given the ecological significance of the wider area, the use of less-persistent herbicides, e.g. glyphosate, will be necessary to re-treat regularly in years two and three, and then to conduct annual spot-checks in May/June of subsequent years to identify and retreat any re-growth.

The current most widely recommended chemical for Japanese Knotweed control is glyphosate, which breaks down in the soil relatively quickly. Glyphosate is potentially damaging to non-target plants. Great care is therefore necessary during application of this herbicide and should be used in compliance with the product label in accordance with *Good Plant Protection Practice* as prescribed in the *European Communities (Authorization, Placing on the Market, Use and Control of Plant Protection Products) Regulations, 2003 (SI No. 83/2003).*

As the majority of herbicides rely on the presence of living foliage for them to be effective, it is important to consider whether the Japanese Knotweed is in leaf or is dormant when choosing a suitable herbicide. As the majority of herbicides are not effective during the winter dormant stage, the most effective time to apply a non-persistent herbicide is between May and September, when the plant is in leaf. This will stunt the growth of the plant, consequently reducing the amount of viable above ground material and the height of the stand.

For infestations, products containing 2,4-D amine can be used. 2,4-D amine has the advantage of being selective and specific to broad-leaved plants. However, in general, it has a greater persistency when compared to glyphosate. Products containing 2,4-D amine should be applied in May, with a follow up treatment in late September or early October. Care is required in the selection of the appropriate product and method of application.

In making the selection of which herbicide to use, regard should be given to, *inter alia*, the abundance of the plants, the location of the stand, the proximity and nature of sensitive receptors, and the season. When using herbicide treatment, plant and protection products and sustainable use of pesticides regulations as well as health and safety measures outlined in this Plan (below) must be followed at all times.

Non-Chemical Control

These options are applied in situations where eradication is required within a short space of time. Non-chemical methods typically involve excavation and disposal of infested topsoils and/or plant material.

Excavation & Burying at Depth

The Japanese Knotweed rhizome rarely penetrates deeper than 3m and in certain cases excavation is the best method for isolation and removal of the infestation. During this method it is advisable to apply a non-persistent herbicide at least once to reduce the growth of infestation. Avoiding excess spoil, and ensuring excavated material does not contaminate surplus soil that is free from infestation, is critical.

Disposal and treatment on site can be done through burying material at least 5m deep and covering it with a root barrier membrane layer to prevent any regeneration. This can involve large scale engineering operations and large holes within the site. Various root barrier membranes are available which can prevent plants penetrating. These membranes need to be specially laid under expert supervision in order to be effective, protecting the surrounding soil. Any burial must be accurately mapped and recorded to prevent potential disturbance through any future development. To be effective, the root barriers used need to be: undamaged; of a large size to minimise the need for seals; where necessary sealed securely; of material that remains fit for purpose (intact) for at least 50 years; and resistant to damage on exposure to ultra violet/sunlight. A vertical root barrier membrane can be been used to prevent the horizontal growth of Japanese knotweed.

Excavation and Burying at Shallow Depth

Where it is not possible to bury 5m deep, it may be possible to bury 2m deep if the contaminated soil is completely sealed in a proprietary root barrier membrane in an area that can be guaranteed will not be disturbed by building work or excavation for services, etc. The excavation and shallow burial option involves a series of 8 stages:

Stage 1: Calculate volume required and excavate site, allowing for 2m depth of burial.
Stage 2: Protect the integrity of the root barrier membrane with a layer of sand and provide shutter ply supports for the edge of the cell.
Stage 3: Put root barrier membrane in place, allowing enough material along the edges to eventually provide a seal.
Stage 4: Protect the root barrier membrane from tyre damage with a layer of sand.
Stage 5: Fill the cell with the knotweed infested soil. No other material, contaminants, or wastes should be included.
Stage 6: Make sure that dedicated vehicles are used and cleaned properly after they have been used. Haulage routes must be protected.
Stage 7: Put the surface of the root barrier membrane in place and make sure the cell is adequately sealed.
Stage 8: Protect the surface of the cell with sand and bury deep enough to prevent disruption in the future.

Excavation and Disposal Off-Site

In scenarios where there are constraints on available space and/or the programme of site works and no other alternatives exist, then excavation and disposal of contaminated soil at a licensed landfill facility is an effective but expensive option.

Bunding

Bunding is a method designed to concentrate the rhizome into the upper surface of a raised or excavated shallow area of contaminated soil typically 0.5m deep where Japanese Knotweed will grow and be controlled by herbicide. This method is used where conditions do not allow for burial and is usually only suitable for large sites as even small infestations, with limited above ground growth, can be very large. The bund method is used when it is not possible to treat Japanese knotweed in the area where it was originally located by moving it to an area that is not used. Bunds should be located at least 10m away from site boundaries to prevent spread. The bund can be raised, on top of the ground or placed within an excavation. The material within the bund is treated as often as is necessary to prevent growth and spread. Bunds should use a root barrier membrane if being constructed in an area free of Japanese Knotweed.

Rhododendron

Construction Phase Management Measures

Management measures that should be implemented for Rhododendron for the construction phase of the proposed development are as follows:

- The location of the stands should be circulated to all construction workers and involved parties, with their positions incorporated into relevant drawings and specifications, to ensure that the risk of disturbance as a result of project enabling works and design development is mitigated
- The stands should be fenced off, with advisory/ warning signage put in position, to protect the stands from the risk of third party disturbance
- All land-based construction works shall be executed in accordance with the TII guidelines, '*Guidelines on the Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads*' (2010). The Contractor shall ensure that the construction machinery used during proposed works is not fouled with any IAS prior to its arrival at the site. Efforts shall also be made to ensure that any plant/equipment (including PPE equipment) is not carrying seeds or plant materials from IAS. The Contractor shall refer to the Invasive Species Ireland '*Marina Operators Code of Conduct*'
- the Contractor shall prepare a Biosecurity Method Statement and an Invasive Species Management Plan detailing his/her proposed approach to ensuring that invasive species are not imported or spread during construction. These documents will be approved by the Project Ecologist prior to their acceptance and implementation.
- A construction stage inspection / monitoring programme should be put in place, to assess the identified locations for potential re-growth, and to inspect the works route for new infestations

Operational Phase Management Measures

Management measures that should be implemented for Rhododendron for the operation of the proposed development are as follows:

- The relevant authorities and their contractors should be formally notified, to ensure that routine operations and maintenance at the locations do not contribute to the further spread of the plants
- A management plan should be developed and implemented, to seek to have the sites physically remediated by the controlled removal of plants, in conjunction with stump treatment and multi-annual follow up inspections

Long-term Management Programme Options

The physical removal of above-ground Rhododendron can be achieved by cutting and removing the stems by hand or chainsaw as close to the ground as possible. The cut material will need to be removed from the site for effective follow-up work. Flailing is another successful method of clearing Rhododendron and involves flailing the thickets down to ground level, using mechanical flail head mounted on a tracked machine. However, this method is not suitable for use in sloping or wet areas.

The removal of above-ground biomass of Rhododendron will not prevent re-growth as the species is able to proliferate from cut stems and stumps. There are four management options that can be applied to prevent re-growth:

1. Digging the stumps out;
2. Direct stump treatment;
3. Spraying of re-growth and large seedlings; and,

4. Stem injection.

Each of these options is discussed in turn below[4].

Digging the stumps out

The digging out of stumps is an effective method of eradicating Rhododendron from the area as it maximises the removal of all viable roots. The digging out can be carried out manually or assisted by machinery if the terrain allows it. To prevent re-growth, as much soil as possible must be removed from the dug-out root system, while the stumps should be turned upside down to expose roots to the air, as well as removing as much soil as possible. The removed roots and stumps should be burned at a licensed facility to prevent re-growth. Although effective, this method results in high degree of soil disturbance, and may not be suitable in sensitive areas.

Direct stump treatment

Direct stump treatment involves the application of herbicide solution or spot spraying of freshly cut stumps (i.e. within minutes of it being cut). When using herbicide treatment, health and safety measures outlined in this Plan (below) must be followed at all times. This method should be implemented in dry conditions so as to prevent wash-off of applied solution. The direct stump treatment has been observed to be most effective outside the spring sap flow timeframe. It is recommended to use vegetable dye to mark treated stumps, as all stumps should be targeted to maximise eradication of Rhododendron. The following herbicides can be applied to treat the stump:

- Glyphosate (20% solution): can be applied to all freshly cut stump surfaces using a knapsack sprayer at low pressure, a forestry spot gun fitted with a solid stream nozzle, a cleaning saw fitted with a suitable spray attachment, or a paint brush. For best results, the application should occur between October and February.
- Triclopyr 'Garlon 4' (8% solution): can be applied to all freshly cut stump surfaces using a knapsack sprayer at low pressure, a forestry spot gun fitted with a solid stream nozzle, a cleaning saw fitted with a suitable spray attachment, or a paint brush. The herbicide can be applied any time between cutting and appearance of new growth.
- Ammonium sulphamate (40% solution): when applied, this herbicide has the best results between June and September.

Although this method often results in complete lysis of the stumps, re-growth has been observed at times, which is usually slow and stunted. To achieve complete kill, carefully timed foliar application of herbicides to the re-growth must occur. When using herbicide treatment, plant and protection products and sustainable use of pesticides regulations as well as health and safety measures outlined in Plan (below) must be followed.

Spraying of re-growth and large seedlings

Spraying of herbicide, typically glyphosate on re-growth (stumps and seedlings of less than 1.5m in height) can be achieved once the re-growth is allowed to proliferate for 1-3 seasons before spraying. Spraying should not be delayed for more than three years after initial cutting, as this can often result in a more severe infestation.

To efficiently spray the re-growth to achieve complete kill, several factors need to be taken into consideration:

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[4] Maguire, C.M., Kelly, J. and Cosgrove, P.J. (2008). Best Practice Management Guidelines Rhododendron *Rhododendron ponticum* and Cherry Laurel *Prunus laurocerasus*. Prepared for NIEA and NPWS as part of Invasive Species Ireland.

- Glyphosate must be sprayed in dry weather. Additionally, the plant must be dry at the time of herbicide application and remain dry for at least 6 hours to allow for complete absorption of solution by the plant.
- The addition of a surfactant can reduce the amount of dry time required by increasing the absorption of solution into the plant. However, surfactants are often more environmentally damaging than herbicides, and must be handled with care, especially in proximity to aquatic habitats.
- Spraying of herbicide must occur in near windless conditions to maximise contact with the plant, and its absorption. Spraying in windy conditions should not be practiced as this is likely to result in damage to nearby native flora.
- At all times, measures should be in place to prevent the chemical solutions from entering aquatic habitats.

Spraying is often not fully effective, and will require two or more applications, before the plant is killed completely. Other common herbicides used for spraying are ammonium sulphamate, Imazapyr and Triclopyr. When using herbicide treatment, plant and protection products and sustainable use of pesticides regulations as well as health and safety measures outlined in Plan (below) must be followed.

Stem injection

Stem injection is a method often used to manage Rhododendron where terrain is sloping, and where other methods are impractical. This method uses the 'drill and drop' methodology[5] to control the growth of established Rhododendron bushes with access to the main stem which is large enough for drilling a hole. The equipment to be used comprises a handheld cordless drill and a spot gun. It is recommended that a glyphosate (25% solution) is to be applied. The methodology used for stem injection treatment is as follows:

- Inspect the size of the Rhododendron stems, to ensure that they are more than 3cm in diameter.
- Position the drill as close to the main root system as possible.
- To effectively hold and insert the herbicide solution, drill as vertically as possible with a drill bit of 11 -16mm in diameter.
- The herbicide solution must be inserted into the hole immediately after drilling. The recommended amount of herbicide to be inserted into each stem is 2ml
- To prevent the overflow of herbicide, a spot gun with a calibrated 10ml chamber should be used as it permits accurate application of herbicide solution.
- Each treated plant should be marked immediately with either coloured paint or by attaching a biodegradable tape.
- Stem injection can be carried out in dry weather or light rain conditions.

This method has been observed to be the most effective during the months of March, April and May. Although the treated Rhododendron bushes can be left on site to decay, they may persist for approximately 10 – 15 years. Alternatively, the recommended option is to cut and remove the treated Rhododendron off site and assess the effectiveness of the treatment every 12 months. When using herbicide treatment, plant and protection products and sustainable use of pesticides regulations as well as health and safety measures outlined in Plan (below) must be followed.

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[5] Edwards, C. (2006). Managing and Controlling Invasive Rhododendron. Forestry Commission Practice Guide, Forestry Commission, Edinburgh.

Three-cornered Leek

Three-cornered leak can be managed via an herbicide treatment or mechanical control.

Mechanical control

The species can be removed from site mechanically by digging, which is recommended to be carried out in spring when surface vegetation is present. Removal by excavation should ensure that all plant material and bulbs are to be removed from site. It is likely that follow up mechanical cutting will be required to ensure reduction of the seed bank.

Herbicide Treatment

A solution of Glyphosate should be sprayed in April before flowering. To maximise absorption of the herbicide by the plant, the leaves should be slightly bruised before treatment. The application of herbicide treatment should be repeated every 2-3 months to prevent re-growth and bulb bank left by this species. When using herbicide treatment, plant and protection products and sustainable use of pesticides regulations as well as health and safety measures outlined in Plan (below) must be followed.

Giant- rhubarb

Giant-rhubarb can be permanently removed from the Study Area through application of several commonly used methods: mechanical control, chemical or biological control, or a combination of these[6].

Mechanical Control

Physical removal of smaller plants can be achieved using spades by cutting the above-ground biomass at an angle as close to the root as possible. The area must be monitored as plant material can be missed during the first removal, which will subsequently need to be removed. If a large area of land is to be cleared from Giant-rhubarb, it is recommended that a restoration protocols to be implemented to prevent reinvasion of Giant-rhubarb or of any other unwanted flora on the bare area.

Chemical Control

Chemical control experiments have been carried out on Achill Island[7], to identify the effectiveness of herbicide treatments on controlling Giant-rhubarb infestation. Glyphosate-based herbicides have been shown to be effective in treating this species. The end of growing period between August to September has been shown to be an optimum timeframe to apply the treatments, with re-growth observed after two years. The re-growth is attributed to the presence of viable rhizomes in the ground, as well as subsequent seedling germination, prompting further application of herbicide to stunt the growth. There are three methods that can be used to apply chemical control for Giant-rhubarb:

1. Spraying;
2. Cut-and-paint method; and,
3. Rhizome injection.

Each of these options of discussed in turn below:

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[6] , Armstrong, C., Osborne, B., Kelly, J. and Maguire, C.M. (2009). Giant Ruhbarb (*Gunnera tinctoria*) Invasive Species Action Plan. Prepared for NIEA and NPWS as part of Invasive Species Ireland.

[7] Armstrong, C., Osborne, B., Kelly, J. and Maguire, C.M. (2009). Giant Ruhbarb (*Gunnera tinctoria*) Invasive Species Action Plan. Prepared for NIEA and NPWS as part of Invasive Species Ireland.

Spraying

Spraying of herbicide-based solution (see manufacturers recommended dosage) is often carried out using a backpack sprayer, which is applied on all leaves. Spraying of this species must occur in dry, and windless weather conditions to prevent run-off of herbicide solution and to avoid damage to nearby native flora.

Cut-and-paint method

This method involves the cutting of the leaf stalk at the base and immediately applying the herbicide on the remaining surface using either a brush or a sponge. This method can be useful when the large size of the plant makes it too difficult and/or too dangerous for spraying. Additionally, this method proves to be cost-effective due to the small quantities of herbicide used.

Rhizome injection

Using a hand-held drill, small holes are drilled into the rhizome of the Giant-rhubarb plant. The herbicide is immediately injected into the wells. Refer to the section on Rhododendron control, where a similar method is applied for the treatment of rhizomes.

When using herbicide treatment, plant and protection products and sustainable use of pesticides regulations as well as health and safety measures outlined in Plan (below) must be followed.

Hottentot-fig

Hottentot-fig has a very limited distribution in Ireland and it was thought the IAPS had been eradicated from the country (W. Earle, pers. comm., 2019). This confirmed record on Dursey Island reveals that, unfortunately, this is not the case. However, it is possible that this occurrence is the only occurrence or one of a few occurrences in Ireland. Additionally, it is the first record of the species on the west coast of Ireland. As such, it is imperative that every effort is made to eradicate this localised occurrence, in agreement with the private landowner in question. Hottentot-fig can be effectively removed off site via physical removal, and chemical means can be employed for control in cases in which physical removal is not practical (e.g. on inaccessible sea cliffs)[8]. In this case, since the occurrence in question is quite localised and is situated in a fully accessible location, it is considered that physical removal would be practical and effective and should be undertaken in agreement with the landowner in question. The situation of the occurrence on a public roadside creates the risk of dispersal by tourists who may pick the attractive flowers or foliage or inadvertently transport plant fragments or seeds on boots/clothing. Therefore, every effort should be made to treat the occurrence at the earliest possible convenience. Early, appropriate treatment of this species will avoid medium to long-term ecological impacts and financial costs.

Physical Removal

The most effective and typical means of eradication of Hottentot-fig from an area is through removal by hand. It is important to ensure that no fragments of this species are left behind during removal, and no plant fragments are transported to a different site. Matting can be placed to ensure no plant fragments remain at the site. Absolutely all plant material should be removed in sealed bags and disposed of appropriately. It is vital that the biosecurity measures outlined in this Plan (see '*Biosecurity Protocols for Invasive Alien Species'* below) are followed.

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[8] Kelly, J. and Maguire, C.M. (2009). Hottentot Fig (Carpobrotus edulis) Invasive Species Action Plan. Prepared for NIEA and NPWS as part of Invasive Species Ireland.

Limitations and Threats to Control Measures

The primary risk is during the site preparation and construction phases when the excavation of materials and movement of vehicles potentially transporting contaminated material can facilitate the spread of IAS. The presence of Japanese Knotweed and Rhododendron, in particular, may result in limitations to overall site management objectives during the construction process, in particular, through the following:

- Delays in scheduling of works, due to treatment of identified locations;
- Structural damage or future potential damage caused by IAPS (particularly Japanese Knotweed); and,
- Potential for spread of IAPS from within and outside the site boundary, e.g. within the site or from adjacent land.

The type of herbicide applied, and the timing of treatment should be cognisant of the receiving environment. The Japanese Knotweed and Rhododendron should be treated with a non-persistent herbicide (certain plant protection products containing glyphosate are non-persistent). It is important to note that certain plant protection products have a specified period of activity, which will be described on the product label and which will dictate when the product can be applied.

Biosecurity Protocols for Invasive Alien Species

Personnel entering an area infested within IAS must take precautionary measures to avoid their spread to wider areas. An exclusion zone or a buffer zone must be set up around the IAS. For instance, in the case of Japanese Knotweed, a 7m buffer zone must be in place. Exclusion zones should be clearly marked and fenced off in order to prevent accidental incursion. Routes within the exclusion zone should be overlaid with a geotextile that has a layer of sand on-top to protect it from being damaged by heavy machinery. The geotextile will prevent potentially contaminated soil/spoil from being transferred onto tracks, tyres or boots.

The following measures are to be followed by all persons entering any infested zones:

- The traffic volume in and out of the zones should be kept to a minimum all times and should remain outside the zone where possible.
- All PPE, other equipment and machinery that enter an infested zone must be cleaned before entering;
- *Inspect, Remove Dispose, Report*: Before leaving an infested area, individuals must thoroughly inspect their clothing, PPE, any equipment and their footwear for rhizomes, or other plant fragments that may be stuck on;
- All personnel should carry a hoofpick or similar implement to thoroughly clean the treads of their footwear with. All footwear must be thoroughly cleaned before leaving an infested zone.
- All PPE, other equipment and machinery, clothing and footwear must be thoroughly cleaned with soapy water and a stiff bristled brush at designated wash-down area(s) before leaving an infested zone.
- As good practice, all staff should follow Inland Fisheries Ireland Biosecurity Protocols when they have entered water or a riparian zone;
- If machinery/plant has entered or worked in an infested zone, it must be thoroughly washed down before leaving the area or working in an infested location; and
- A power washer must be provided for effective cleaning of machinery, along with stiff bristled brushes.

Key Legislation Related to the Use of Pesticides and Plant Protection Products:

Legislation regulating the use of herbicides (or 'plant protection products') have implications for the management of IAPS. As stated in the Preamble to the *Plant Protection Products Regulations*, the use of plant protection products (such as herbicides) *"may involve risks and hazards for humans, animals and the environment, especially if used incorrectly"*. As such, it is important that proper protocols and procedures are adhered to when undertaking chemical treatment of IAPS. Those involved in the management of IAPS will need to be aware of, and comply with (at a minimum), the following laws and policies:

- *Regulation (EC) No. 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC (hereinafter referred to as the 'Plant Protection Products Regulation')*; and,
- *European Communities (Plant Protection Products) Regulations, 2012 (S.I. No. 159 of 2012)*.
- *Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides ('Sustainable Use of Pesticides Directive')*; and,
- *European Communities (Sustainable Use of Pesticides) Regulations, 2012, (S.I. No. 155 of 2012)*.

This section outlines key stipulations of these regulations/policies related to the use of chemical control measures for the management of IAPS. However, it should be noted that this text serves as an overview only, and the respective policies should be consulted in their entirety prior to the planning or commencement of any chemical IAPS treatment measures.

According to the *Plant Protection Products Regulations*, plant protection products should be used:

1. In accordance with their authorisation;
2. Having regard to the principles of integrated pest management (IPM); and
3. Giving priority to non-chemical and natural alternatives wherever possible.

The Preamble to the Regulations also states that the user should follow instructions provided on the product label of plant protection products.

Those proposing to use plant protection products to manage IAPS should be well informed of the stipulations of the authorisation in question, should identify what plants and plant products are proposed to be used, and the land use type(s) in the area where the treatment is proposed to be applied.

When choosing the plant protection products, only those entered on a register of authorised and permitted plant protection products can be used, or those which have been granted a trial permit. Consequently, it is important to check that the proposed product is entered on the register[9], or has been granted a trial permit before application.

Article 31 (2) of *Plant Protection Product Regulations* states that the authorisation shall set out the requirements relating to the use of the plant protection product.[10] Furthermore, Article 31 (3) provides that the authorisation must also include, where applicable:

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[9] Register of plant protection products: http://www.pcs.agriculture.gov.ie/products/

[10] Regulation (EC) No. 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC Article 31(2).

- The maximum dose per hectare in each application;
- The period between the last application and harvest; and,
- The maximum number of applications per year.[11]

Article 31 (4) provides further that the requirements relating to the use of the plant protection products may include, *inter alia*:

- a restriction with respect to the use of the plant protection products in order to protect the health of the users, bystanders, residents or the environment (such restrictions shall be included on the label);
- the obligation to provide prior notice to any neighbours who could be exposed to the spray drift and those who have requested to be informed;
- indications for proper use according to the principles of IPM;
- designation of categories of users, such as professional and non-professional; and,
- the approved label.[12]

According to Article 67 (1) of the *Plant Protection Product Regulations*, professional users need to practice record keeping of the plant protection products used for at least 3 years. Records should contain "*the name of the plant protection product, the time and the dose of application [and] the area and the crop where the plant protection product was used*".[13]

The *Sustainable Use of Pesticides Regulations* state that those persons seeking to manage IAPS using pesticides must ensure that they procure the services of registered and appropriately trained advisors and professional users. The professional user must be aware of the contents of any relevant Invasive Species Action Plan prior to commencing work. Additionally, the professional user must have pesticide application equipment[14] inspected and certified for compliance with the relevant standard by a registered inspector at least every five years up to the 1st of January 2020, and at least once in every three years following that date.[15]

Regulation 9 (2) provides further that "[a] *professional user shall only apply pesticides with equipment that is correctly calibrated and is appropriate for the use intended*."[16] Regulation 9 (3) provides that "[a] *professional user shall only apply pesticides with* [the equipment specified], *if it has been inspected and certified as satisfying the appropriate standard* [...]."[17]

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[11] Regulation (EC) No. 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC Article 31(3).

[12] Regulation (EC) No. 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC Article 31(4).

[13] Regulation (EC) No. 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC Article 67(1).

[14] Schedule 1 to the European Communities (Sustainable Use of Pesticides) Regulations, 2012, (S.I. No. 155 of 2012).

[15] European Communities (Sustainable Use of Pesticides) Regulations, 2012, (S.I. No. 155 of 2012) Regulation 9(1).

[16] European Communities (Sustainable Use of Pesticides) Regulations, 2012, (S.I. No. 155 of 2012) Regulation 9(2).

[17] European Communities (Sustainable Use of Pesticides) Regulations, 2012, (S.I. No. 155 of 2012) Regulation 9(3).

Furthermore, it is very important to note that the *Sustainable Use of Pesticides Directive*[18] and related Irish transposing Regulations[19] place additional restrictions and, in some cases, prohibitions, on the use of pesticides in certain specified areas. Such areas include:

- Areas in or near the aquatic environment
- Areas for the abstraction of drinking water;
- Transport routes (such as railway lines);
- Areas with sealed or very permeable surfaces;
- Groundwater vulnerable areas;
- Areas used by the general public or defined vulnerable groups; and,
- European (i.e. Natura 2000) sites.

In this case, restrictions related to European sites (i.e. Natura 2000 sites) are especially relevant, due to the presence of a number of such sites within and immediately adjacent to the site of the proposed development. The following sections outline restrictions related to certain specified areas:

In or Near Aquatic Environment

The *Sustainable Use of Pesticides Directive* highlights that the aquatic environment is especially sensitive to pesticides, which means that particular attention is required to avoid polluting surface water and groundwater when using pesticides.[20] Measures to avoid such pollution may include, for example, the establishment of buffer zones and, the planting of hedges to reduce exposure of water bodies to spray drift, drain flow and run-off.[21] The Directive indicates that the dimensions of buffer zones will depend on the circumstances of each case.[22] It also indicates that the use of pesticides in areas for the abstraction of drinking water, on or along transport routes (such as railway lines); and on sealed or very permeable surface can lead to higher risks of pollution of the aquatic environment.[23] The Directive also states that, in such areas, pesticide use should be minimised, or eliminated, if appropriate.[24]

Near Wells, Boreholes, Abstraction Points, and Groundwater Vulnerable Areas

The *Sustainable Use of Pesticides Regulations* details "*Prohibitions on pesticides near aquatic environment and drinking water*".[25] The Regulations provide that a person shall not use a pesticide within specified distances of certain water sources.[26] The specified water sources and distances are listed in Schedule 2 to the Regulations:

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[18] Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides.

[19] European Communities (Sustainable Use of Pesticides) Regulations, 2012, (S.I. No. 155 of 2012).

[20] Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides Recital 15 of the Preamble.

[21] Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides Recital 15 of the Preamble.

[22] Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides Recital 15 of the Preamble.

[23] Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides Recital 15 of the Preamble.

[24] Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides Recital 15 of the Preamble.

[25] European Communities (Sustainable Use of Pesticides) Regulations, 2012, (S.I. No. 155 of 2012) Regulation 11.

[26] European Communities (Sustainable Use of Pesticides) Regulations, 2012, (S.I. No. 155 of 2012) Regulation 11(1).

Table 7.34 Water sources listed in Schedule 2 of the *Sustainable Use of Pesticides Regulations*

Water Source	Distance
Abstraction point of any surface waters, borehole, spring or well used for the abstraction of water for human consumption in a water scheme supplying 100m^3 or more of water per day or serving 500 or more persons,	200m
Abstraction point of any surface waters, borehole, spring or well used for the abstraction of water for human consumption in a water scheme supplying 10m^3 or more of water per day or serving 50 —500 persons,	100m
Abstraction point of any surface waters, borehole, spring or well used for the abstraction of water for human consumption in a water scheme supplying 1-10m^3 of water per day or serving 10-50 persons,	25m
Abstraction point of any surface waters, borehole, spring or well used for the abstraction of water for human consumption in a water scheme supplying 1m^3 or less of water per day or serving 10 or less persons,	5m[27]

Regulation 11 (2) states further that "*A person shall not use a pesticide within 15 metres of a landscape feature that is known to be a ground water vulnerable area including karst areas, sinkholes and collapse features*"[28] Regulation 11 (3) provides that "*Subject to paragraphs (1) and (2), a person shall not use a pesticide close to water other than in accordance with the conditions set out in the approved label for that pesticide*."[29]

'Specific Areas'

In relation to '*Specific Areas*', Regulation 12 (1) of the *Sustainable Use of Pesticides Regulations* provides that, subject to paragraph (2), a person shall not apply a pesticide in:

a) areas used by the general public or by defined vulnerable groups;[30] and,

b) a European (i.e. Natura 2000) site.[31]

Health and Safety

An appropriate risk assessment, which includes Health & Safety considerations, should be carried out before any control or survey work is undertaken. Protective clothing must be worn when attempting control. All works to be compliant with the *Safety, Health and Welfare at Work Act, 2005* as well as the *Safety, Health and Welfare at Work (General Application) Regulations, 2007.*

Chainsaws should only be used by competent persons. The use of chainsaws should adhere to the *Guide to Safe Working with Timber and Chainsaws* (HSA, 2010). Chainsaws and equipment should be maintained and correct protective equipment should be used at all times.

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[27] Schedule 2 to the European Communities (Sustainable Use of Pesticides) Regulations, 2012, (S.I. No. 155 of 2012).

[28] Regulation 11(2) of the European Communities (Sustainable Use of Pesticides) Regulations, 2012, (S.I. No. 155 of 2012).

[29] Regulation 11(3) of the European Communities (Sustainable Use of Pesticides) Regulations, 2012, (S.I. No. 155 of 2012).

[30] Regulation 12(1)(a) of the European Communities (Sustainable Use of Pesticides) Regulations, 2012, (S.I. No. 155 of 2012).

[31] Regulation 12(1)(b) of the European Communities (Sustainable Use of Pesticides) Regulations, 2012, (S.I. No. 155 of 2012).

Health and Safety during Chemical Control

While using herbicide, it is paramount that clearly visible signs stating the use of herbicide and its risk to children and animals are in place until treated plants are dry. Symptoms of ingestion by human and animals consist of burns to the mouth and throat, salivating, nausea, vomiting and diarrhoea. If herbicide ingestion is suspected, medical treatment should be sought immediately.

Glyphosate has a low known toxic effect on aquatic life. However, water for mixing of a 10% solution should be sourced from a private source (pre-collected and stored).

It is very important that the *Safety, Health and Welfare at Work (Chemical Agents) Regulations, 2001* as well as the *European Communities (Authorisation, Placing on the Market, Use and Control of Plant Protection Products) Regulations, 2003* are consulted.

The success of the management plan for chemically treated stands will be based on the initial reduction in area IAS ascertained from annual pre-treatment monitoring followed by the complete eradication from the site within 5 years.

To comply with the Quality Control procedures for *Sustainable Use of Pesticides Legislation*, the application of herbicide can only ever be undertaken by registered professional users. Registered Pesticide Advisors (RPA) can provide Quality Control by approving procedures prior to works. Professional users will also demonstrate proper use, ensuring only authorised products are used and all Works are catalogued and documented pursuant to the requirement of *Plant Protection Products Regulations*.

These documents include measures to aid the identification of relevant species, with details for the timing, chemicals and methodology for chemical control and for measures to avoid environmental damage during the use of herbicides. It is recommended that the Contractor should prepare a specific plan in accordance with the relevant guidelines.

Appendix 7.2 Design of Outdoor Signage

Cork
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APPENDIX 7.2
Design of Outdoor Signage

Research indicates that MIB signage can be effective in promoting pro-environmental behaviour (Baltes & Hayward, 1976; Reiter & Samuel, 1980; Durdan *et al*., 1985; Austin *et al*., 1993; Sussman & Gifford, 2012; Meis & Kashima, 2017; Parker *et al*., 2018), including in natural recreation areas (McCool & Cole, 2000; Duncan & Martin, 2002; Bradford & McIntyre, 2007; Medeiros *et al*., 2007; Hockett *et al*., 2010). Research indicates that the vast majority of hikers (between 74 - 85%) stop to read trailside signs, regardless of sex or educational level (Cole, 1998; McCool & Cole, 2000). Various factors can influence the effectiveness of outdoor signage in promoting desirable behaviour:

> *"Variables influencing effectiveness may be broadly characterized as message, visitor, and situational characteristics. Message characteristics include design parameters such as color, size, length, number and placement of the message. Other important message attributes involve message content, the nature of the persuasive argument used, and message source characteristics. Situational characteristics involve not only the specific site of the bulletin board, but the social and behavioral context that affects decisions to engage in minimum impact behaviors. Visitor characteristics that may be influential when trying to encourage minimum impact behaviors include attributes of the visit itself (length of stay, for example), social-demographic background of the visitor, previous experience and level of knowledge and a host of social-psychological variables, such as involvement, motivation and existing belief systems). Ideally, each of these attributes is considered in a systems context when developing appeals to a specific audience, thereby increasing the probability that the message will be received, considered, adopted and acted upon."*
>
> – (McCool & Cole, 2000, p. 208)

Message Characteristics

The following message characteristics have been linked to effectiveness:

- Use of a clear behavioural recommendation (e.g. 'stop here', 'stay on the trail') (Meis & Kashima, 2017);
- Concise messaging (Cole *et al*., 1997; McCool & Cole, 2000);
- Inclusion of a persuasive explanation as to the reason for the recommendation being made (e.g. 'this is a chough hotspot', 'this area is being managed for chough', 'chough are sensitive to human disturbance', 'this habitat supports native wildlife') (Gramann *et al*., 1995; Duncan & Martin, 2002; Bradford & McIntyre, 2007);
- Use of a positive, encouraging tone (Winter *et al*., 2000);

Avoidance of 'plea' type messages (Cole, 1998; Bradford & McIntyre, 2007). In short, signage should be used which tells the walker *what* to do, tells them *why* they should do it, and encourages them to *feel good* about doing it.

Plate 7.19 provides a good example of outdoor signage for natural recreation areas. These signs are eye-catching, emotionally engaging, concise, clearly state a recommendation, and explain in a simple and persuasive tone why the recommendation has been made. In the case of the proposed development, outdoor signage related to chough should also emphasise the real threat posed by human disturbance to the conservation status of the population.

Plate 7.19 Examples of emotionally engaging signage advising walkers of the sensitivity of species to human disturbance. Source: Stonehouse Designs

Visitor Characteristics

It is important that the message used is persuasive in a general sense but also in terms of the typical 'type' of visitor to the island. Because of its rather isolated location, on the western tip of a peninsula on the west coast of Ireland, it may be assumed that the site attracts a relatively low proportion of casual, disinterested visitors. On the contrary, the site is popular among walkers, birdwatchers and whale and dolphin watchers, groups which may be assumed to largely exhibit positive attitudes with respect to environmental conservation, and to engage in relatively a lot of outdoor recreation activities in a given year (i.e. 'experienced visitors'). Indeed, during the breeding bird surveys, with the exception of two instances of littering, surveyors reported seeing no deliberately ecologically harmful behaviour. Visitors were observed to predominantly stay on established paths. Furthermore, of all of the visitors to Dursey Island, the subset who complete the entirety of the existing loop walk (approx. 10km + climb to a high point of approx. 250m), are likely to be predominantly more experienced walkers with an interest in the natural environment. Research has found that 'experienced visitors' (i.e. those who visit a higher number of natural recreation areas in a year) are more likely to attend to trailside signs (Mc Cool & Cole, 2000). Thus, it may be considered likely that, if outdoor signage is placed in an obvious location on Dursey Island, it will be read by the majority of walkers. It is also considered that the typical 'type' of visitor to Dursey Island is likely to be susceptible to pro-environmental messages regarding habitats and wildlife. Non-native English-speaking European nationalities (particularly Germans) constitute a significant cohort of site visitors (Germans being the second largest group after Irish). For this reason, signage should include German and French translations of the key message(s).

Appendix 7.3 Keribiou et al., 2009

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Tourism in protected areas can threaten wild populations: from individual response to population viability of the chough *Pyrrhocorax pyrrhocorax*

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Summary

1. Many protected areas are now faced with increasing pressure from visitors and tourism development. There is thus an urgent need for conservation biologists to evaluate the full impact of human disturbance not only on individual responses, but also on the viability of protected populations, so that relevant management measures can be proposed.

2. We studied the impact of tourism on the rare and endangered chough *Pyrrhocorax pyrrhocorax* on a protected French island to assess the relationship between visitor pressure, bird individual behaviour and fitness, and population viability. During 8 years, we monitored foraging behaviour and estimated monthly juvenile survival using mark–recapture data. Population viability was examined under different tourism scenarios, using a stochastic individual-based model that incorporated the impact of visitor numbers on juvenile survival.

3. In summer, the foraging probability of choughs was negatively correlated with the number of visitors. As a result, the time allocated to foraging during peak tourist season, adjusted to day length and prey availability, was 50% lower than expected.

4. Juvenile survival rates were lowest in August, the peak tourist season, and varied significantly across years. August survival rate and therefore annual survival were negatively correlated with the number of visitors on the island in August and, except for a minor negative effect of rainfall, were not influenced by other environmental variables.

5. Stochastic simulations predicted a low probability of extinction of the protected population if the number of visitors remains constant in the future. However, short-term viability would be dramatically reduced if the current rate of increase in visitor numbers is maintained.

6. *Synthesis and applications*. We show that a relatively minor human-induced disturbance (e.g. scaring individuals away) has dramatic effects on population viability in a protected area, even when breeding individuals are not directly affected. This suggests that the full impact of tourism in protected areas may be overlooked, and has direct consequences for the assessment of sustainable levels of human disturbance and the design of quantitative management options compatible with tourist activities in protected areas. We specifically emphasize the need for more integrative approaches combining research at individual and population levels.

Key words: tourism disturbance, population viability analysis, individual-based-model, sensitivity of growth rate, Biosphere Reserve, ecological compensation, visitor access, recreation, Ouessant Island

Introduction

Protected areas, which now cover more than 11% of the Earth's terrestrial surface (Rodrigues *et al*. 2004), play a crucial role in tourism and receive an ever-increasing number of visitors (Buckley 2003). Many protected areas were primarily designed to conserve species and habitats without consideration for visitor access (Boo 1990), which may result in significant wildlife disturbance and/or habitat degradation by visitors (Kelly, Pickering & Buckley 2002). Numerous studies have documented a negative impact of tourism on individual responses of disturbed animals, including behavioural changes (avoidance behaviour,

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Belanger & Bedard 1989; Beale & Monaghan 2004, Holm & Laursen 2009; reduction in feeding time, Duchesne, Cote & Barette 2000 or resting time, King & Heinen 2004; changes in social structure, Saltz *et al.* 2002) and physiological responses (e.g. modification of heart rate, McArthur, Geist & Johnston 1982, Thiel *et al.* 2008). Such information could be used by conservation biologists and/or managers to evaluate sustainable levels of disturbance or propose landscape management measures to ensure the viability of protected populations (Liley & Sutherland 2007; Mallord *et al.* 2007).

However, most studies of the impact of tourism have focused on individual response, with little consideration for population-level response (but see Carney & Sydeman 1999, Nisbet 2000, Patthey *et al.* 2008), so that studies concluding that tourism has negative effects on population viability are being questioned (Hill *et al.* 1997, Gill, Norris & Sutherland 2001). To demonstrate an effect of individual responses of disturbed animals on the dynamics and viability of populations, one should show that human disturbance reduces individual fitness, which, in turn, influences population dynamics and viability when summed over the entire population. However, the mean daily duration of disturbance of individuals is generally short (e.g. Hulbert 1990) and can be partly compensated for by behavioural changes (Riddington *et al.* 1996). Furthermore, human disturbance is generally confined to a small fraction of a given protected area, so that relatively few individuals of the population of concern are affected. Consequently, previous studies have generally failed to detect a decrease in fecundity or survivorship with increasing human disturbance (King & Heinen 2004).

In this study, we combine long-term population monitoring and modelling to document the impact of tourism on individual response and population viability of the red-billed chough *Pyrrhocorax pyrrhocorax* Linnaeus (hereafter name chough), a rare and declining bird species in Europe, and to propose management measures to protect the population in the long term. The study population breeds on Ouessant Island in Western France, a highly protected area where the number of visitors has increased considerably in recent years, so that tourism has become the main source of income for the islanders. We demonstrate that tourism-related disturbance affects the viability of the Ouessant chough population by characterizing changes in individual behaviour induced by the presence of visitors and examining the relationship between individual response and fitness. We used monthly juvenile survival, estimated with colour-mark resighting data, as a proxy for individual fitness. These data were then incorporated into a population dynamics model to project the influence of human disturbance on present and future population viability under different scenarios of tourism development.

Materials and methods

STUDY SITE

Ouessant is a small island (1541 ha) located 20 km west off the western coast of Brittany, France (48°28′N, 5°5′W). Due to the presence of rare species, high biological diversity and an exceptionally preserved coastal ecosystem, it is highly protected (Supporting Information, Fig. S1). During the last 50 years, the number of visitors on Ouessant has increased dramatically, due to a combination of (i) a general increased desire to explore natural environments, and (ii) the liberalization of passenger transport services in 1990, which resulted in increased ferry passenger carrying capacity (Levrel *et al.*, in press). The annual number of ferry passengers increased from 5000 in 1950 to 150 000 in 2005, with a constant annual increase of *c.* 2500 passengers during the last 20 years and no signs of levelling-off in the near future (Levrel *et al.* in press). High season runs from the second week of July to the end of August, with a peak in August (48% of annual visits). Tourism is currently the main source of income on the island. Most visitors take a 1-day excursion to the island; they are mostly interested in the spectacular coastline scenery, which they discover by following paths around the island, and are generally not aware of the presence of endangered species and habitats (C. Kerbiriou unpublished data).

FOCAL SPECIES

The chough has a scattered distribution, resulting from specific ecological requirements, (i.e. suitable nesting sites: shallow caves in cliffs) and foraging areas (short grassland with low cover, Blanco, Tella & Torre 1998). During the 19th and 20th centuries, the distribution and population sizes of the chough in Europe have declined drastically (Kerbiriou 2001; Burfield & Bommel 2004) and the species is now listed in Annex 1 of the European Union Directive on the Conservation of Wild Birds (79/409/EEC). This strong decrease is thought to result from changes in agricultural practices, notably abandonment of grasslands that used to provide suitable foraging habitats for choughs (Kerbiriou 2001). The western French population of chough is now confined to very few localities in Brittany and seems to have stabilized at a small size (39–55 pairs in 2002, Kerbiriou *et al.* 2005). The population is limited to coastal sites where short grassland habitat above cliffs is maintained by marine physical factors, such as wind and salt spray, i.e. precisely where visitors like to walk. In particular, choughs are never seen in inland agricultural grasslands, which tend to be undergrazed and too tall for choughs to forage (Kerbiriou *et al.* 2006a). Birds are typically distributed around the island coastline in pairs and in a few small cohesive flocks with immature birds.

DATA COLLECTION AND ANALYSIS

We monitored the chough population of Ouessant between 1993 and 2005, focusing on the potential impact of tourism on chough behaviour and demography.

Flush distance

Flush distance was defined as the distance at which a foraging bird or flock will fly off when approached by a person or group of persons. Flush distance was estimated to the nearest 10 m using take-offs caused unintentionally by visitors walking towards the choughs (n = 103) or triggered by a member of the research team to increase sample size (n = 63). We explored the effects of flock size, presence of dependent fledglings, visitor group size, type of disturbance (unintentional vs. intentional) and season on the flush distance using a linear model and analysis of variance.

Seasonal and daily variation in the spatial distribution of choughs

To study feeding habitat choice, we first examined the spatial distribution of choughs in relation to feeding habitat availability. We have shown previously that choughs avoid inland pastures and feed almost exclusively in very short swards (< 5 cm, Kerbiriou *et al.* 2006a) found exclusively on the coastline. Hence, we surveyed the coastline only, which was divided into 123 squares measuring 250 × 250 m (see Supporting Information, Appendix S1). During the summer in 1993 and 1994, and all year round between 1995 and 2001, each square was routinely surveyed for 10 to 30 min by the same observer at least once a month, yielding a total of ca. 80 000 data points. For each observation, we recorded date, time and number of choughs observed; when choughs were present (n = 8273), we also recorded the behaviour of each individual on first contact (foraging, resting or flying). The reproductive season of the chough (mid-March to early July) was excluded because (i) the bird distribution is controlled mainly by territorial defence (Kerbiriou *et al.* 2006a), and (ii) the number of visitors is intermediate and concentrated on a few specific dates (public holidays).

Short grasslands (< 5 cm) and paths were mapped from field observations and aerial photographs (IGN 2002), and the map was implemented in a GIS (ARCGIS9·1/ESRI). We also measured the area of feeding habitat in each 250 × 250 m square. We studied the spatial distribution of birds in relation to their feeding habitat (i) in winter, when visitors are virtually absent, and (ii) in summer, during the peak tourist season, by using a Poisson linear mixed model (R, lme4 package), where the number of choughs observed in a square was a function of the area of feeding habitat in this square (m^2), time of the day, a random square effect, and the average number of choughs in adjacent squares, to account for possible spatial autocorrelation.

Impact of tourism on foraging behaviour

Simultaneously with bird counts, the number of visitors was recorded on areas about 10 times larger than those defined for chough observation, because visitors tend to move around more than foraging birds. These larger areas (hereafter 'visitor zones') are a combination of squares used for chough observation and correspond to the main points of interest on Ouessant (see Supporting Information, Fig. S1 and Kerbiriou *et al.* 2008).

As for each observation we have information of all bird behaviour, we used the proportion of foraging individuals as a proxy for foraging time, which, we assume, carries information on food intake. To study the impact of tourism on foraging, we first examined annual variation in foraging time and compared the peak tourist season (August) to neighbouring months (see Supporting Information, Appendix S2 for a description of how confounding effects of day length and prey availability were removed).

Secondly, we assessed the correlation between the number of choughs observed foraging and the number of visitors using a Poisson linear mixed model (R, lme4 package), as well as a Generalized Additive Model (GAM, Hastie & Tibshirani 1990, R package mgcv), because we expected a non-linear relationship due, for example, to threshold behavioural responses. Spatial autocorrelation was accounted for as described above.

Finally, we quantified the spatio-temporal decrease in available feeding habitat generated by the presence of visitors. To this end, we used the observed relationship between number of foraging choughs and number of tourists to assess the threshold number of visitors above which birds stop foraging in a given visitor zone. By combining this information and the observed daily number of visitors on the island, we estimated the total area of feeding habitat available for each hour of a day. For each day, this value was summed over all hours of daylight and compared to the total area of feeding habitat to generate a daily spatio-temporal decrease in feeding habitat.

Estimates of juvenile survival rates

Because the peak tourist season on Ouessant occurs simultaneously with the fledging period of the chough, we expected a strong impact of the presence of visitors on chough juvenile survival. Chough breeding success was monitored thoroughly from 1998 to 2005 (on average 12 breeding pairs each year). All accessible juveniles were colour-ringed a few days before fledging (n = 122, representing 72% of fledglings observed between 1998 and 2005). Juvenile survival was estimated through resighting of marked individuals (n = 2972 records), via a square-by-square survey similar to that used to collect behavioural data. Resighting data between Ouessant and the mainland coast (not shown) suggest that dispersal outside Ouessant is possible but occurs rarely (as in Reid *et al.* 2004) and is unlikely to remain undetected.

Monthly survival was estimated each year between June and December. The date of disappearance of a given individual was estimated accurately, thanks to very high resighting rates, that is, all living individuals were seen at least once every 30 days (between 1998 and 2003) or 60 days (in 2004–2005). We estimated monthly juvenile survival using the Cormack–Jolly–Seber (CJS) model (Pollock *et al.* 1995) implemented in program MARK (White & Burnham 1999). The following covariates were included in the survival analysis: (i) total number of visitors in August (ranging from 27 431 to 42 243 between 1998 and 2005, data from ferry companies and office of tourism), to test the impact of tourism on juvenile survival; (ii) annual productivity (number of fledglings on Ouessant, ranging from 15 to 32) to assess a possible year quality effect (as in Reid *et al.* 2003a); (iii3) climatic data (monthly rainfall, temperature and number of sunny days; data from the Ouessant meteorological station/Météo France), to investigate whether monthly survival depended on environmental conditions. For details on the goodness of fit, the model selection, and the design matrix see Supporting Information, Table S2.2.

Viability of the Ouessant chough population

We assessed the effects of tourism on chough population viability using two types of population models. First, a deterministic matrix model (computer program ULM; Ferrière *et al.* 1996) was developed to examine population equilibrium and sensitivity of the population growth rate to demographic parameters (Zambrano *et al.* 2007). Parameter values were obtained from this or previous experimental studies (see Supporting Information, Fig. S2.3).

Secondly, to examine the joint effects of population regulation (limited number of nesting sites, as suggested by a census of available nesting areas, Kerbiriou *et al.* 2006b), temporal and environmental variation (tourism), as well as demographic stochasticity, we developed a stochastic two-sex individual-based population model (IBM). The IBM allowed a complete description of sex, age, and reproductive status (nesting versus non nesting) of all individuals (see Supporting Information, Fig. S2.3). Because tourism was shown to strongly affect August juvenile survival (see Results), we modelled the expected August juvenile survival in year t as a function of the number of visitors in August (divided by 1000) the same year, using results from the most parsimonious model of capture–recapture of monthly juvenile survival. The relationship between August juvenile survival in year *t*, $s_{a,t}$, and number of visitors in August, x_t, takes the form: $s_{a,t} = e^{ax_t+b}/(1 + e^{ax_t+b})$. For the sake of simplicity, we did not incorporate the effect of weather on juvenile survival, which was small compared to the effect of visitor number. Therefore, *a* and *b* coefficients used in the above equation were estimates from the survival model including the effect of tourism only (see model selection presented in Supporting Information, Table S3.3). The values of these coefficients were a = 0·29 (SE = 0·073) and *b* = 10·11 (SE = 2·56). The average juvenile survival rate in year *t* was thus $s_0(t) = s_r s_{a,t}$, where $s_r = 0{\cdot}509$ is the juvenile survival rate for the rest of the year (constant across years). Different scenarios for the variation of number of tourist (x_t) through time were investigated to extrapolate the effects of tourism on population dynamics and viability. Scenario A: constant number of visitors; x_t was set to the average value estimated over the 8 years study period (32 150); Scenario B: stochastic annual variation in visitor numbers, no deterministic increase; x_t was varied stochastically across years, by sampling from a Normal distribution with mean 32 150 and standard deviation 5350 (estimated from data over the study period); Scenario C: deterministic increase in visitor number; x_t was a linear function of time, $x_t = 0{\cdot}7t + 32\,150$ (Supporting information, Fig. S1 and Levrel *et al.* in press), estimated from the observed trend in visitor numbers in Ouessant over the last 20 years; Scenario D: deterministic increase and stochastic variation in visitor numbers; x_t' was drawn from a normal distribution with mean $x_t = 0{\cdot}7t + 32\,150$ and standard deviation 5350. In each case, N_0 individuals (the current population size, *n* = 55) were initially present in the population.

Results

FLUSH DISTANCE

Flush distance was significantly increased by the presence of dependent juveniles in the flock ($F_{2,156} = 59{\cdot}60$, $P < 0{\cdot}0001$; average flush distance = 147 ± 23 vs. 75 ± 9 m for flocks with and without juveniles, respectively). Flush distance was not affected by visitor number ($F_{1,155} = 0{\cdot}69$, $P = 0{\cdot}41$), type of disturbance (unintentional vs. intentional, $F_{1,155} = 0{\cdot}01$, $P = 0{\cdot}91$) or flock size ($F_{1,155} = 2{\cdot}557$, $P = 0{\cdot}11$). By combining the average flush distance and the spatial distribution of paths on the coastline, we estimated that 97% of the main feeding habitat of the chough was potentially affected by human disturbance.

SPATIAL DISTRIBUTION OF CHOUGHS AND VISITORS

In winter, the spatial distribution of chough flocks was positively correlated with the amount of feeding habitat throughout the day, whereas in summer this correlation was significant in early morning or late afternoon only (Table 1 and Supporting Information, Table S3.1). In summer at midday when visitors were present, the largest number of choughs was observed on an inaccessible islet with small areas of feeding habitat. In summer afternoons, visitors were found almost everywhere, but highest densities occurred on the western part of the island, i.e. in places where choughs had disappeared (Supporting information, Table S3.1).

Table 1. Within-day correlation between the spatial distribution of choughs and feeding habitat areas in winter and summer. Linear mixed model with additive effect of average chough in neighbouring square, habitat areas and a random effect of square surveyed

	Winter correlation between chough and habitat		Summer correlation between chough and habitat	
Time	Estimate	*P*	Estimate	*P*
8	6·70	***	1·81	ns
9	3·98	***	2·35	***
10	3·43	***	2·49	***
11	2·38	***	1·16	ns
12	2·28	***	0·02	ns
13	2·20	***	–0·19	ns
14	2·40	***	–0·33	ns
15	1·86	***	–0·46	ns
16	2·15	***	0·71	ns
17	1·77	***	0·49	ns
18	3·17	***	1·39	ns
19	1·91	***	1·88	**
20	0·32	ns	3·00	*

ns, $P > 0{\cdot}05$; *$P < 0{\cdot}05$; **$P < 0{\cdot}001$; ***$P < 0{\cdot}0001$.

FORAGING BEHAVIOUR

We observed a large variation in the frequency of foraging behaviour, a lot of which was attributable to tourism disturbance. Two observations support a negative impact of visitors on foraging time.

First, comparisons in space or time showed that undisturbed choughs systematically forage (hence feed) for longer time periods than individuals that are disturbed by visitors. Temporally, this was true when comparing different hours within a day or different months within a year. In winter, on average 90% of individuals were observed foraging in a given flock, with little variation throughout the day (Fig. 1). In contrast, in summer, there was a large within-day variation in the frequency of foraging individuals, which was high (85%) in the morning and evening, but much lower (33%) in the middle of the day, during peak visitor hours; the remaining 67% individuals were seen in flight or resting (Fig. 1). In addition, a comparison of consecutive months, minimizing the variation of confounding factors, showed that only 58% of observed choughs were foraging in August (*n* = 7063) vs. 77% in June (*n* = 4770), 86% in September (*n* = 4874) and 91% in October (*n* = 3289). Even when the confounding effects of day length and prey availability were removed, the time allocated to foraging in August was still 56% lower than in June, 43% lower than in September and 37% lower than in October. Spatially, we compared foraging time during summer afternoons on the main island vs. on a small inaccessible islet on which most individuals were observed (Supporting Information, Fig. S2): 65% of observed choughs were foraging on the undisturbed islet vs. 33% on the main island.

Secondly, when controlling for within-day variation, the frequency of observed foraging behaviour in summer was negatively correlated with visitor number (GLM $\chi^2 = 1582{\cdot}4$, d.f. = 1, $P < 0{\cdot}0001$ and Fig. 2). This result was true even

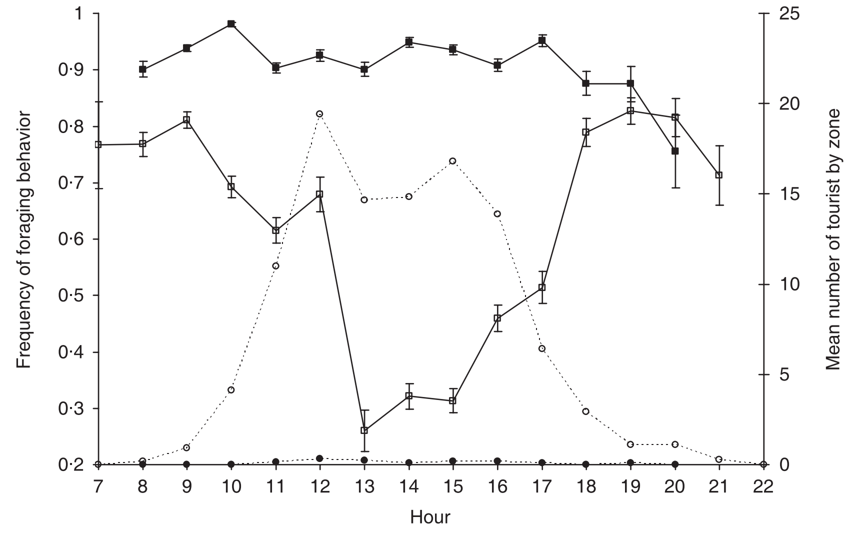

Fig. 1. Daily variation in the average observed proportion of foraging choughs (solid line: ■, winter, $n = 2183$; □, summer, $n = 1445$) and average number of visitors per zone (dotted line: ●, winter, $n = 2708$; ○, summer, $n = 2151$).

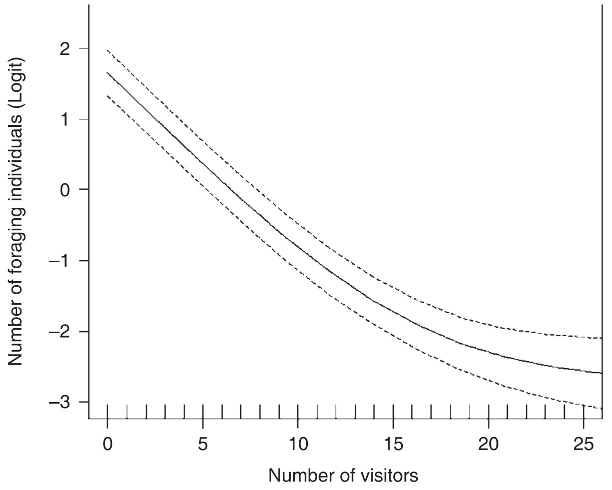

Fig. 2. Number of foraging individuals in summer as a function of the number of visitors per zone (Generalized Additive Model, adjusted for within-day variation). The dotted lines represent the 95% confidence interval. (GAM $\chi^2 = 1042$, d.f. = 1, $P < 0·0001$.)

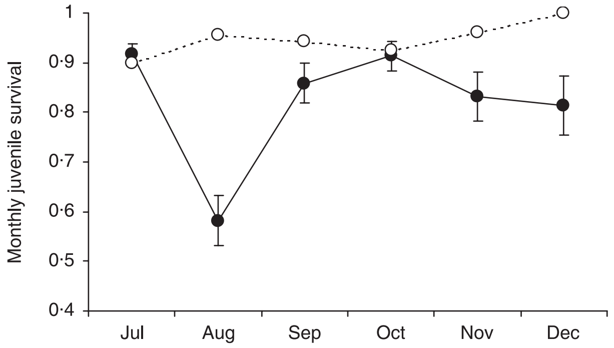

Fig. 3. Temporal changes in chough juvenile survival within a year. Closed circles: average survival rates in Ouessant (1998–2005, 122 fledglings), errors bars represent standard errors; open circles: Islay (1983–1985; $n = 173$, Bignal *et al.* 1987).

when controlling for pseudo-replication effects (see Supporting Information, Fig. S3.2). This negative impact of the number of visitors on foraging behaviour was due to a reduction in the area of available feeding habitat. With low visitor numbers (e.g. in June, September, and October, or in the early morning or late evening in August), there was 62 ha of feeding habitat available, of which choughs utilized 26 ha on average. In contrast, during peak visitor hours in summer days, the total area available was reduced to 4·8 ha, all of which was used by choughs. When summing available areas over time within a day, this resulted in a 41% spatio-temporal decrease in feeding habitat availability in summer vs. winter days.

CHOUGH DEMOGRAPHY

Juvenile survival, estimated from fledging data collected from June to December varied across months, with most variation due to the difference between survival in August and other months (58 vs. 81–94%, Fig. 3 and Supporting Information, Table S3.3). Monthly juvenile survival was constant across years for all months except for August: this significant yearly variation seemed to be attributable to variation in August visitor number (higher survival with lower visitor numbers, Fig. 3, ANODEV, $F_{1,4} = 78·87$; $P < 0·001$; $\beta = -0·44 \pm 0·09$; Fig. 4) but also to variation in August rainfall (higher survival with lower rainfall, ANODEV, $F_{1,4} = 13·70$; $P = 0·01$; $\beta = -0·02 \pm 0·01$). The effect of August rainfall on survival was nevertheless negligible compared to that of visitor number in August ($\beta = -0·02$ vs. $-0·44$, respectively). In contrast, the correlations between juvenile survival in August and breeding success, temperature or number of sunny days were not significant (ANODEV, $F_{1,4} = 1·48$; $P = 0·28$; $F_{1,4} = 1·99$; $P = 0·22$; and $F_{1,4} = 0·53$; $P = 0·50$, respectively). Note that we detected no significant correlation between visitor numbers and weather (rainfall and visitor number: $F_{1,6} = 0·87$; $P = 0·39$; temperature and visitor number: $F_{1,6} = 0·004$; $P = 0·95$; sunshine duration and visitor number: $F_{1,6} = 1·07$; $P = 0·34$).

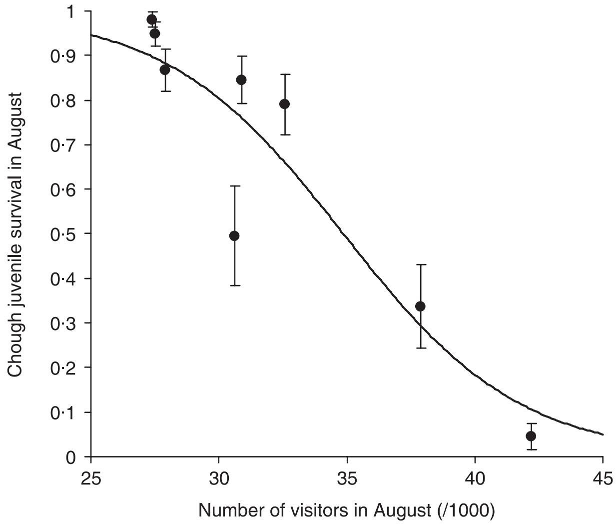

Fig. 4. Relationship between August juvenile survival and the number of visitors on Ouessant in August.

CHOUGH POPULATION VIABILITY

In the absence of regulation and inter-annual variation in demographic parameters, the deterministic matrix model predicted a slight annual increase of the population (asymptotic growth rate λ = 1·0189) and a geometric increase in population size (Fig. 5). Moreover, the sensitivity of λ to adult survival rates was high (elasticity = 0·82), while variation in juvenile survival had a weak influence on the deterministic growth rate λ (elasticity = 0·17).

In contrast to the deterministic model, the IBM model included population regulation, which yielded density-dependent behaviours in some cases (Supporting Information, Fig. S3.4). However, density-dependence never affected the main prediction of the model, that is, a strong impact of tourism on short-term population dynamics and viability, which suggests an appreciable influence of reduced juvenile survival on chough population growth rate. We examined four scenarios regarding the future change in the number of visitors, x_t (Fig. 5). With no deterministic increase in visitor number, the IBM model predicted relatively stable chough population sizes (56·07 ± 0·06 individuals and 36·51 ± 0·03 breeders for Scenario A; 47·63 ± 0·49 individuals and 30·99 ± 0·56 breeders for Scenario B), but with stochastic variation the IBM model predicted much higher extinction probabilities (1% vs. 10% over 50 years in Scenarios A and B, respectively). When the current rate of increase in the number of visitors was considered (Scenarios C and D), the chough population size dropped rapidly, and extinction was almost unavoidable within 50 years. Scenario C (deterministic temporal increase in visitor number without stochastic variation) led to the lowest viability (100% extinction after 49 years). The differences among scenarios were little modified by changes in adult survival or nest limitation (Supporting Information, Fig. S3.4).

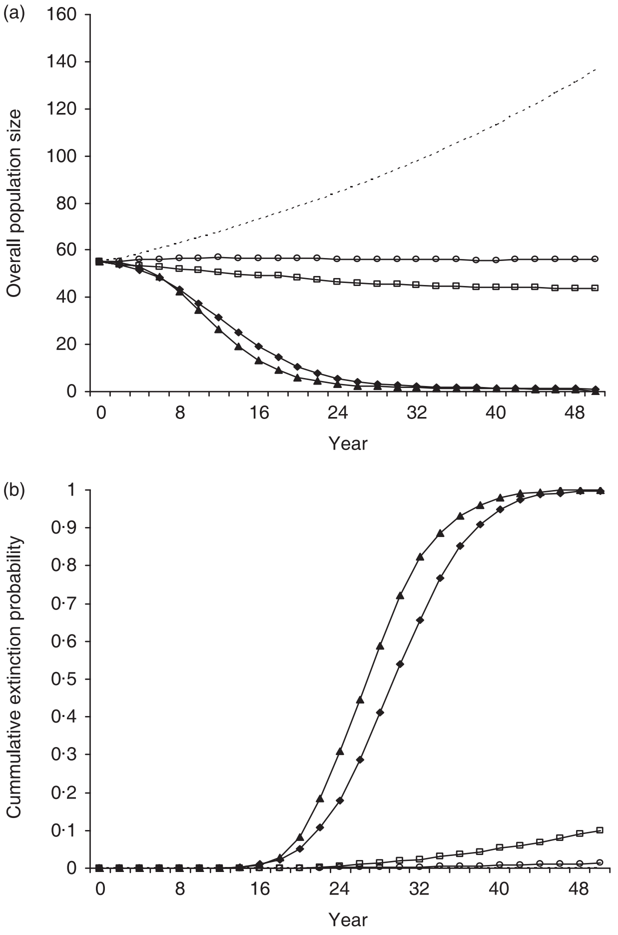

Fig. 5. Temporal variation in mean population size (a) and extinction probability (b) under the deterministic matrix (dashed line) and individual-based (solid lines) models. Parameter values are provided in Table 1. Standard errors were too small to be plotted. Open circles: constant number of visitors (Scenario A); open squares: stochastic variation in visitor number (Scenario B); solid triangles: deterministic increase in visitor number (Scenario C); solid diamonds: deterministic increase and stochastic variation in visitor number (Scenario D).

Discussion

Our results indicate that the presence of visitors on Ouessant Island resulted in a severe decrease in the area available for foraging in choughs and a reduction in the time allocated to foraging. This translates into reduced summer juvenile survival and, we predict, reduced population viability. Below, we discuss the relationship between the number of visitors and population viability, and derive recommendations to facilitate the coexistence of tourism and viable population of choughs.

REDUCED RESOURCE AVAILABILITY RESULTED IN REDUCED JUVENILE SURVIVAL

Visitor-induced disturbance is of conservation concern only if it actually affects population viability. This seemed to be the case in the chough population of Ouessant, although the observed disturbance (birds fly off during their foraging time) may appear minor at first. First, the survival of juveniles in their first year was much lower in Ouessant (32%) than in a comparable island hosting choughs (Islay, UK, estimated juvenile survival = 71% in Bignal *et al.* 1987; 42% in Reid *et al.* 2003a,b), despite large differences in survival estimates in the latter. Secondly, survival rates in Ouessant varied from month to month, and were lowest (58%) in August. This again contrasted with the situation on Islay, where monthly juvenile survival rates were above 90% all year round. August mortality accounted for half of the total observed mortality on Ouessant between July and January. Most authors agree that the post-fledging period, when juvenile choughs become independent, is often critical for their survival (Holyoak 1971; Bullock, Drewett & Mickleburgh 1983; Robert 1985). However, the low juvenile survival in August is not merely the result of birds reaching nutritional independence, because in Ouessant more than half of yearlings become independent in September or July (Kerbiriou *et al.* 2006a,b), two months when high survival rates were recorded. Thirdly, the large difference in survival rates between August and other months (June, July, September and October) was not explained by changes in prey assemblages (see Kerbiriou & Julliard 2007), prey biomass, day length or weather conditions (temperature and rainfall), but was strongly correlated with the number of visitors on the island.

The most obvious physiological mechanism causing the observed excess juvenile mortality is severe undernourishment, due to the reduction in feeding time budget. On Ouessant, three ringed juveniles were found freshly dead in summer without any external parasite or wound. All three exhibited abnormally low weight (162 g, 184 g and 180 g vs. 261–295 g for healthy ringed fledglings) and had suffered severe weight loss since they were ringed 1 or 1 months earlier (–53 g, –94 g and –135 g, respectively). In addition, undernourishment may have acted in synergy with a production of corticoids, often associated with human disturbance (see Sapolsky 1992), to reduce juvenile survival.

REDUCED JUVENILE SURVIVAL AFFECTS POPULATION VIABILITY IN A LONG-LIVED SPECIES

Age-structured models of long-lived species predict that variation in juvenile survival rates should have little effect on population growth rate compared to variation in adult survival rates (Caswell 1989). In the Ouessant chough population, a species whose demographic parameters indicate that it is relatively long-lived (Bullock *et al.* 1983; Roberts 1985; Reid *et al.* 2003a,b), reduced juvenile survival may be considered of little consequence for the population growth at first, as suggested by results from the deterministic model. However, long-term studies of long-lived species have also shown that demographic parameters of high elasticity, such as adult survival, were often the least variable parameters (Hatter & Janz 1994; Gaillard, Festa-Bianchet & Yoccoz 1998), in agreement with theoretical expectations (Stearns & Kawecki 1994). As a result, population dynamics can be much more influenced by demographic parameters with smaller elasticity but larger variability (Gaillard *et al.* 1998), such as juvenile survival or fecundity. This pattern has been reported in various populations of long-lived birds, as exemplified by the California spotted owls (Blakesley, Noon & Shaw 2001) or the southern fulmar (Jenouvrier *et al.* 2005). We have no information regarding adult survival in the Ouessant population, but a long-term study on Islay showed that the contribution of between-year variation in first-year and second-year survival to the total variance in the population growth rate was similar to that of adult survival (Reid *et al.* 2004).

The Ouessant breeding population has been fairly stable in the last 50 years (10 to 13 pairs), but we observed a strong decrease in the number of non-breeders, from about 55 individuals in the 1970s to only 15 currently. Agricultural changes are probably an important driver of this loss, but we believe visitor disturbance is also involved, via a reduction in juvenile survival that could lead to a point where the production of juveniles does not compensate adult mortality and where the population is likely to go extinct rapidly. This is supported by our simulations, predicting a relatively large number of non-breeders under scenarios with a low probability of extinction (Fig. 5; 19·6 and 16·6 non-breeders without or with stochastic variation, respectively), that is, when the number of visitors remains at its current level. Under this model, non-breeders were expected to account for 35% of the population, of which 16% were old enough to reproduce (> 2 years old). In contrast, under scenarios with quasi-certain extinction (deterministic or stochastic increase in visitor numbers), non-breeders accounted for 11% only of the population, and were all ≤ 2 years old.

PERSPECTIVES FOR THE CONSERVATION OF CHOUGHS IN OUESSANT AND OTHER PROTECTED AREAS

Our study suggests that tourism threatens the chough population of Ouessant to the point where the short-term viability is endangered. This threat from visitors must be taken into consideration because the population of Ouessant is one of the core populations in western France, despite its small size and isolation. Several simple management actions could be taken to improve access to feeding areas for the choughs. First, footpaths could be redrawn to preserve feeding areas from visitor disturbance. However, given the chough flush distance and the coastal location of chough feeding sites, paths would always have to be located 150 m away from the coastline, which would obviously be detrimental for visitors to the spectacular coastline and has little chance of being accepted by Park managers and Ouessant residents. Secondly, large sections of the coastline (26 ha of short grassland, i.e. the area used by the chough population at a given time) could be closed to tourist access throughout August. Given the current distribution of the chough feeding habitat, this would result in a minimum of 3 km of coastline closed to visitor access, i.e. 8% of Ouessant coastline. Finally, it would be possible to create 26 ha of short grassland, through grazing control, in inland areas, which are not attractive to visitors. A preliminary test (mowing of small inland areas in spring) showed that choughs do use these new foraging areas, although they are not adjacent to their former foraging sites, and suggested that this may result higher fledging success.

Conservation policies need not rely on complete separation of choughs and visitors, and there is hope that space can be shared between protected birds and visitors. Obviously, the latter should be informed about conservation issues and advised to avoid foraging flocks of choughs. In addition, the observed response of choughs to increasing visitor number (Fig. 3) indicates that birds could spend 92% of their time foraging (i.e. the time they spend without disturbance) if the number of visitors within 3 km of the coastline does not exceed 0·7 per hour. In addition, considering that the chough population requires 26 ha of short grassland at all times and that for a given number of visitors, the proportion of visitors within each zone does not change, we estimate that the number of tourists should not exceed 16 500 in August (i.e. half the current number). However, this solution is probably not economically sustainable because tourism is the main source of income on Ouessant. A realistic approach would be to combine different strategies defined with respect to local situation (reroute paths away from priority feeding areas, create feeding habitats on areas with low tourist interest, etc.). At the island level, an education programme to increase visitor awareness of the detrimental effects of wildlife disturbance must be launched.

Despite Caughley's (1994) recommendation to use a mixing of the two paradigms of conservation biology, the declining-population and the small-population paradigm, few studies have so far quantified the link between ultimate factors of species decline, stochastic processes and extinction risk for particular species or populations. By demonstrating how tourism pressure is related to both individual response and population dynamics in an endangered bird species, we hope that the present study is a step in the right direction.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Location of the study area (Ouessant) and protection status levels (Fig. S1)

Appendix S2. Methodology details (one table and one figure)

Appendix S3. Results details (two tables and three figures)

Appendix 7.4
Chough Survey Data

Cork County Council
Comhairle Contae Chorcaí

Fáilte Ireland
National Tourism Development Authority

ROD
ROUGHAN & O'DONOVAN

APPENDIX 7.4
Chough Survey Data

Introduction

This Appendix presents the numerical data obtained with respect to (i) flock size; (ii) nest locations/breeding success; and (iii) flush distances, during the 2019 survey of breeding chough undertaken in the Study Area for the purposes of this EIA. For a description of the survey methodology and study area, please refer to Section 7.2.8 of this Chapter. Section 7.4.2.2 presents an overview of the findings of the surveys and their implications in terms of the proposed development. The data presented in this Appendix are derived from raw field survey notes, which can be made available upon request.

Flock Size

Table 7.35 Maximum chough flock sizes recorded during 2019 surveys

Maximum flock size recorded	Date
4	03/02/2019
13	17/05/2019
6	24/05/2019
6	27/05/2019
4	28/05/2019
2	29/05/2019
2	30/05/2019
14	31/05/2019
6	03/06/2019
2	04/06/2019
8	05/06/2019
6	06/06/2019
3	07/06/2019
2	10/06/2019
11	11/06/2019
4	12/06/2019
6	13/06/2019
2	14/06/2019
2	17/06/2019
19	18/06/2019
6	19/06/2019
2	20/06/2019
6	21/06/2019
6	24/06/2019
28	25/06/2019
12	26/06/2019

Maximum flock size recorded	Date
2	27/06/2019
6	28/06/2019
25	01/07/2019
28	02/07/2019
32	04/07/2019
7	05/07/2019
22	08/07/2019
6	09/07/2019
20	10/07/2019
6	11/07/2019
12	12/07/2019
32	15/07/2019
3	16/07/2019
6	17/07/2019
14	18/07/2019

→ Maximum flock size between 03/02/2019 and 18/07/2019 = 32

Breeding/Nests

Table 7.36 Details of chough nest sites (confirmed and discounted) identified during 2019 surveys [Precise locations redacted in public version]

Count	Status	Location	Date first recorded	No. juveniles fledged	Notes
1	Breeding	Dursey Island [Redacted]	17/05/2019	2	Faecal sac seen 17/05; Pair seen entering cliffs on eastern side of inlet on 27/05 and both seen entering/exiting separately on 30/05; pair seen entering/leaving nest on 12/06; juveniles heard and fecal sac sighted on 20/06; 2 juveniles sighted out of nest and being fed by parents on 24/06
2	Breeding	Dursey Island [Redacted]	03/06/2019	2	Chicks/feeding heard on 03/06; pair observed entering and leaving nest again on 11/06; Fledging later confirmed during nest watches.
3	Breeding	Dursey Island [Redacted]	05/06/2019	4	One bird seen entering crack in cliff on 05/06; Breeding and fledging later confirmed during nest watches.
4	Breeding	Dursey Island [Redacted]	03/06/2019	3	In most westerly derelict house; pair seen flying in and out and foraging in vicinity on 05/06, 10/06 and 13/06; 3 juveniles observed on 18/06 and again on 24/06; Fledging later confirmed during nest watches.
5	Breeding	Dursey Island [Redacted]	13/06/2019	4	Pair seen entering and exiting on 13/06. Pair seen to use rock immediately above nest site as landing and preening area. Breeding and fledging later confirmed during nest watches.
6	Breeding	Crow Head [Redacted]	24/05/2019	2	Two birds seen enter crack in cliff on eastern side of island on 24/05 and again on 29/05; 2 juveniles observed on 19/06; Fledging later confirmed during nest watches.
-	Discounted	Dursey Island [Redacted]	03/06/2019	-	Pair seen entering cliff. Chicks heard.
-	Discounted	Garinish Head [Redacted]	04/06/2019	-	Pair seen active in vicinity and one seen entering cliff (04/06).
-	Discounted	Crow Head	29/05/2019	-	1 bird seen entering and leaving cliff on SE side of headland.
-	Discounted	Dursey Island [Redacted]	30/05/2019	-	Pair seen going out of view at cliffs and emerging shortly after on 30/05.
-	Discounted	Dursey Island [Redacted]	10/06/2019	-	Pair seen entering inlet and not re-emerging on 10/06.

Count	Status	Location	Date first recorded	No. juveniles fledged	Notes
-	Discounted	Garinish Head [Redacted]	14/06/2019	-	Nest watch conducted on 14/06 but no evidence of nesting noted. Presume pair must have been seen entering cliffs in area.
-	Discounted	Dursey Island [Redacted]	18/06/2019	-	One bird seen entering crack in south-facing cliff on 18/06
-	Prospected; no breeding	Dursey Island [Redacted]	17/05/2019	-	Two birds seen enter cave on 17/05 and again on 29/05. According to first report, no breeding occurred here. May have been non-breeding pair simulating nesting.

→ Total number of breeding pairs/nests = 6
→ Mean no. juveniles fledged per nest = 3
→ Total no. fledglings = 17
→ 100% of confirmed breeding pairs successfully fledged offspring

Please note: coordinates of locations of nest sites have been omitted from Table 7.36 in order to protect the nest sites in question, and can be made available to the Competent Authority upon request, if required.

Flush Distance

Table 7.37 Flush distances of chough recorded during 2019 surveys

Date	Flush distance (m)	No. birds	Disturber	Notes
03/06/2019	40	4	Surveyors	
03/06/2019	40	1	Surveyors	
18/06/2019	5	12	Surveyors	Surveyor obscured from view of birds until that distance so exclude
18/06/2019	2	2	Surveyors	Disturbed birds were juveniles (one froze) so exclude
30/05/2019	150	2	Surveyors	
31/05/2019	40	1	Surveyors	
31/05/2019	25	9	Surveyors	
31/05/2019	45	10	Surveyors	
31/05/2019	25	2	Surveyors	
11/06/2019	10	2	Surveyors	
11/06/2019	20	2	Surveyors	
19/06/2019	80	2	Surveyors	
21/06/2019	30	2	Surveyors	
24/06/2019	25	1	Surveyors	
24/06/2019	35	3	Surveyors	
24/06/2019	30	6	Surveyors	
25/05/2019	40	5	Surveyors	
25/06/2019	25	7	Surveyors	
25/06/2019	25	5	Surveyors	
26/06/2019	25	3	Surveyors	
28/06/2019	50	4	Surveyors	
01/07/2019	40	5	Surveyors	
04/07/2019	25	2	Surveyors	
05/07/2019	12	6	Surveyors	
11/07/2019	10	3	Surveyors	One chough foraging 10m for observers simply alarm called, did not take flight as surveyors passed on the path
11/07/2019	10	5	Surveyors	
11/07/2019	20	2	Surveyors	
12/07/2019	20	4	Surveyors	
15/07/2019	15	12	Surveyors	
18/07/2019	20	1	Surveyors	
18/07/2019	25	5	Surveyors	
03/06/2019	30	2	Tourists	

Date	Flush distance (m)	No. birds	Disturber	Notes
03/06/2019	50	5	Tourists	
01/07/2019	30	6	Tourists	
01/07/2019	30	6	Tourists	
01/07/2019	30	6	Tourists	
01/07/2019	30	8	Tourists	
01/07/2019	35	8	Tourists	
02/07/2019	35	2	Tourists	
02/07/2019	45	16	Tourists	
02/07/2019	25	3	Tourists	
02/07/2019	30	5	Tourists	
02/07/2019	10	2	Tourists	
08/07/2019	30	9	Tourists	
08/07/2019	15	7	Tourists	
08/07/2019	15	7	Tourists	
10/07/2019	25	6	Tourists	
10/07/2019	30	20	Tourists	
11/07/2019	35	4	Tourists	

Key Notes

Key notes from survey field notes are as follows:

- Evidence was observed of illegal dumping on southern face of Crow Head (24/05/2019).
- Birds were observed flying between the island and mainland on a number of occasions, including 24/05, 09/07 and 18/07/2019.
- Interactions with other species:
  - Interactions between ravens and choughs were observed regularly, e.g.:
    - 27/05/2019 choughs mobbing raven
    - 31/05/2019 chough alarm calling while pursued by 2 ravens
  - Some antagonistic interactions were also observed between choughs and hooded crows and magpies.
  - Choughs were observed mobbing a peregrine falcon near *Drom Gabhair* nest site on 13/06/2019 and a peregrine was observed flushing choughs a number of times thereafter.
- In late June/early July, family groups were observed to start flocking on the western end of the island, and birds largely stayed around this area from this point onwards. One surveyor reported walking from the eastern to the western end of the island on 02/07/2019, observing no choughs until reaching the western end of the island.
- Birds were observed to display vigilance behaviour – calling more frequently than normal – when walkers were within 50m.
- Choughs were observed to become familiar with the surveyors over time, allowing surveyors to forage quite close by on a few occasions towards the end of the season.

- *Cuas na gColúr* and *Brann Righe* were identified as potential roosting sites, but no evidence was found of Foilnamuck being used as such.
- The extreme western end of the island (*Maoil, Maoil Mhór* and *Maoil Bheag*) is a key foraging and flock-forming area for choughs and the largest flocks were consistently seen here.
- From late June/early July, choughs appeared to be roosting in family groups, near their respective nests, from around sunset.

Appendix 7.5
Bird Survey Methodology

Cork
County Council
Comhairle Contae Chorcaí

Fáilte Ireland
National Tourism Development Authority

ROD
ROUGHAN & O'DONOVAN

APPENDIX 7.5
Bird Survey Methodology

Overview

Bird surveys were undertaken on behalf of CCC for the purposes of this EIAR and for the Appropriate Assessment for the proposed development by the Project Ecologist, Paul Murphy (EirEco Environmental Consultants) with assistance by three ROD employees, Christina McKiernan, Tadhg Twomey and Jason Cahill, and a sub-consultant of ROD, John Deasy. Surveys commenced in March 2019 and will continue until November 2019. Table 7.38, below presents an overview of the surveys undertaken. While Red-billed Chough (*Pyrrhocorax pyrrhocorax*) was the focal species of these surveys, the occurrence and activity of other species of rare and protected birds was also observed and recorded during these surveys. Evidence of breeding was recorded for all species of bird. General data recorded during the surveys included:

- Number of birds observed;
- How birds first detected (seen or heard; flying or on the ground; distance from the observer);
- Location (grid reference and description/place name);
- Behaviour (foraging, flying, preening, vigilant, loafing, breeding or heard only);
- Habitat;
- Micro-habitat patch use;
- Land use;
- Grazing regime on land in question (including type of livestock, sward height, presence/absence of dung)
- Cultivation (if any) on land in question (cut silage, amenity grassland, etc.);
- Weather conditions (wind force, wind direction, visibility and occurrence of precipitation);
- General notes on other interesting aspects, including:
    - Specific features of land use and habitat e.g. poaching, strip grazing, out-wintering of livestock;
    - Timing of agricultural activities e.g. spring grazing, cutting of silage; and,
    - Behavioural aspects of the birds e.g. did the bird(s) move to different habitats or direction of flights.

The principal objective of the bird surveys was to obtain data with respect to the following in the study area:

- The abundance of chough;
- The number of breeding pairs of chough;
- The abundance and location of nests of breeding chough;
- The breeding success (productivity) of chough;
- The distribution of chough foraging habitat;
- The average flush distance of chough; and,
- The location(s) of communal chough roosting site(s).

The suite of surveys undertaken aimed to cover the entire breeding season of the species, from nest selection through to fledging of young, foraging habitat utilisation during breeding and subsequently by post-breeding communal flocks, and location of communal roost sites on

Dursey Island. The Sections below refer to surveys undertaken with respect to chough. During these surveys, the activity of other species of birds was recorded on an *ad hoc* basis, as described previously.

Table 7.38 Overview of breeding bird surveys undertaken Stage

	Period	Chough Activity Phase	Surveys Objectives	Surveyors
Breeding	March – June 2019	Breeding commences early to mid-April, when eggs are laid in the wool-lined nest cup. The female is solely responsible for incubating the eggs and during this time the male forages alone, returning to the nest periodically to feed the female and allowing her time to feed close to the nest.	• Abundance of chough • Breeding distribution and abundance • Foraging habitat utilisation by adult birds • Breeding & occurrence of other bird species	Paul Murphy
Fledging	June – August 2019	Nestlings start to fledge and form family groups which remains within their breeding season home range. Nursery flocks (comprising several family groups) beginning to form.	• Chough breeding success (productivity) • Flush distance by human disturbance • Foraging habitat utilisation by family groups • Total abundance of chough • Distribution and occurrence of other species	Paul Murphy Christina McKiernan Tadhg Twomey Jason Cahill John Deasy
Post-breeding/ Dispersal	August – November 2019	Flock utilisation of communal roosts. Potential dispersal to wintering areas such as sand dunes and machair.	• Location of communal roost sites on Dursey Island • Distribution and occurrence of other species	Paul Murphy

Study Area

The study area for the surveys took in the following areas:

- The entirety of Dursey Island;
- The immediate vicinity of the site of the proposed development (mainland and island);
- Crow Head; and,
- Garinish Head.

The primary focus of efforts was in the immediate vicinity of the existing cable car site. However, since there is evidence to suggest that chough may be sensitive to human disturbance (Keribiou et al., 2009), and since the proposed development will substantially increase the number of walkers on Dursey Island, and potentially on Garinish Head and Crow Head, it was considered necessary to include these areas in the study area also.

Transects

Existing walking trails on Dursey Island, and on Garinish Head and Crow Head, were used as transects for surveys, while off-transect observation were also made, as per Trewby *et al*. (2004) (Plate 7.20).

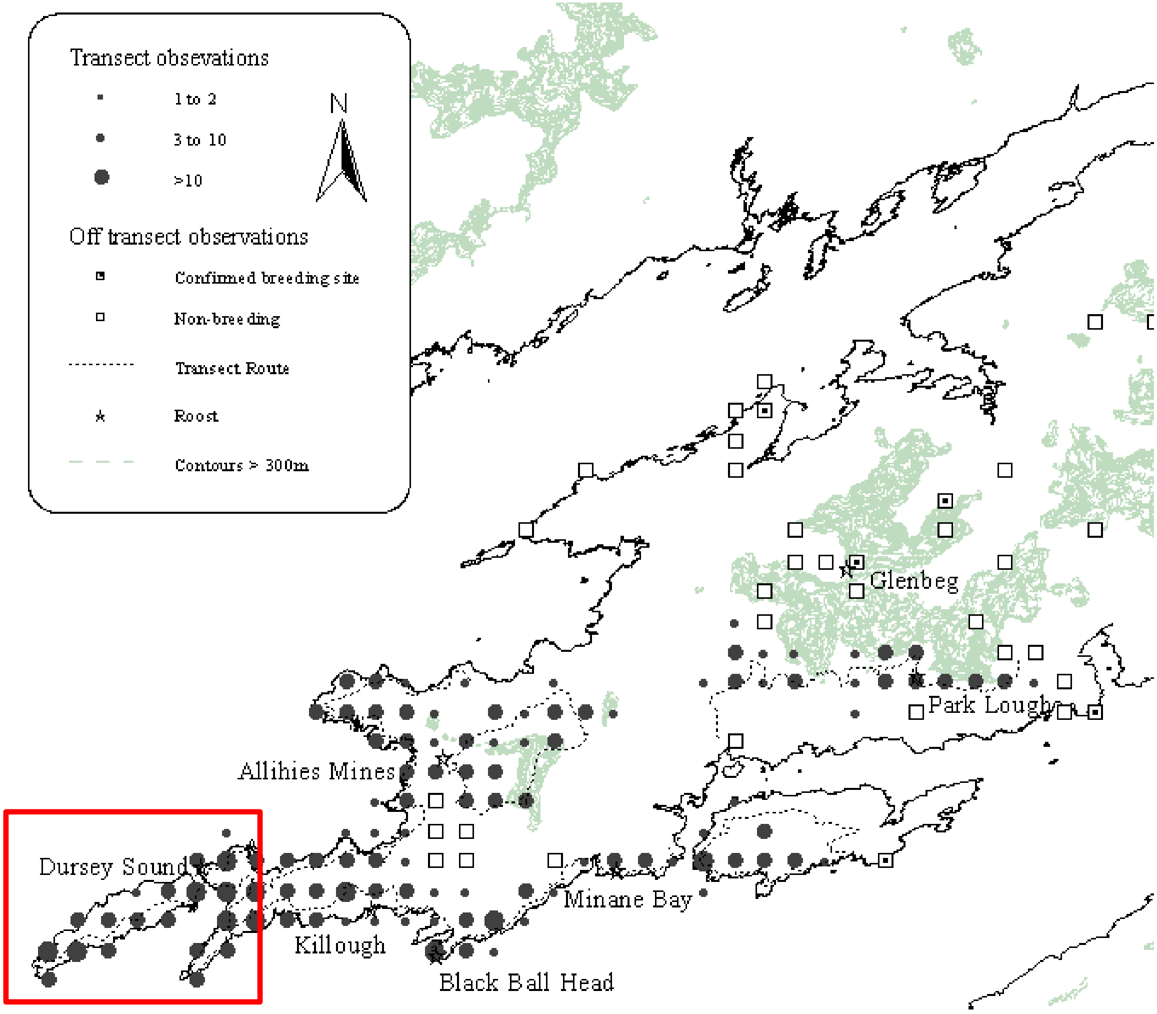

Plate 7.20 **Transects used in study area (study area in red; transects as per legend). Source: Trewby *et al*., 2004**

Surveys were not undertaken during periods of prolonged heavy rain or when wind speeds were at or in excess of Beaufort scale 6.

Abundance of Chough

Throughout the duration of the breeding and fledging periods, the maximum number of chough per flock was recorded on an ongoing basis. Towards the end of the fledging season, when non-breeding birds and family groups begin to gather in large communal flocks, this number serves as a proxy for the abundance of chough inhabiting a particular area.

Breeding Distribution & Abundance

In order to identify breeding pairs and locate nest sites, nest sites identified in previous studies (e.g. Trewby *et al*., 2004; Scott, 2017) were investigated and monitored to confirm/discount the presence of birds. In addition to the transects described in Section 1.3, the entire coastline was walked twice before the fledging period to ensure that all potential nest sites were identified. The location of confirmed and potential nest sites was recorded along with all observations of potential and confirmed breeding pairs. Criteria used to determine whether nests were breeding or non-breeding were based on Gray *et al.* (2003). Dedicated focal nest watches of 3 – 5 hours were undertaken once the locations of nests were identified to confirm whether breeding occurred. Behaviour of birds at nest sites including frequency of feeding visits, duration of visits, foraging in the vicinity of the nest, etc. was noted.

Breeding Success (Productivity)

Breeding success of confirmed breeding pairs was determined during the fledging period, by observing family groups consisting of adults and juveniles foraging in in the vicinity of nests. The number of juveniles successfully fledged by each pair was noted.

Distribution of Foraging Habitat

Detailed mapping of habitats was undertaken in the study area (see Section 7.4.1 of Chapter 7 of this EIAR) and habitats were classified according to potential suitability as chough foraging habitat, on the basis of a literature review undertaken on the ecology of the species (see Section 7.3.2.1, subheading 'Chough', of Chapter 7 of this EIAR). Additionally, throughout the breeding and post-fledging periods, birds were observed while foraging and the location, habitat use, land management and other relevant details were noted. The distribution of key areas of foraging habitat (particularly for family groups) was thus determined.

Flush Distance

Flush distance is defined as "*the distance at which a foraging bird or flock will fly off when approached [i.e. disturbed] by a person or group of persons*" (Keribiou *et al*., 2019; p. 658). During all surveys, flush distances (to the nearest 5 or 10m) were recorded whenever flushing was observed and these details could be judged accurately. Data recorded included the source of disturbance (individual or group of people), the number of birds flushed and the subsequent behaviour of the birds (re-settled or flew from the area).

Location of Roosts

During the post-breeding surveys, surveys were undertaken on Dursey Island with a view to identifying the location(s) of communal chough roosts.

Chapter 8 Land and Soils

8.1 Introduction

This chapter describes the natural characteristics of the site of the proposed development and its immediate surroundings in terms of soils and geology. This chapter also assesses the likely significant impacts of the construction and operation of the proposed development on these resources and where required, mitigation measures are proposed to avoid, reduce or minimise the impact on soils and geology due to the proposed development.

The existing ground conditions are outlined in this chapter, with the predicted impacts assessed on the basis of the relevant construction methodology and particular ground characteristics.

The mitigation measures and the residual impacts are provided in Sections 8.5 and 8.6 of this chapter respectively.

In addition to the cable car and the visitor centre, the proposed development also includes upgrades to the approach road, the R572, from the junction with the R575 to the mainland side cable car. These road improvement work will include the construction of 10 no. passing bays and 1 no. visibility splay at Bealbarnish gap and completion of a number of local improvements to improve visibility. A full description of the proposed development is detailed in Chapter 4 of this EIAR.

8.2 Methodology

This chapter is prepared having regard to the Environmental Impact Assessment (EIA) Directive 2014/52/EU and the following guidance documents:

- Environmental Protection Agency (EPA 2017) Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports;
- Environmental Protection Agency (EPA 2015) Draft Advice Notes for Preparing Environmental Impact Statements;
- Advice notes on Current Practice in the Preparation of Environmental Impact Statements, published by the Environmental Protection Agency (EPA) (2003);
- Guidelines on the information to be contained in environmental impact statements, published by the EPA (2002);
- National Roads Authority (NRA 2008) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes; and
- Institute of Geologists of Ireland (IGI) (2013) Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements.

8.2.1 Summary of Available Information

Walkover surveys

ROD's chartered civil engineers have surveyed the area of the proposed development on several occasions throughout 2018 and 2019. Observations were made and ample photographic evidence was taken during these site visits.

Mapping and Aerial Photography

Geological mapping from the Geological Survey of Ireland, covering the subsoils and solid geology of the location of the proposed development was reviewed. Digital mapping, available at www.gsi.ie/mapping, also shows the quaternary geology along with aquifer vulnerability, known groundwater wells and existing ground investigation information.

Open source (Google Earth, Bing Maps) and Ordnance Survey Ireland (OSI) aerial photography was analysed in order to identify large scale ground characteristics.

Ground Investigations

Ground investigation works specific to this project were tendered by Cork County Council and were carried out by Priority Geotechnical Limited between the 4th and 18th of April 2019. The ground investigation consisted of:

- Mainland: three rotary core boreholes including one for trial well, two trial pits and slit trenches, three pavement cores and four geophysical profiles; and
- Island side: three rotary core boreholes including one for trial well, two slit trenches and two pavement cores.

Pumping tests, falling head permeability tests and percolation tests were carried out in the boreholes. Samples taken from the rock cores were analysed in a laboratory in order to determine the geotechnical parameters and contamination/aggressivity levels. The findings from the laboratory analyses were reported in a Factual Report.

Contaminated Land

The development area is largely greenfield, with the exception of the existing station footprint and the access road and parking area. A sample for environmental ground contamination testing was taken next to the existing station. No noticeable signs of contamination were noted by the specialised contractor during sampling. Laboratory testing confirmed that there is no ground contamination present, and that the soil material is non-hazardous and inert.

8.3 Receiving Environment

The description of existing conditions is based on desk study information, site walkovers, mapping and ground investigations undertaken in the development area.

Topography

On the mainland, the topography of the area rises steeply from the coastline with minor cliffs up to 7m height, after which it turns onto a gentler slope of approximately 20°. The topography steepens up again approximately 300m behind the coastline as it approaches the local hill. The island side follows the similar outline, with locally higher cliffs. The surface is typically uneven with many smaller rock outcrops scattered across the area.

Bedrock Geology

GSI 1:100,000 Bedrock Geology mapping indicates that the entire area (mainland and Dursey island) is underlain by the Caha Mountain Formation, comprised of purple and green sandstones and siltstones. The bedrock geology is presented in Figure 8.1 of Volume 3 of this EIAR. The quaternary sediment map shows the bedrock to outcrop and subcrop in the wider area, which was confirmed during the walkover survey where only a very thin layer of topsoil and some weathered colluvium (up to 1.0m thick) was found to overlie the bedrock.

A geological fault with northwest-southeast direction is shown in GSI 1:100,00 Bedrock Geology map, passing in the immediate vicinity of the proposed locations on both mainland and Dursey Island.

The photographic evidence of outcrops of limited size and the borehole logs suggest that the rock is very thinly bedded to laminated, with bedding planes nearly vertical and the orientation of the bedding planes towards northwest-southeast. The discontinuities in the predominant discontinuity set (bedding) are generally undulated to stepped, rough, closed, slightly weathered and very closely spaced. Borehole logs indicate medium strong to very strong grey to purple siltstone with minimal non-intact zones and very little weathering. Unconfined strength of the rock from the laboratory testing was typically 10 to 30 MPa, with several samples exceeding 100 MPa. Groundwater level was observed approximately 1m below ground level.

Soils and Subsoils

Subsoil depths across the site are typically low (up to 1.0m) with bedrock being exposed throughout the development area. Bedrock outcrop is recorded in the GSI Quaternary and Teagasc subsoil mapping, as presented in Figure 8.2 of Volume 3 of this EIAR. The "Rock – Bedrock at surface" in GSI classification and "Shallow rocky Peaty/Non-peatymineral Complexes" in Teagasc classification is the recorded subsoil classifications present across the site. The site walkover and ground investigation show that the overburden is typically composed of very thin peaty topsoil and gravelly/cobbly colluvium overlying shallow bedrock.

Geologic heritage and geohazards

There are no Geologic Heritage features, quarries or commercial mineral deposits within the boundaries of the site or impacted by the proposed development.

No historical landslides are recorded within or in the vicinity of the site extent. This is anticipated, as the ground cover is rock outcrop and the slope angle is too mild to enable the detachment and sliding of rock blocks. The national Landslide Susceptibility Map shows the area to fall within the moderately low to moderately high landslide susceptibility area. The Landslide Susceptibility Map is developed primarily for landslides in mineral soils and peat and is known to overpredict the susceptibility category in rock slopes.

8.4 Predicted Impacts

All structural elements will be founded on pad foundations placed onto the fresh unweathered bedrock. Loading, stresses and deformations applied to the bedrock will be well within the capacity of the rock mass and tolerance of structural elements. Negligible settlements are expected due to the high stiffness of the rock. Foundation of the structural elements will, therefore, have a negligible impact on the existing rock conditions.

Approximately 6,500m^3 of overburden and bedrock will be excavated from the foundation footprint and from a part of the parking area on the mainland side. The rock will be reused on-site as fill to structures as described in the mitigation measures.

There are no predicted impacts in the operation phase.

8.5 Mitigation Measures and Monitoring

In general, the temporary and permanent impacts on land and soils are considered minimal and will be managed by the following best practice control measures.

The bedrock excavated on site will be reused as fill to structures, below the structures' floor slab where the slab is above the existing ground level, and to level the parking area. The laboratory tests carried out on rock samples confirm that the rock won on site can be used for structures' fill purposes in accordance to Specifications for Road Works. The majority of the excavated bedrock will be reused on site and there will be very limited and/or no need for off-site disposal. The design also ensures that the cut and the fill requirements are balanced, so that only small volumes of imported fill will be required.

Stripped topsoil will be temporarily stored and reused throughout the development area, for instance over the currently paved area next to the existing station.

A geotextile screen and boom with oil barrier will be required around the perimeter of the construction works to prevent the runoff of silt, oil or other deposits generated by construction activities.

8.6 Residual Impacts

There are no residual impacts on land and soils as a result of this proposed development.

8.7 Conclusions

The development area is situated in the geological context of outcropping sandstones and siltstones of Caha formation. A detailed project-specific ground investigation campaign has been planned and undertaken, with the results of satisfactory density and quality for the project requirements. The bedrock is proven to be medium strong to very strong and suitable as a structural foundation medium. No impacts are thus expected from the construction to the land and soils. Furthermore, the excavated rock will be able to be reused on site as fill to structures. No ground contamination was encountered. Potential impacts to land and soils arising from the potential need to dispose of the surplus excavated material or importing large quantities of fill, were mitigated by design as an earthwork balance has been achieved, with only very minor quantities of soil for off-site disposal and/or importation. The best practice control measures for impact mitigation will be employed to ensure no residual impacts on land and soils.

8.8 References

Priority Geotechnics Ltd (2019). *Dursey Cable Car Ground Investigation Draft Factual Report*.

Environmental Protection Agency (EPA) (2017). *Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports*.

EPA (2015). *Draft Advice Notes for Preparing Environmental Impact Statements*.

EPA (2003). *Advice notes on Current Practice in the Preparation of Environmental Impact Statements*.

EPA (2002). *Guidelines on the information to be contained in environmental impact statements*.

TII (formerly NRA) (2008). *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*

Institute of Geologists of Ireland (IGI) (2013). *Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements.*

Appendix 8.1 Factual Report

ROD
ROUGHAN & O'DONOVAN

Cork
County Council
Comhairle Contae Chorcaí

Mid West
National Road Design Office

Our Ref: JMS/Rp/P19033 (*.pdf)

24th June, 2019

Messrs. Roughan O’Donovan
Arena House,
Arena Road,
Sandyford,
Dublin 18.

Re: Dursey Island Cable Car & Visitor Centre Development, Co. Cork, Ground Investigation – Factual report.

Introduction

In February 2019, Priority Geotechnical were requested by Roughan O’Donovan on behalf of the client Cork County Council to undertake a ground investigation (GI) as part of the proposed Dursey Island Cable Car & Visitor Centre Development, Co. Cork.

The proposed GI works are located adjacent to the existing cableway which is also the site of the proposed Dursey Island Cableway and Visitor Centre Development, and is located at the southwestern tip of the Beara Peninsula (Lambs Head) in the west of County Cork. The cable car connects the mainland at Ballaghboy to a point on the eastern coast of Dursey Island over a narrow stretch of water known as the Dursey Sound.

Ground investigation works are required on both the mainland and on the island adjacent to the existing cableway infrastructure. A new support tower and a new station are proposed approximately 30m southeast from the existing towers and stations.

The investigation works required for the Dursey Island Cable Car and Visitor Centre Development will be undertaken at a number of locations on the mainland and island Including Greenfield lands, a combination of natural grasslands and agricultural pasture land with rock outcrops throughout. Some locations may require access via steeply sloping ground. Areas in the vicinity of the existing cable car mainland and island stations which are paved in bituminous surfacing.

Objectives

The project involves the gathering, manipulation and compilation of ground investigation data to enable the preliminary detailed planning and design of the proposed cableway and visitor centre.

Scope

The scope of the ground investigation, which was specified by Roughan O'Donovan, comprised of the following:

- Rotary boreholes;
- Trial pits;
- Slit trenches;
- *In situ* tests;
- Standpipe installations;
- All associated sampling;
- Laboratory testing and
- All associated reporting.

This report presents a summary of the factual records, data obtained with regard to the ground investigation for the proposed Dursey Island Cable Car and Visitor Centre Development. This report should be read in conjunction with the accompanying exploratory logs and laboratory test data.

Site Works

This investigation was carried out in accordance with the contract specification: Specification and Related Documents for Ground Investigation in Ireland (Engineers Ireland, October 2006), Eurocode 7- Geotechnical Design Part 2, ground investigation and testing (BS EN 1997-2: 2007) and the relevant British Standards (BS 5930 (1999) Code of Practice for Site Investigation +A2:2010 and BS 1377, Method of Tests for Soil for Civil Engineering Purposes, *in situ* Tests.

The investigation fieldworks were undertaken between the 05th April and the 14th April, 2019 under the supervision of PGL, Engineering Geologist(s). Details of the plant and equipment used are detailed on the relevant exploratory records, accompanying this factual report.

Metroscan Utility Locating (MUL) carried out a Ground Penetrating Radar (GPR) survey to locate underground services at the site of the existing station on the mainland. The findings are accompanying this factual report.

Rotary Boreholes

Six (6) rotary boreholes were advanced to depths 7.0m below existing ground level (bgl) to 25.5m bgl using PGL's Deltabase 520 rig and Symmetrex casing system. The exploratory records are attached, herein.

Location	Final Depth (m bgl)	Date Start (dd/mm/yyyy)
RC01	18.6	14/04/2019
RC02	16.15	10/04/2019
RC03	13.65	08/04/2019
RC04	7.0	09/04/2019
RCTW01	25.5	12/04/2019
RCTW02	25.5	05/04/2019

Trial Pits

Two (2) trial pit excavations were dug to depths 0.3m bgl to 1.0m bgl using an 8t tracked excavator. The exploratory records are attached, herein.

Location	Final Depth (m bgl)	Date Start (dd/mm/yyyy)
TP01	0.3	11/04/2019
TP02	1.0	12/04/2019

Slit Trenches

Four (4) slit trench excavations were dug to depths between 0.4m bgl and 1.3m bgl using a 3t tracked excavator. The exploratory records and associated cross sectional drawings are presented, herein.

Location	Final Depth (m bgl)	Date Start (dd/mm/yyyy)
ST01	1.3	11/04/2019
ST03	0.6	09/04/2019
ST04	0.6	09/04/2019
ST04A	0.4	09/04/2019

Sampling

Four (4) bulk disturbed samples (B), four (4) small disturbed samples (D), four (4) pavement cores and 51.0lin.m of rock core were taken from exploratory locations in general accordance with the preparation for and methods of taking samples, together with their size, preservation and handling was in accordance with British Standard BS 5930: 1981 - Code of Practice for Site investigation, the contract documents and the Association of Geotechnical and Geo-environmental Specialists (AGS) guide to environmental sampling, September 2010.

A single (1) environmental sample (ES) was taken at 0.25m bgl at location TP02. The sample was placed immediately in air-tight containers, which were filled to the top of the sample container. The sample suite consisted of: 2No. small disturbed samples (D) not less than 1.0kg, 2No. 250g amber glass sample containers and 2No. 60g amber glass sample containers. Additionally seven (07) environmental water samples were taken in litre glass and plastic bottles.

The preparation for and methods of taking environmental samples, together with their size, preservation and handling was in accordance with British Standard BS 5930: 1981- Code of Practice for Site investigation, the contract documents and the Association of Geotechnical and Geo-environmental Specialists (AGS) guide to environmental sampling, September 2010.

In-Situ Testing

Standard Penetration Test

Six (6) Standard Penetration Tests, N values, were carried out in the boreholes using the 60^{o} solid cone in place of the standard split barrel sampler in accordance with Geotechnical Investigation and Testing, Part 3 Standard penetration test, BS EN ISO 22476-3:2005+A1:2011. Standard penetration tests were carried out in the rotary boreholes with values N_{spt}= >50.

Permeability Testing

In situ variable head (falling) permeability tests was carried out in rotary borehole RC01. *In-situ* permeability tests were carried out in accordance with BS5930: 1999, Section 4: Cl. 25.4, within the superficial deposits over duration of one (1) hour. The processed test data is presented on the relevant borehole log presented herein of this factual report. The shape or intake factor, f was derived from the condition at the base of the borehole at the test depth and test geometry as per Hvorslev (1951).

$$k = \frac{A}{fd} \frac{\log_e (H_0 / H_t)}{t}$$

Generally for all tests the specific depth range of the test was the ground conditions below the casing. A mean k measured ($k_H = k_V$), permeability in the soil was assumed equal in both horizontal and vertical direction, ($k_H / k_V = 1.$). The test geometry provided a shape factor, f of 20 for the test undertaken.

Infiltration Pits

A single (1) infiltration test was carried out in general accordance with the BRE Digest 365, 2007 Soakaway Design Standards. A single (1) cycle of infiltration/ drainage was undertaken at a depth of 1.5m bgl. A summary of the testing is shown below and presented accompanying the relevant exploratory records attached, herein.

Percolation Tests

Percolation tests to assess the hydraulic assimilation capacity of the soils encountered were carried out using the P-test and T-test method. Three test holes per percolation test were dug. Tests were carried out in accordance with Section 6.3 of I.S CEN/TR 12566-2:2005. The results are accompanying this factual report.

Pump Tests

In situ pump tests were carried out in 125mm diameter standpipe wells at RCTW01 and RCTW02. Groundwater was monitored during pumping tests using Rugged Troll 100 level loggers. Continuous, absolute pressure (hydrostatic and barometric pressure) was measured *in situ* to determine continual groundwater levels. Levels were obtained prior to the pump test, during pumping and during the recharge phase. Accuracy was within 0.05% in water depths up to 30m. The data logs are presented as digital spreadsheet data (*.xls) accompanying this factual report.

Continuous monitoring of groundwater levels at the station well was undertaken using a Rugged Troll 100 data logger. The readings are presented as digital (.xls) files and accompany this factual report. Continuous monitoring was being undertaken at the time of reporting with results to be issued separately at a later date.

SUMMARY OF IN-SITU TESTS

Test	Quantity	Comment
Standard penetration test	06Nr.	Nspt=>50
Soakaway Test	01Nr.	$1.13x10^{-5}$
Falling Head Test	01Nr.	$3.93x10^{-3}$
Percolation Tests	-	P-Tests and T-Tests. See attached results
Pump Tests	02Nr.	RCTW01 & RCTW02. See accompanying .xls files.

Survey and Drawings

The ‘as built’ exploration locations were subsequently surveyed using Trimble 5700/5800 GPS equipment to the Ordinance Survey Irish Transverse Mercator system of co-ordinates (ITM) and elevations to Malin Head datum. The location layout (P19033_SI_A, P19033_SI_01 & P19033_SI_02) is attached.

Location	Easting	Northing	Ground Level (mOD)	Final Depth (m bgl)	Date Start (dd/mm/yyyy)
RC01	50809.84	41858.34	21.30	18.60	14/04/2019
RC02	50737.83	41854.34	13.70	16.15	10/04/2019
RC03	50543.98	41651.52	18.05	13.65	08/04/2019
RC04	50520.07	41619.36	20.90	7.00	09/04/2019
RCTW01	50777.83	41902.35	23.70	25.50	12/04/2019
RCTW02	50497.58	41564.08	23.27	25.50	05/04/2019
ST01	50811.84	41855.34	20.80	1.30	11/04/2019
ST03	50550.02	41648.35	17.47	0.60	09/04/2019
ST04	50523.15	41624.58	20.36	0.60	09/04/2019
ST04A	50528.73	41615.59	20.50	0.40	09/04/2019
TP01	50825.85	41875.34	25.30	1.00	11/04/2019
TP02	50792.84	41886.35	23.30	0.30	12/04/2019

Laboratory Testing

Laboratory testing was scheduled by PGL on behalf of Roughan O’Donovan and carried out by PGL. Specialist chemical testing was undertaken by Chemtest Ltd. (UK) on behalf of PGL in accordance with BS1377 (1990), Methods of test for soils for civil engineering purposes and the ISRM suggested methods for rock characterisation, testing and monitoring.

Please note that all samples shall be retained for a period no longer than 28 days from the date of this report. Thereafter all remaining samples shall be appropriately disposed of unless a written instruction to the contrary is received by PGL prior to the date of this reporting and within the 28 day period outlined above. Laboratory testing will result in a reduction of sample quantity and in some cased the use of the full sample mass. Samples already tested may not be suitable or available for further testing.

The laboratory data is attached and summarised as follows;

SUMMARY OF LABORATORY TESTING

Type	Nr.	Remarks
Natural Moisture Content	05	12% to 22%
Atterberg Limits	06	Liquid Limit, LL 37% to 52% Plastic Limit, PL 37% to 52% Plasticity Index, PI 8 to 18
Particle Size Distribution	04	No hydrometer analysis on fine soils
pH	05	7.9 to 9.5

Type	Nr.	Remarks
Sulphate (water soluble as SO_4)	05	<0.010g/l
Sulphate (acid soluble)	05	0.010% to 0.021%
Organic matter	01	0.91
Magnesium (water soluble)	04	<0.010g/l
Total Sulphur	04	<0.010%
Environmental Water	07	See attached results
Environmental Soil	01	See attached results
Point load IS50	23	0.2MPa to 7.1MPa
Unconfined compressive strength (UCS	09	9.67MPa to 44.97MPa
Slake durability	04	See attached results
Los Angeles abrasion Value	04	See attached results
Magnesium sulphate soundness	04	See attached results

Published Geology

The geology of the study area (GSI 1:100,000 mapping Sheet 24) is characterised by the Caha Mountain Formation (CH), described as purple and green Sandstone and Siltstone. Outcropping bedrock is shown extensively in the study area. The national groundwater mapping indicates extreme vulnerability with rock at or near the surface.

Teagasc subsoil mapping indicates that the area is underlain by exposed bedrock and Glacial till deposits derived from Devonian Sandstones.

Ground Conditions

The full details of the ground conditions encountered are provided for on the exploratory records accompanying this report. The records provide descriptions, in accordance with BS 5930 (1999) +A2: 2010 and Eurocode 7, Geotechnical Investigation and Testing, Identification and classification of soils, Part 1, Identification and description (EN ISO 14688-1: 2002)– Identification and Classification of Soil, Part 2: Classification Principles (EN ISO 14688-2:2004) and Identification and Classification of Rock, Part 1: Identification & Description (EN ISO 14689-1:2004) of the materials encountered, *in situ* testing and details of the samples taken, together with any observations made during the site investigation.

Groundwater Conditions

Groundwater is recorded when encountered during boring over a period of 20 minutes, noting any changes that may occur.

Groundwater conditions observed in the excavations are those appertaining to the period of the investigation. Groundwater levels may be subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions or tidal variations etc.

Groundwater was encountered between 0.2m bgl and 9.0m bgl during the period of works. Four (4) 50mm diameter HDPE standpipes were installed as per the scope of works. The groundwater regime should be assessed from monitoring standpipes where available.

SUMMARY OF STANDPIPE INSTALLATIONS

Location	Depth Top (m bgl)	Depth Base (m bgl)	Diameter (mm)	Pipe Type
RC01	0.0	2.0	50	PLAIN
	2.0	10.5	50	SLOTTED
RC03	0.0	1.65	50	PLAIN
	1.65	13.65	50	SLOTTED
RCTW01	0.0	9.0	125	PLAIN
	9.0	25.5	125	SLOTTED
RCTW02	0.0	10.0	125	PLAIN
	10.0	20.5	125	SLOTTED

Exploratory locations were backfilled with gravel, bentonite and arisings.

⁘ GRAVEL Backfill to installation/ borehole

▩ ARISINGS Backfill

≡ uPVC slotted pipe

▧ BENTONITE Backfill to installation/ borehole

Should you have any queries in relation to the data presented, please do not hesitate to contact our office.

Yours sincerely,
For **Priority Geotechnical,**

SMcSweeney

James McSweeney BSc
Engineering Geologist

No responsibility can be held by PGL for ground conditions between exploratory locations. The exploratory logs provide for ground profiles and configuration of strata relevant to the investigation depths achieved during the fieldworks. Caution shall be taken when extrapolating between such exploratory locations. No liability is accepted for ground conditions extraneous to the exploratory locations. Where additional information becomes available any assessment may be subject to review and change.

This report has been prepared for the employer Ireland and their Representative(s) as outline, herein. The information should not be used without their prior written permission. PGL accepts no responsibility or liability for this document being used other than for the purposes for which it was intended.

KEY TO SYMBOLS ON EXPLORATORY HOLE RECORDS

All linear dimensions are in metres or millimetres

DESCRIPTIONS

**	Drillers Description
Friable	Easily crumbled

SAMPLES

U( )	Undisturbed 102mm diameter sample, ( ) denotes number of blows to drive sampler
U( )F, U( )P	F- not recovered, P-partially recovered
U38	Undisturbed 38mm diameter sample
P(F), (P)	Piston sample - disturbed
B	Bulk sample - disturbed
D	Jar Sample - disturbed
W	Water Sample
CBR	California Bearing Ratio mould sample
ES	Chemical Sample for Contamination Analysis
SPTLS	Standard Penetration Test S lump sample from split sampler

CORE RECOVERY AND ROCK QUALITY

TCR	Total Core Recovery (% of Core Run)
SCR	Solid Core Recovery (length of core having at least one full diameter as % of core run)
RQD	Rock Quality Designation (length of solid core greater than 100mm as % of core run)

Where there is insufficient space for the TCR, SCR and RQD, the results may be found in the remarks column

If	Fracture Spacing in mm (Minimum/Average/Maximum) NI - non intact, NR - no recovery
AZCL	Assumed Zone of Core Loss
NI	Non intact

GROUNDWATER

▽	Groundwater strike
▼	Groundwater level after standing period
Date/Water	Date of shift (day/month)/Depth to water at end of previous shift shown above the date and depth to water at beginning of shift given below the date

INSITU TESTING

S	Standard Penetration Test - split barrel sampler
C	Standard Penetration Test - solid 60^{o} cone
SW	Self Weight Penetration
Ivp, HVp (R)	In Situ Vane Test, Hand Vane Test (R) demonstrates remoulded strength
K(F), (C), (R), (P)	Permeability Test
HP	Hand Penetrometer Test

MEASURED PROPERTIES

N	Standard Penetration Test - blows required to drive 300mm after seating drive
x/y	Denotes x blows for y mm within the Standard Penetration Test
x*/y	Denotes x blows for y mm within the seating drive
c_u	Undrained Shear Strength (kN/m^2)
CBR	California Bearing Ratio

ROTARY DRILLING SIZES

Index Letter	Nominal Diameter (mm)	
	Borehole	Core
N	75	54
H	99	76
P	120	92
S	146	113

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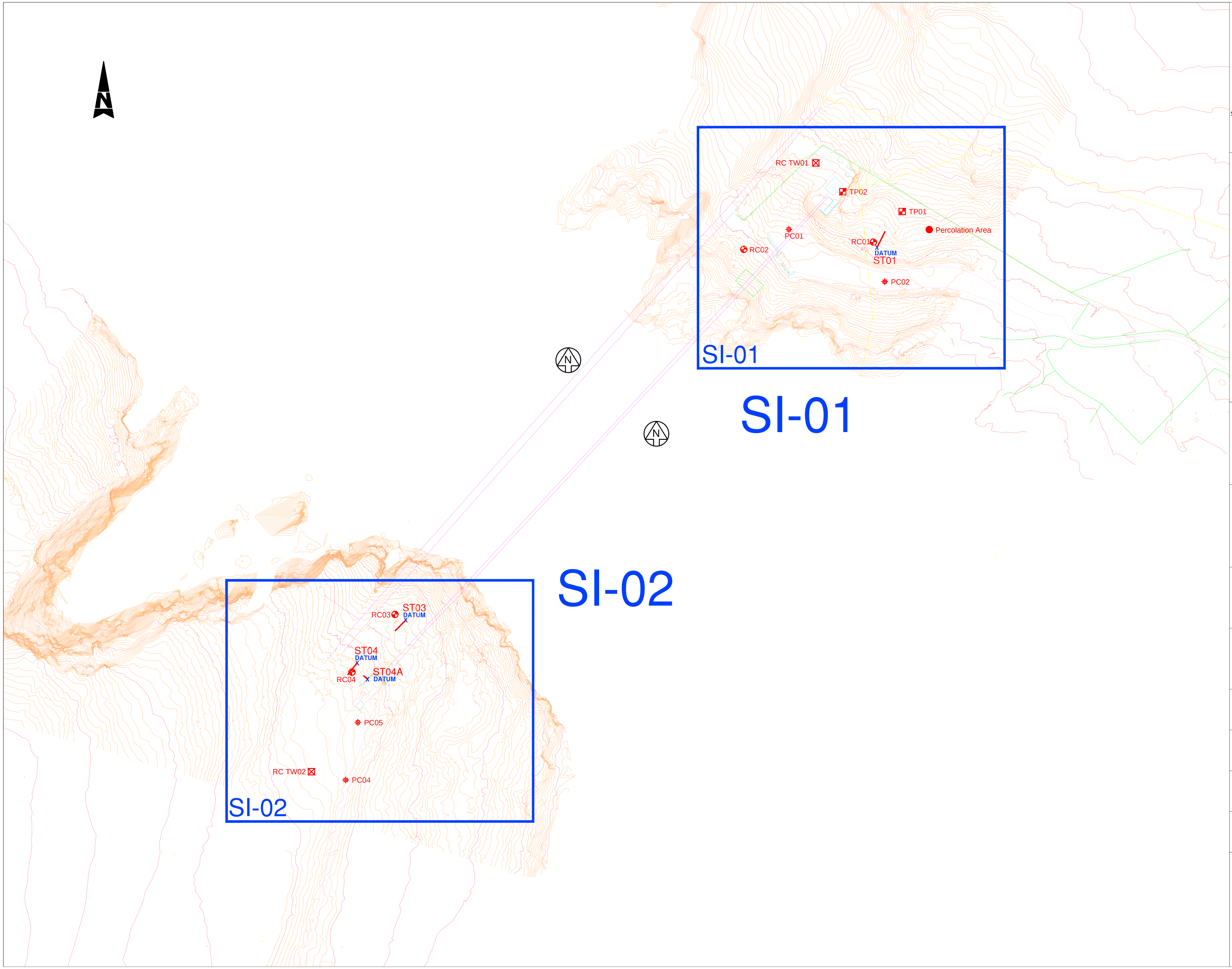
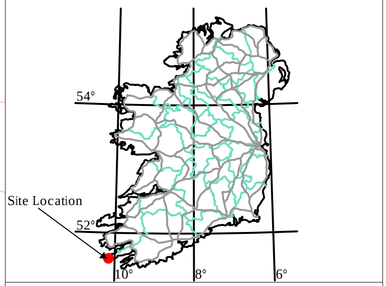
Key Sheet



Priority Geotechnical Site



JOB NAME:

Dursey Island Cable Car &
Visitor Centre Development

Sheet Title:

EXPLORATORY LOCATION
LAYOUT

JOB NUMBER:

P19033

DRAWING NUMBER:

P19033-SI-A

DRAWN BY:

Gary Curtin

DATE:

15/04/2019

SCALE:	APPROVED:
1:2000 ON A3	GH

REVISION:

D01

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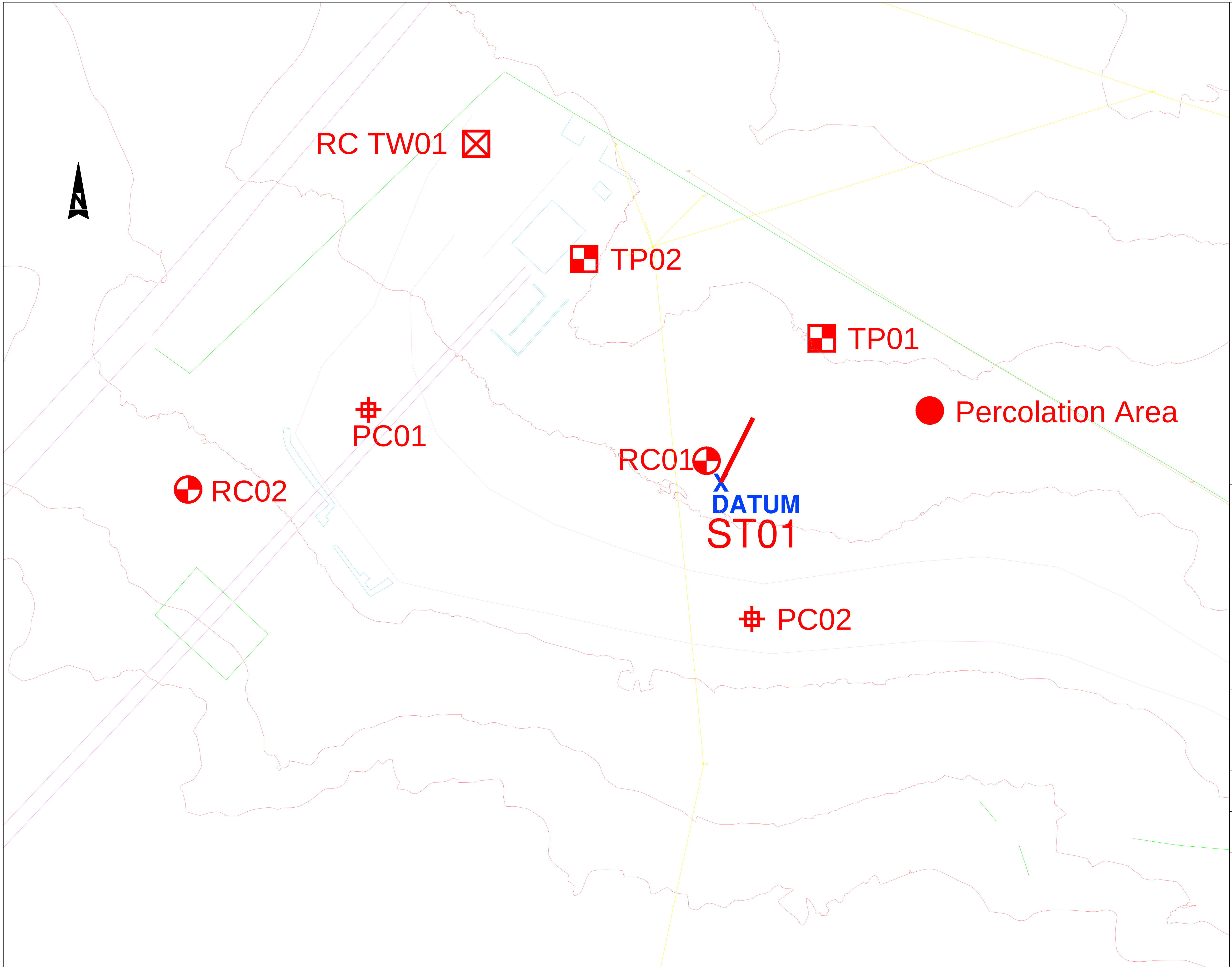

KEY:

ST00 DATUM x	Denotes Slit Trench and Datum location
RC00	Denotes Rotary Core location
PC00	Denotes Pavement Core location
RCTW0	Denotes Trial Well location
TP00	Denotes Trial Pit location
●	Denotes Percolation area

JOB NAME:
Dursey Island Cable Car &
Visitor Centre Development

Sheet Title:
LOCATION PLAN

JOB NUMBER:
P19033

DRAWING NUMBER:
P19033-SI-01

DRAWN BY:
Gary Curtin

DATE:
15/04/2019

SCALE:	APPROVED:
1:500 ON A3	GH

REVISION:
D01

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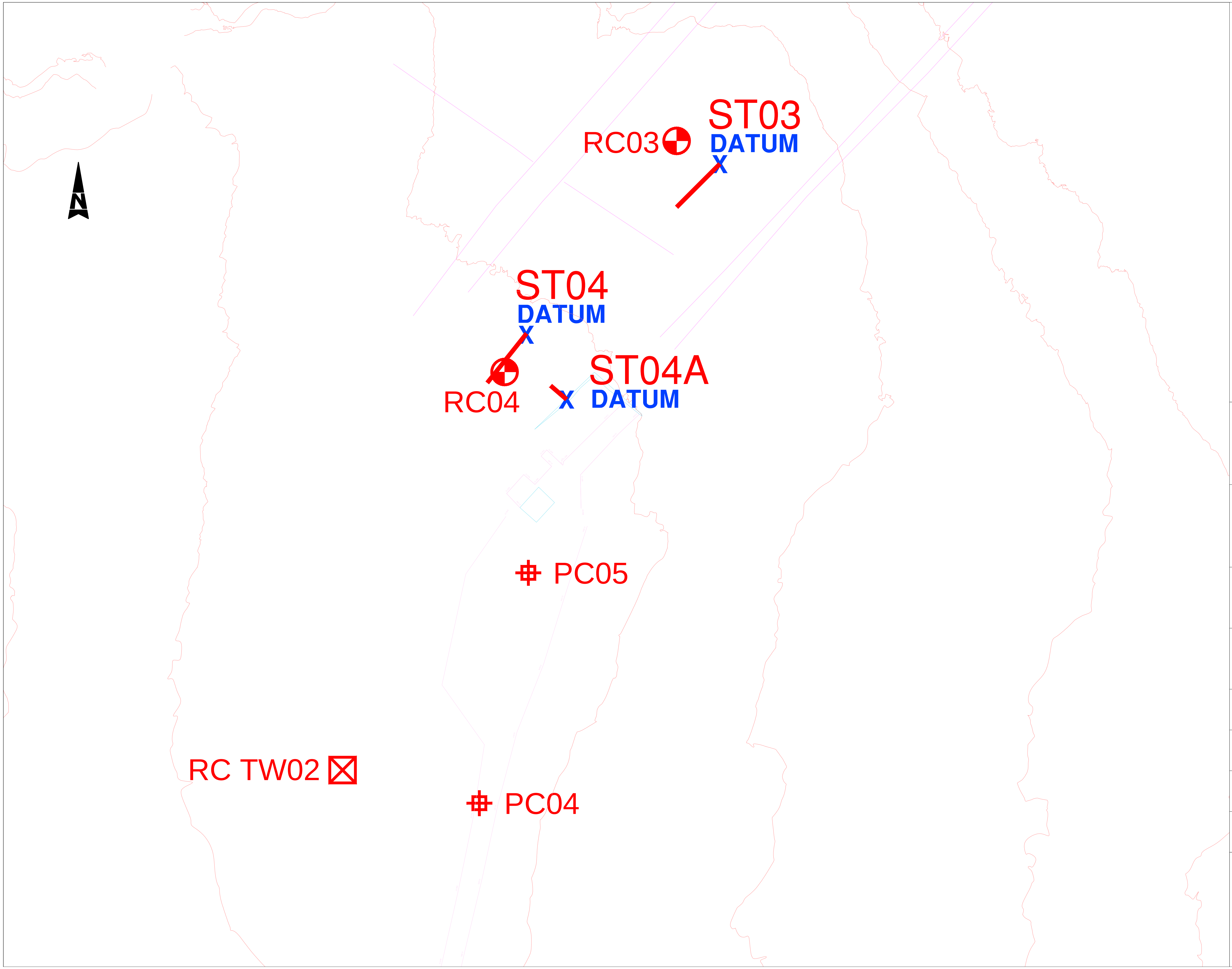

KEY:

ST00 DATUM X	Denotes Slit Trench and Datum location
RC00	Denotes Rotary Core location
PC00	Denotes Pavement Core location
☒ RCTW0	Denotes Trial Well location
TP00	Denotes Trial Pit location

JOB NAME:
Dursey Island Cable Car & Visitor Centre Development

Sheet Title:
LOCATION PLAN

JOB NUMBER:
P19033

DRAWING NUMBER:
P19033-SI-02

DRAWN BY:
Gary Curtin

DATE:
15/04/2019

SCALE:	APPROVED:
1:500 ON A3	GH

REVISION:
D01

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Priority Geotechnical Ltd. **Tel: 021 4631600** **Fax: 021 4638690** **www.prioritygeotechnical.ie**	**Drilled By:** AK **Logged By:** SR	Borehole No. **RC01** Sheet 1 of 3	
Project Name: Dursey Island Cable Car & Visitor Centre	**Project No.** P19033	**Co-ords:** 50810E - 41858N	**Hole Type** Rotary cored
Location: Dursey Island, Co. Cork.		**Level:** 21.30m OD	**Scale** 1:50
Client: Cork County Council		**Dates:** 14/04/2019	15/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description
										Open hole boring. Driller described: Peat with boulder content.
		74 (19,22/74 for 225mm) (C) 1.00 - 2.50		40	10	6	1.00	20.30		Core run attempted. Poor recovery. Assumed Boulders.
		N=89 (12,19/20,20,24,25) (C) 2.50 - 4.00		36	8	0	2.50	18.80		Core run attempted. Poor recovery. Weathered SILTSTONE.
		0 (25,25/0 for 0mm) (C) 4.00 - 4.85		82	47	0	4.00	17.30		Lithology: Weak to medium strong, purple SILTSTONE. Weathering: Slightly weathered. Fractures: Set 1 dipping 60 to 80 degrees, undulated to stepped rough fracture surfaces. Set 2 dipping 10 to 25 degrees, wide spacing, stepped rough to undulated rough. Detail: Not intact from 4.00m to 4.20m and 12.40m to 12.50m.
		4.85 - 6.35	10mm 330mm 160mm	100	100	27	6/m			
		6.35 - 7.80	40mm 450mm 280mm	100	100	38	5/m			
		7.80 - 9.40	40mm 500mm 220mm	38	38	31	3/m			

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
18.60	76	131

Equipment:	Deltabase 520
Method:	Compressed air mist

Remarks:

Borehole terminated at 18.60m bgl. 50mm standpipe installed. Depth response from 2.00m o 10.50m. Falling head permeabiliy test carried out for 1 hour.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	14/04/2019 08:00	0.00	Start of shift.
3.4	14/04/2019 18:00	12.40	End of shift.
3.4	15/04/2019 08:00	12.40	Start of shift.
3.4	15/04/2019 18:00	18.60	End of borehole.

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Drilled By: AK	**Logged By:** SR	Borehole No. **RC01**	Sheet 2 of 3
Project Name: Dursey Island Cable Car & Visitor Centre	**Project No.** P19033	**Co-ords:** 50810E - 41858N	**Hole Type** Rotary cored
Location: Dursey Island, Co. Cork.		**Level:** 21.30m OD	**Scale** 1:50
Client: Cork County Council		**Dates:** 14/04/2019	15/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description
										Lithology: Weak to medium strong, purple SILTSTONE. Weathering: Slightly weathered. Fractures: Set 1 dipping 60 to 80 degrees, undulated to stepped rough fracture surfaces. Set 2 dipping 10 to 25 degrees, wide spacing, stepped rough to undulated rough. Detail: Not intact from 4.00m to 4.20m and 12.40m to 12.50m.
		9.40 - 10.90	30mm 500mm 350mm	100	100	100	10/m			
		10.90 - 12.40	10mm 500mm 200mm	100	100	100	6/m			
		12.40 - 14.00	50mm 650mm 380mm	88	88	47	4/m			
		14.00 - 15.50	30mm 660mm 280mm	100	100	47	7/m			
		15.50 - 17.05	90mm 460mm 310mm	100	100	74	6/m			
		17.05 - 18.60	150mm 750mm 550mm	100	100	68	3/m			

10 11 12 13 14 15 16 17 18

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
18.60	76	131

Equipment:	Deltabase 520
Method:	Compressed air mist

Remarks:

Borehole terminated at 18.60m bgl. 50mm standpipe installed. Depth response from 2.00m o 10.50m. Falling head permeabiliy test carried out for 1 hour.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	14/04/2019 08:00	0.00	Start of shift.
3.4	14/04/2019 18:00	12.40	End of shift.
3.4	15/04/2019 08:00	12.40	Start of shift.
3.4	15/04/2019 18:00	18.60	End of borehole.

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Drilled By:	AK
Logged By:	SR
Borehole No.	**RC01**
	Sheet 3 of 3

Project Name:	Dursey Island Cable Car & Visitor Centre	**Project No.** P19033	**Co-ords:**	50810E - 41858N	**Hole Type** Rotary cored
Location:	Dursey Island, Co. Cork.		**Level:**	21.30m OD	**Scale** 1:50
Client:	Cork County Council		**Dates:**	14/04/2019	15/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description
▨							18.60	2.70	×	Lithology: Weak to medium strong, purple SILTSTONE. Weathering: Slightly weathered. Fractures: Set 1 dipping 60 to 80 degrees, undulated to stepped rough fracture surfaces. Set 2 dipping 10 to 25 degrees, wide spacing, stepped rough to undulated rough. Detail: Not intact from 4.00m to 4.20m and 12.40m to 12.50m. End of Borehole at 18.600m

19
20
21
22
23
24
25
26
27

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
18.60	76	131

Equipment:	Deltabase 520
Method:	Compressed air mist

Remarks:

Borehole terminated at 18.60m bgl. 50mm standpipe installed. Depth response from 2.00m o 10.50m. Falling head permeabiliy test carried out for 1 hour.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	14/04/2019 08:00	0.00	Start of shift.
3.4	14/04/2019 18:00	12.40	End of shift.
3.4	15/04/2019 08:00	12.40	Start of shift.
3.4	15/04/2019 18:00	18.60	End of borehole.

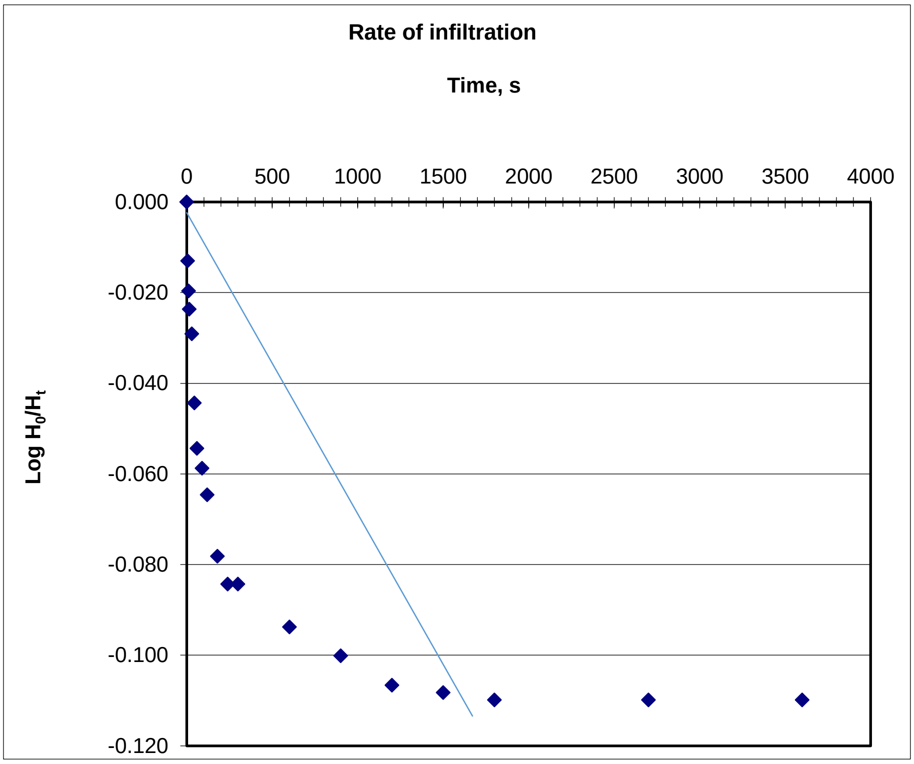
P19033 **Falling head permeability test**

Location	**Dursey Island**		
BH ID	**RC01**	$H_{w/}$ H_o	**3.40**
Test	**1**		
Casing diameter	**100** mm		
Casing depth	**4** m		
Borehole depth	**6.35** m		
Groundwater level	**3.40** m bgl		
Date	**14/04/2019**		

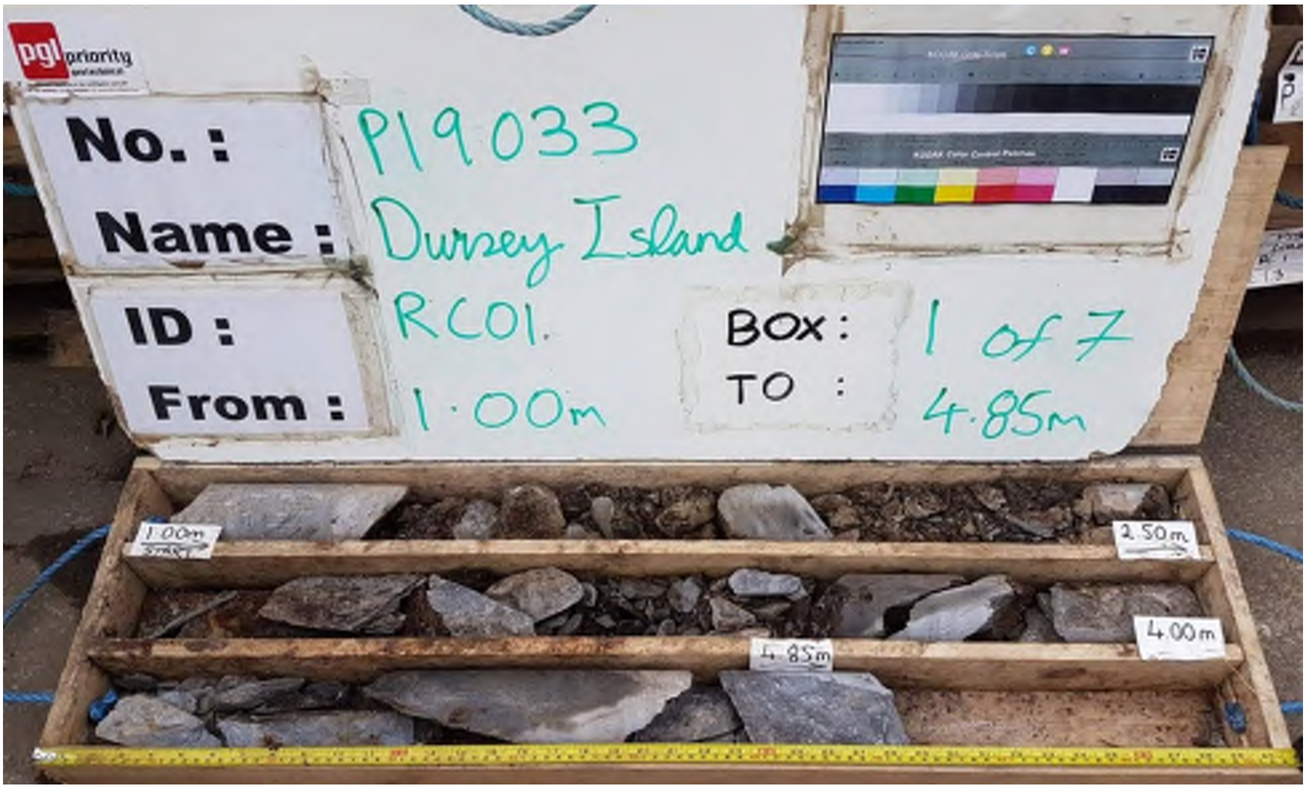
Min	**Sec**	**depth, m bgl**	**vol, cu.m**	**H_t**	**log H_0/H_t**
0	0	0.000	0.00000	3.400	0.000
0.08	5	0.100	0.00079	3.300	-0.013
0.17	10	0.150	0.00118	3.250	-0.020
0.25	15	0.180	0.00141	3.220	-0.024
0.50	30	0.220	0.00173	3.180	-0.029
0.75	45	0.330	0.00259	3.070	-0.044
1	60	0.400	0.00314	3.000	-0.054
1.5	90	0.430	0.00338	2.970	-0.059
2	120	0.470	0.00369	2.930	-0.065
3	180	0.560	0.00440	2.840	-0.078
4	240	0.600	0.00471	2.800	-0.084
5	300	0.600	0.00471	2.800	-0.084
10	600	0.660	0.00518	2.740	-0.094
15	900	0.700	0.00550	2.700	-0.100
20	1200	0.740	0.00581	2.660	-0.107
25	1500	0.750	0.00589	2.650	-0.108
30	1800	0.760	0.00597	2.640	-0.110
45	2700	0.760	0.00597	2.640	-0.110
60	3600	0.760	0.00597	2.640	-0.110

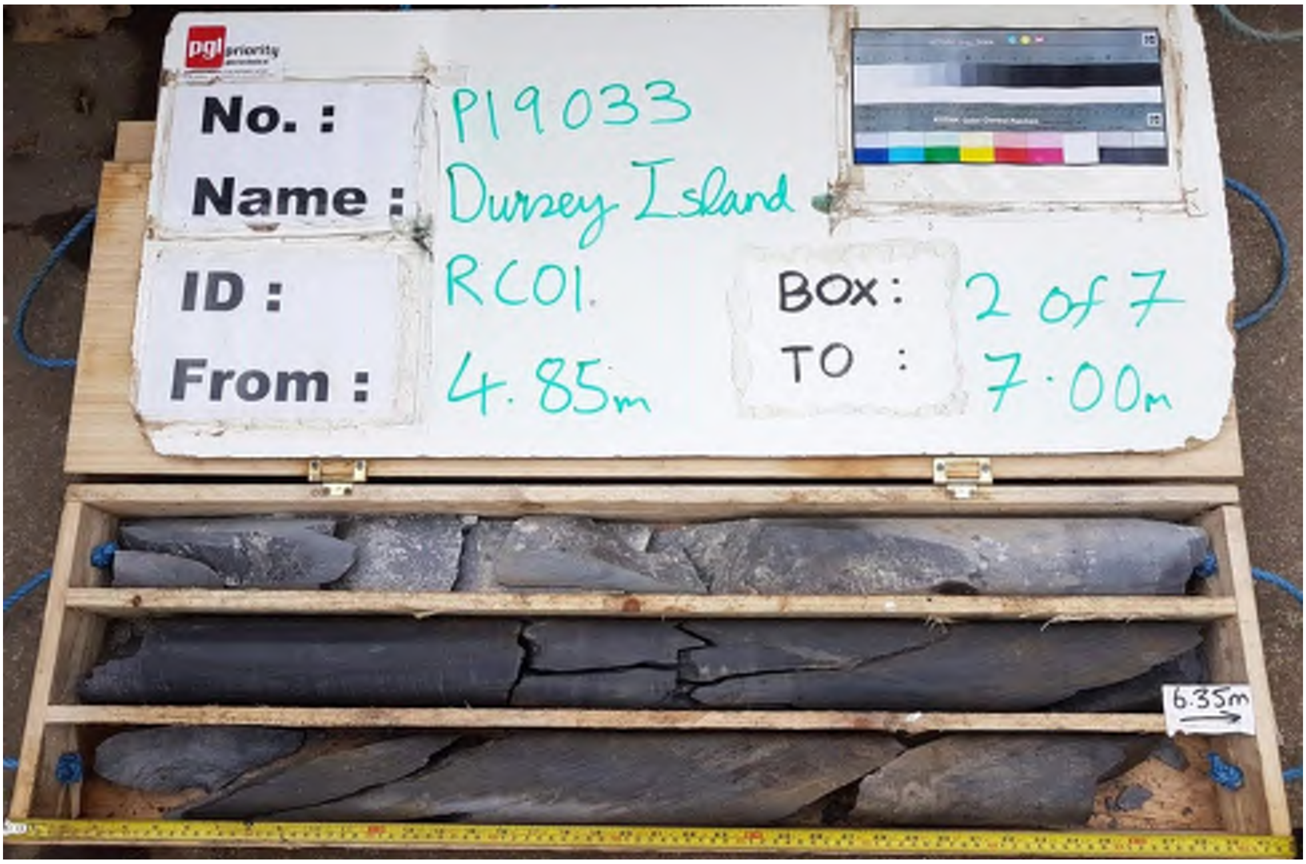
k_{mean} **3.93E-03** **ms^{-1}**

$k_H = k_V$



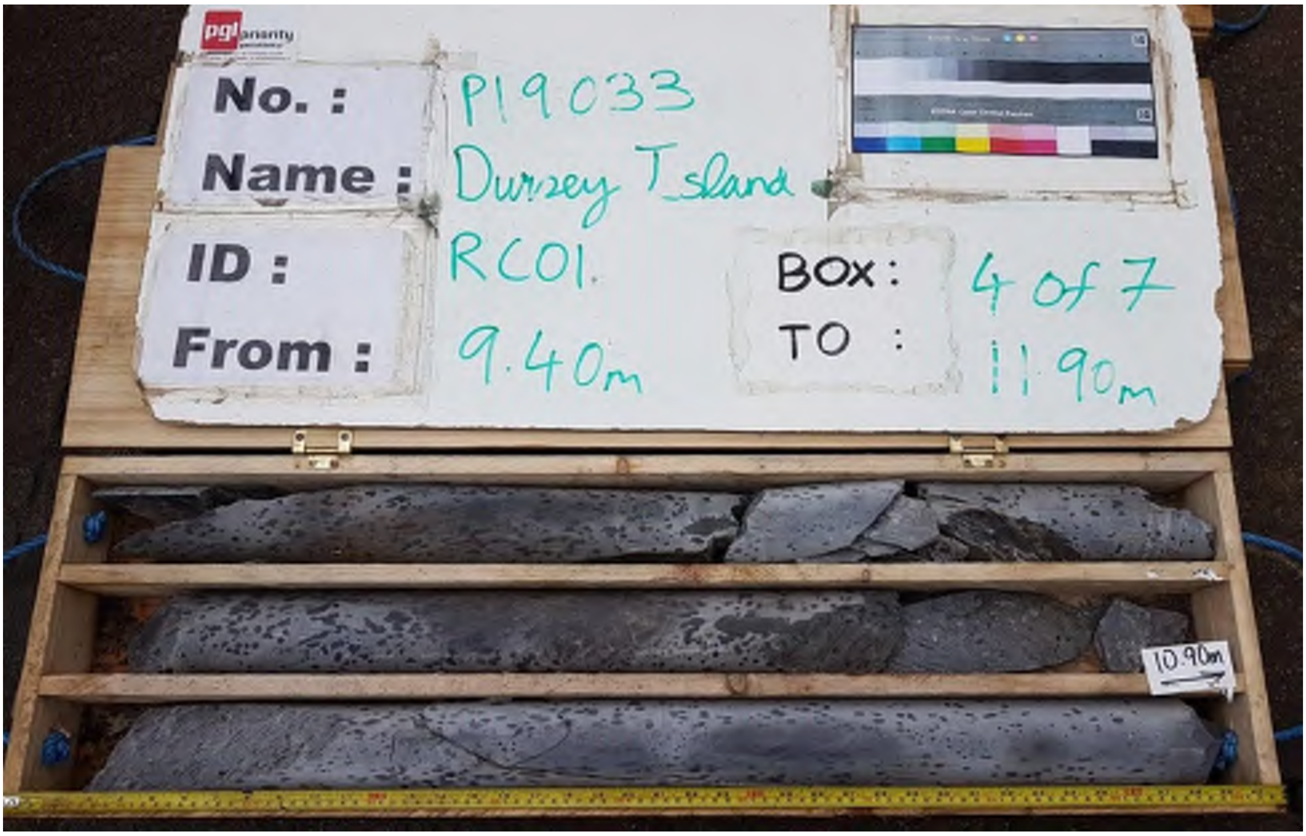
Photographic Record





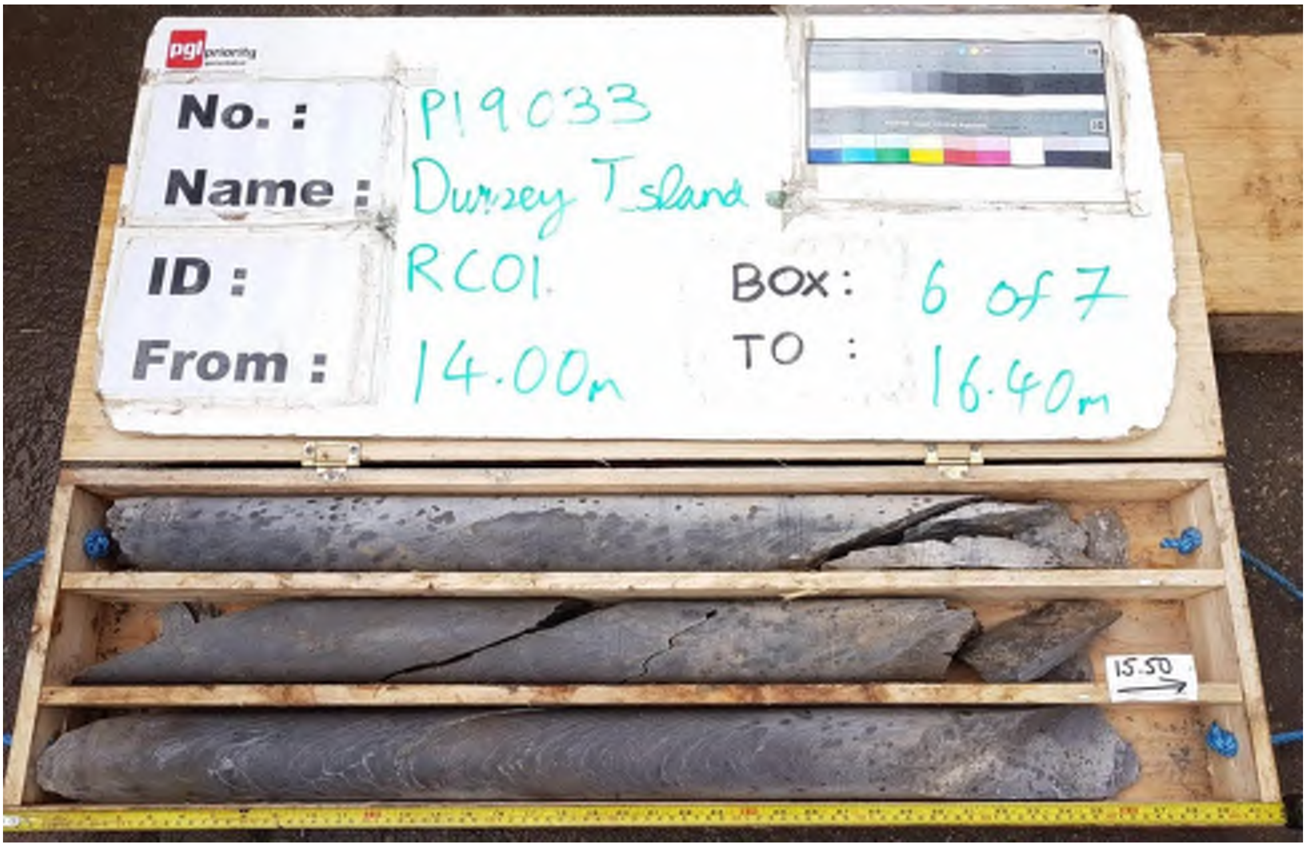
Number:	**RC01**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan	

Photographic Record



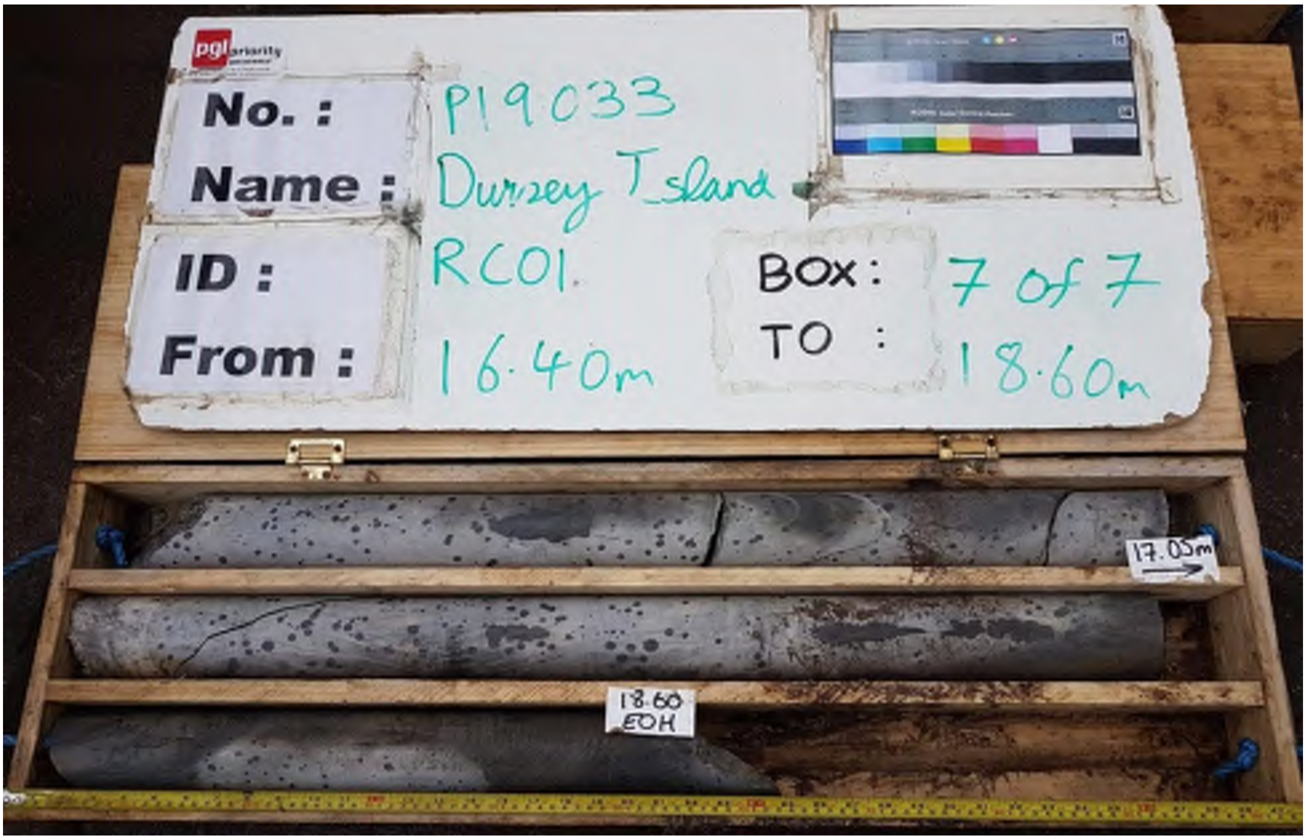
Number:	**RC01**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan

Photographic Record



Number:	**RC01**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan

Photographic Record



Number:	**RC01**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan	

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Drilled By:	AK	Borehole No.	**RC02**
Logged By:	OD		Sheet 1 of 2
Project Name:	Dursey Island Cable Car & Visitor Centre	**Project No.**	P19033
Co-ords:	50738E - 41854N	**Hole Type**	Rotary cored
Location:	Dursey Island, Co. Cork.	**Level:**	13.70m OD
Scale	1:50		
Client:	Cork County Council	**Dates:**	10/04/2019 12/04/2019

Well	**Water Strike (m)**	**Depth (m)**	**Type /Fs (min, max, avg)**	**Coring (%) TCR**	**SCR**	**RQD**	**Depth (m) / FI (/m)**	**Level (mOD)**	**Legend**	**Stratum Description**
										Open hole boring. Driller described: Peat with weathered rock.
		0 (50 for 5mm/0 for 0mm) (C)					2.25	11.45		Lithology: Medium weak, purple SILTSTONE. Weathering: Slightly weathered, with light clay smearing and oxidation colouration discoloration. Fractures: Main set dips 60 to 70 degrees, close to medium, undulate to planar smooth. Minor set dips sub-horizontal, wide, stepped rough.
			120mm 450mm 300mm				6/m			
		2.25 - 3.75		100	100	30				
			100mm 450mm 310mm				7/m			
		3.75 - 5.00		100	100	12				
			100mm 340mm 150mm				3/m			
		5.00 - 6.50	130mm 600mm 300mm	100	100	37	6/m			
		6.50 - 7.15	100mm 550mm 500mm	100	100	49	2/m			
	▼									
		7.15 - 8.70	150mm 800mm 300mm	100	100	36	5/m			

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Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
7.00				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
16.15	76	131

Equipment:	Deltabase 520.
Method:	Compressed air mist.

Remarks:

Borehole terminated at 16.15m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	10/04/2019 08:00	2.25	Start of shift.
Dry.	10/04/2019 18:00	7.15	End of shift.
7.00	11/04/2019 08:00	7.15	Start of shift.
8.00	11/04/2019 18:00	11.30	End of shift.
8.00	12/04/2019 08:00	11.30	Start of shift.
8.00	12/04/2019 18:00	16.15	End of borehole.

Priority Geotechnical Ltd. **Tel: 021 4631600** **Fax: 021 4638690** **www.prioritygeotechnical.ie**	**Drilled By:** AK **Logged By:** OD	Borehole No. **RC02** Sheet 2 of 2	
Project Name: Dursey Island Cable Car & Visitor Centre	**Project No.** P19033	**Co-ords:** 50738E - 41854N	**Hole Type** Rotary cored
Location: Dursey Island, Co. Cork.		**Level:** 13.70m OD	**Scale** 1:50
Client: Cork County Council		**Dates:** 10/04/2019	12/04/2019

Well	**Water Strike (m)**	**Depth (m)**	**Type /Fs (min, max, avg)**	**Coring (%)** TCR	SCR	RQD	**Depth (m) / FI (/m)**	**Level (mOD)**	**Legend**	**Stratum Description**	
		8.70 - 9.75	100mm 380mm 200mm	100	100	24	7/m			Lithology: Medium weak, purple SILTSTONE. Weathering: Slightly weathered, with light clay smearing and oxidation colouration discoloration. Fractures: Main set dips 60 to 70 degrees, close to medium, undulate to planar smooth. Minor set dips sub-horizontal, wide, stepped rough.	
		9.75 - 11.30	180mm 700mm 400mm	100	100	32	5/m				10 11
		11.30 - 12.70	200mm 660mm 400mm	100	100	43	5/m				12
		12.70 - 14.20	650mm 650mm 650mm 50mm 700mm 150mm	100	100	67	2/m 3/m				13 14
		14.20 - 15.25	525mm 550mm 500mm	100	100	95	2/m				15
		15.25 - 16.10	350mm 580mm 270mm	100	100	88	2/m				16
							16.15	-2.45		End of Borehole at 16.150m	17 18

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
7.00				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
16.15	76	131

Equipment: Deltabase 520.

Method: Compressed air mist.

Remarks:

Borehole terminated at 16.15m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	10/04/2019 08:00	2.25	Start of shift.
Dry.	10/04/2019 18:00	7.15	End of shift.
7.00	11/04/2019 08:00	7.15	Start of shift.
8.00	11/04/2019 18:00	11.30	End of shift.
8.00	12/04/2019 08:00	11.30	Start of shift.
8.00	12/04/2019 18:00	16.15	End of borehole.

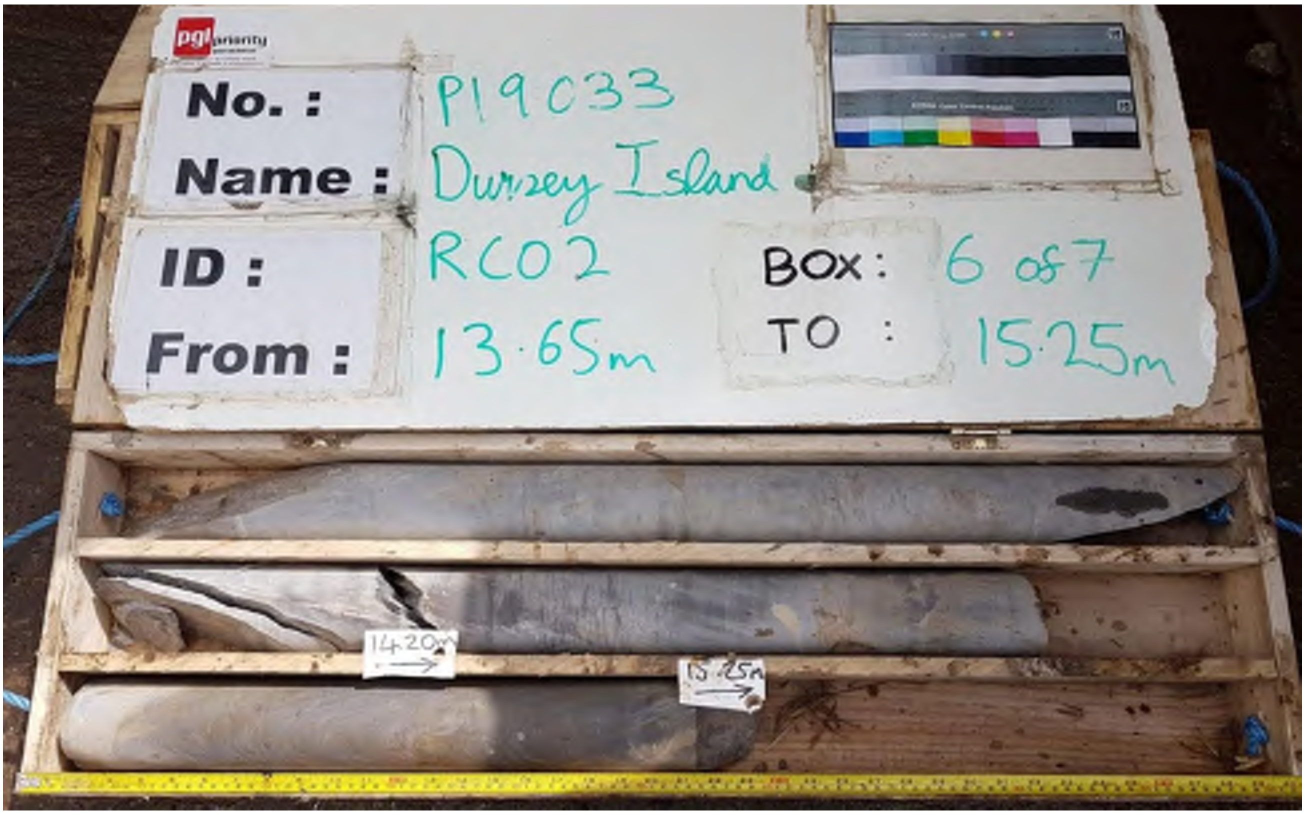
Photographic Record

Number:	**RC02**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan

Photographic Record

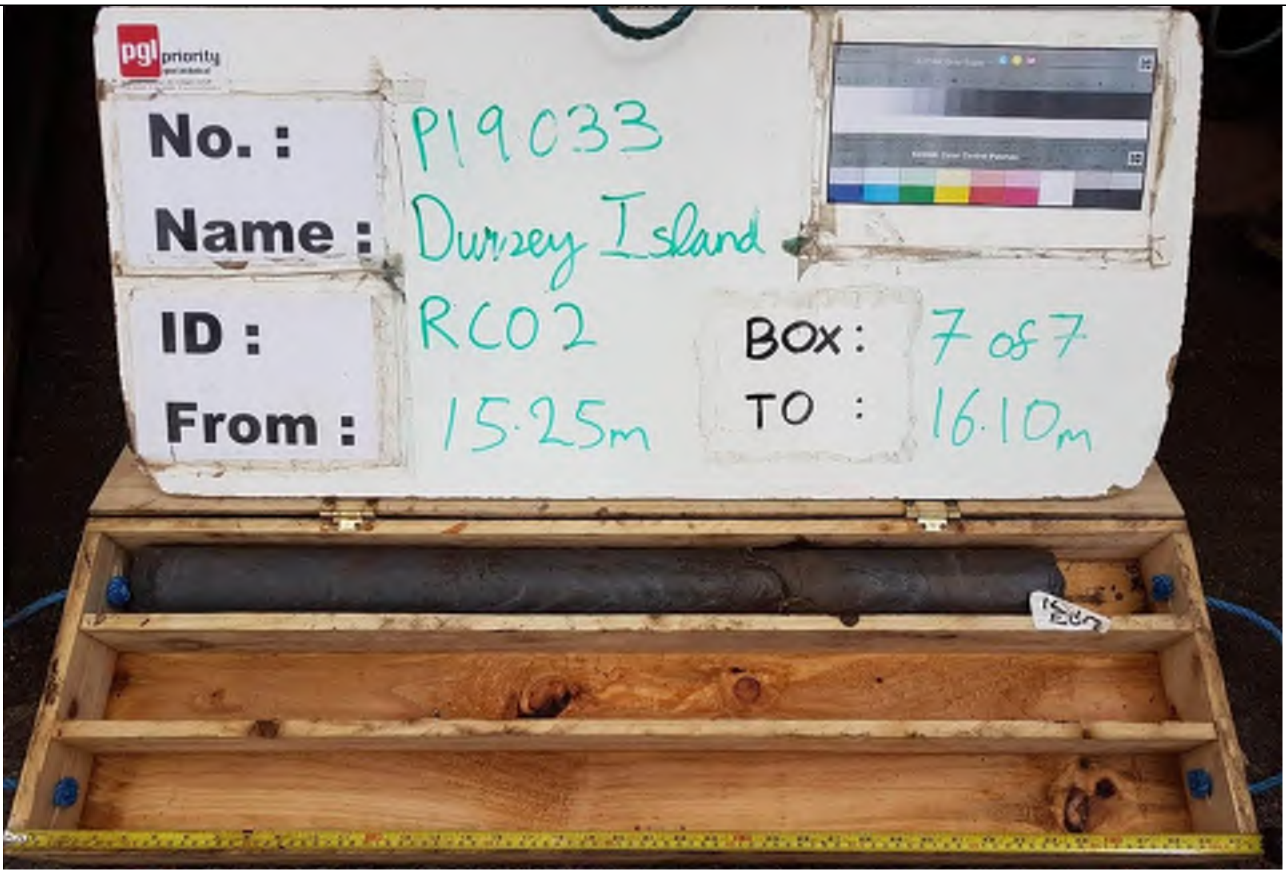
Number:	**RC02**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan	

Photographic Record



Number:	**RC02**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan

Photographic Record



Number:	**RC02**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan	

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Drilled By:	AK
Logged By:	OD
Borehole No.	**RC03**
	Sheet 1 of 2

Project Name:	Dursey Island Cable Car & Visitor Centre	**Project No.**	P19033
Co-ords:	50544E - 41652N	**Hole Type**	Rotary cored
Location:	Dursey Island, Co. Cork.	**Level:**	18.05m OD
Scale	1:50		
Client:	Cork County Council	**Dates:**	08/04/2019 09/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description
										Open hole boring. Driller described: Peat with weathered rock.
		0 (50 for 0mm/0 for 0mm) (C) 0.70 - 1.50		94	94	44	0.70 2/m	17.35		Lithology: Weak to medium strong, purple, SILTSTONE. Weathering: Slightly weathered with minor clay infill and oxidation discoloration. Fractures: Main set dips 70 to 80 degrees, close to medium, planar to undulate smooth. Minor set dips 45 degrees, medium to wide, stepped rough.
		1.50 - 3.00	130mm 700mm 400mm	100	100	20	5/m			
		3.00 - 4.60	320mm 800mm 420mm	100	100	49	4/m			
		4.60 - 6.15		100	100	55	2/m 2/m			
		6.15 - 7.45	280mm 460mm 300mm	100	100	50	4/m			
	▼	7.45 - 9.05	170mm 750mm 400mm	100	100	28	6/m			

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
9.00				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
13.65	76	131

Equipment:	Deltabase 520.
Method:	Compressed air mist.

Remarks:

Borehole terminated at 13.65m bgl. Standpipe (50mm dia) installed from GL to 13.65m bgl. Response zone from 1.50m to 13.65m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
Dry.	08/04/2019 08:00	0.70	Start of shift.
9.00	08/04/2019 18:00	11.10	End of shift.
9.00	09/04/2019 08:00	11.10	Start of shift.
9.00	09/04/2019 18:00	13.65	End of borehole.

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Project Name:	Dursey Island Cable Car & Visitor Centre	**Project No.** P19033	
Co-ords:	50544E - 41652N	**Hole Type** Rotary cored	
Location:	Dursey Island, Co. Cork.	**Level:**	18.05m OD
Scale	1:50		
Client:	Cork County Council	**Dates:**	08/04/2019 09/04/2019

Well	**Water Strike (m)**	**Depth (m)**	**Type /Fs (min, max, avg)**	**Coring (%)** TCR	SCR	RQD	**Depth (m) / FI (/m)**	**Level (mOD)**	**Legend**	**Stratum Description**
		9.05 - 10.55	150mm 600mm 300mm	100	100	28	5/m			Lithology: Weak to medium strong, purple, SILTSTONE. Weathering: Slightly weathered with minor clay infill and oxidation discoloration. Fractures: Main set dips 70 to 80 degrees, close to medium, planar to undulate smooth. Minor set dips 45 degrees, medium to wide, stepped rough.
		10.55 - 11.10		100	100	91	1/m			
		11.10 - 12.70	200mm 400mm 250mm	100	100	28	7/m			
		12.70 - 13.65	120mm 480mm 450mm	100	100	25	3/m			
							13.65	4.40		End of Borehole at 13.650m

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Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
9.00				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
13.65	76	131

Equipment:	Deltabase 520.
Method:	Compressed air mist.

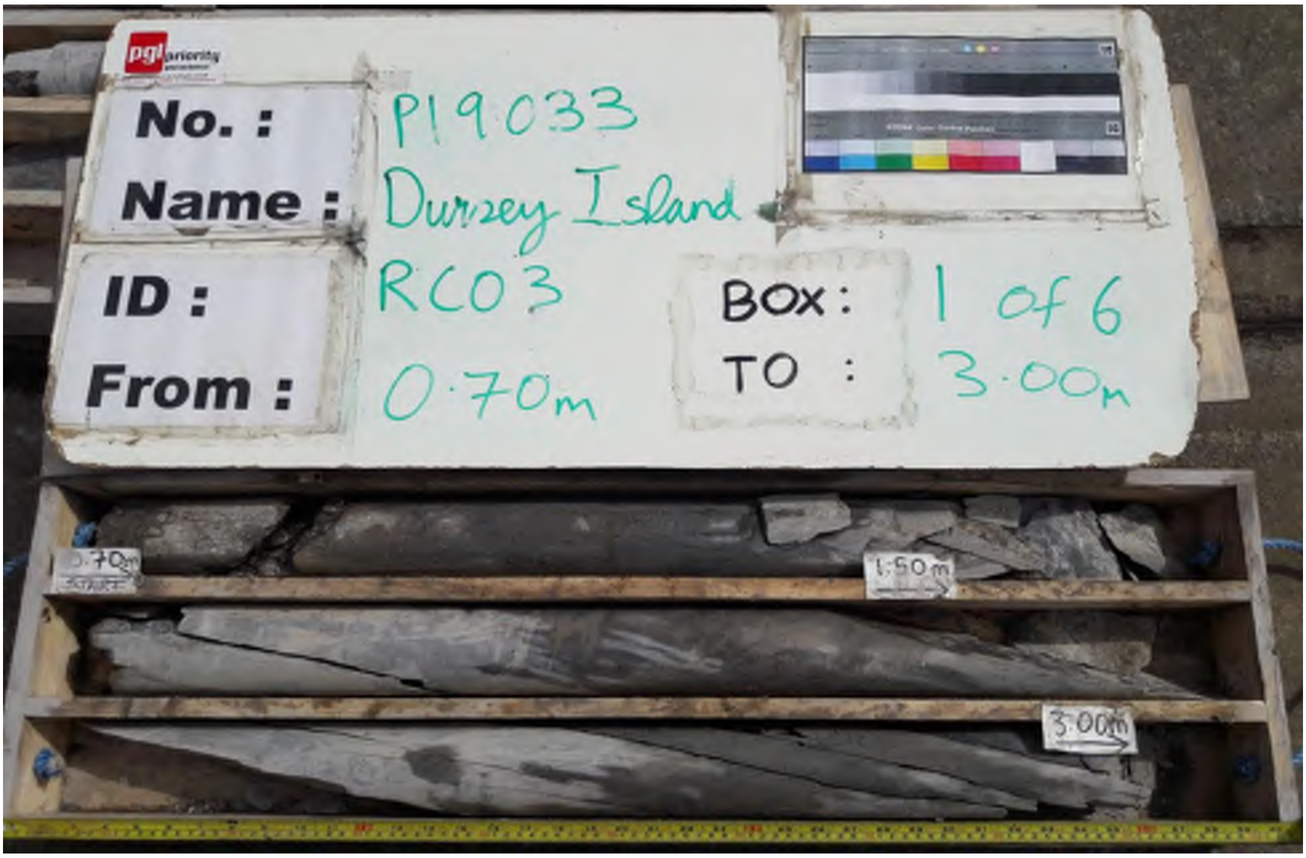
Remarks:

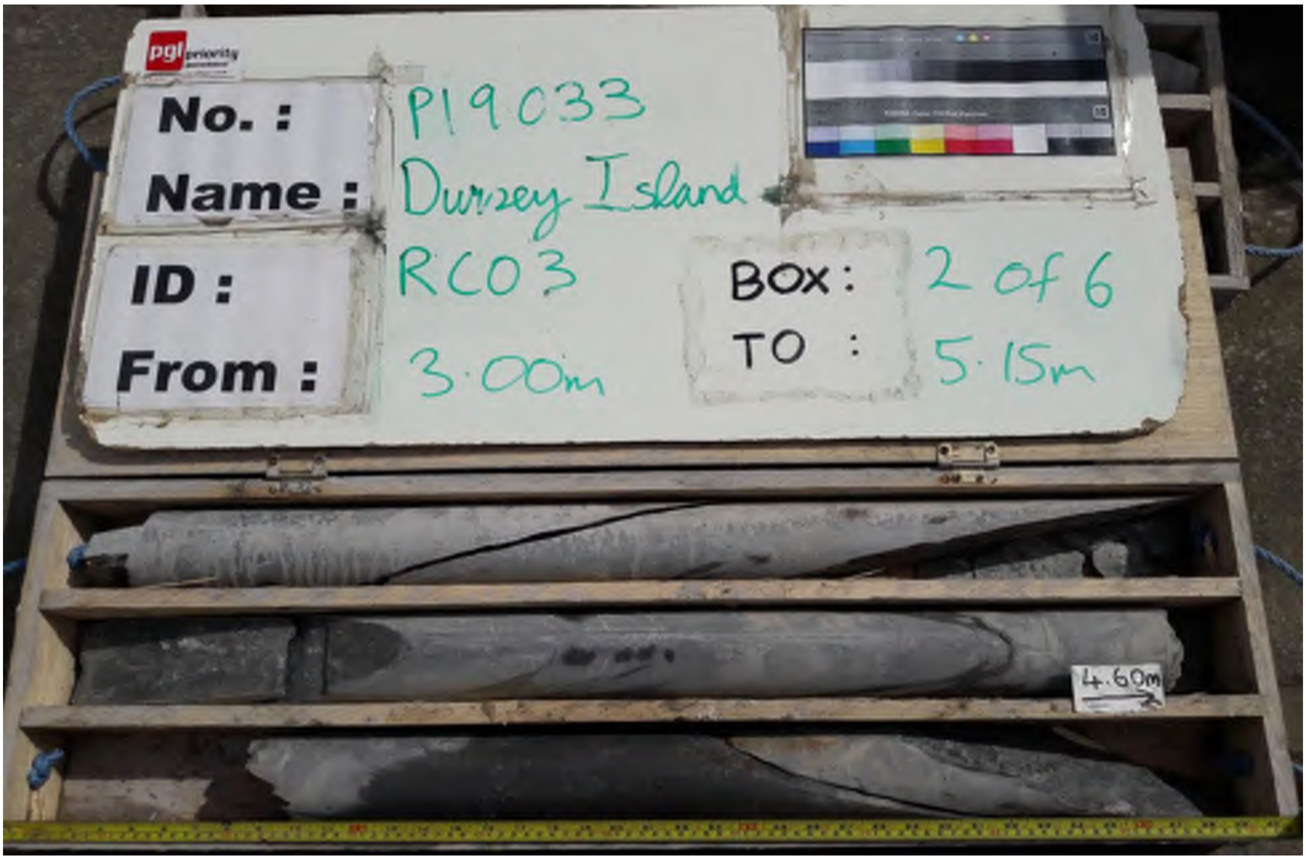
Borehole terminated at 13.65m bgl. Standpipe (50mm dia) installed from GL to 13.65m bgl. Response zone from 1.50m to 13.65m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
Dry.	08/04/2019 08:00	0.70	Start of shift.
9.00	08/04/2019 18:00	11.10	End of shift.
9.00	09/04/2019 08:00	11.10	Start of shift.
9.00	09/04/2019 18:00	13.65	End of borehole.

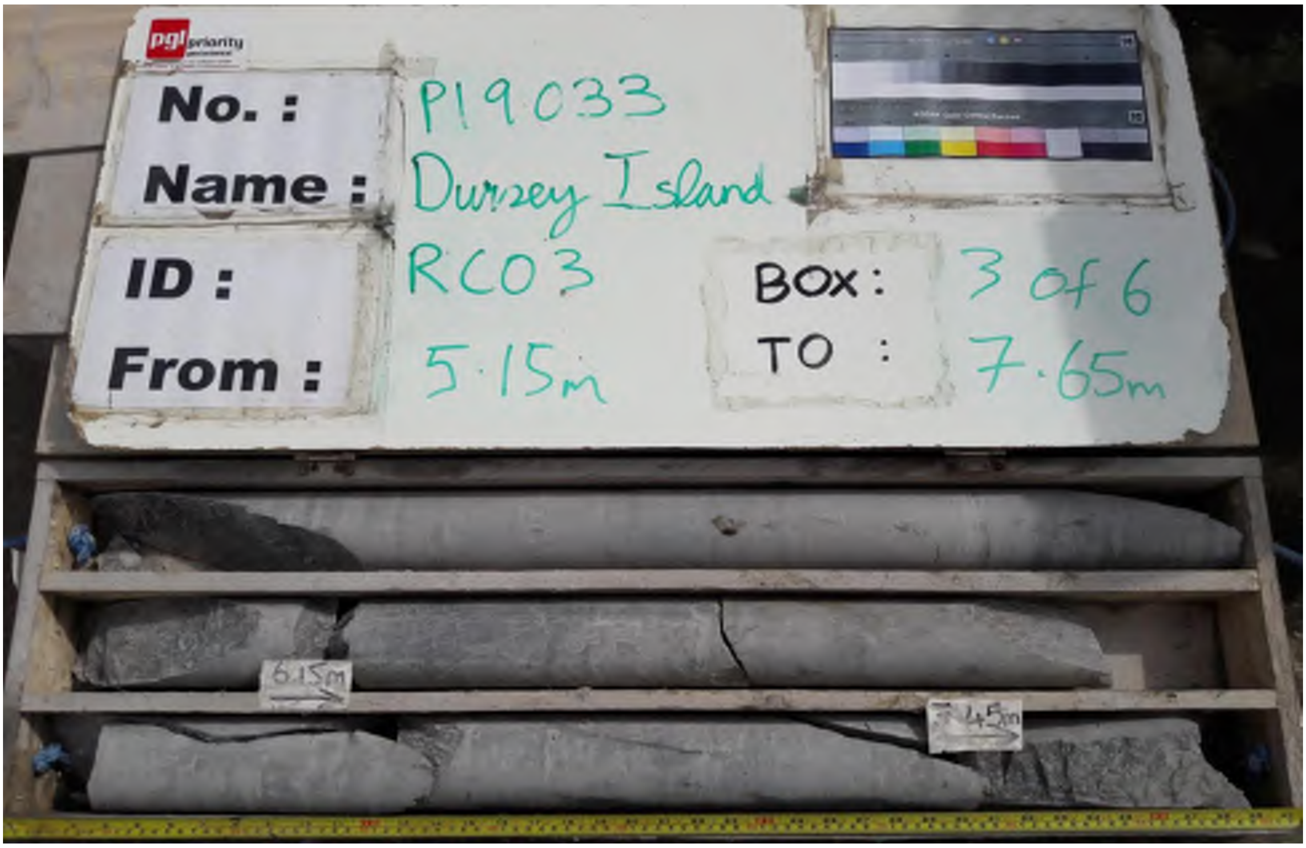
Photographic Record

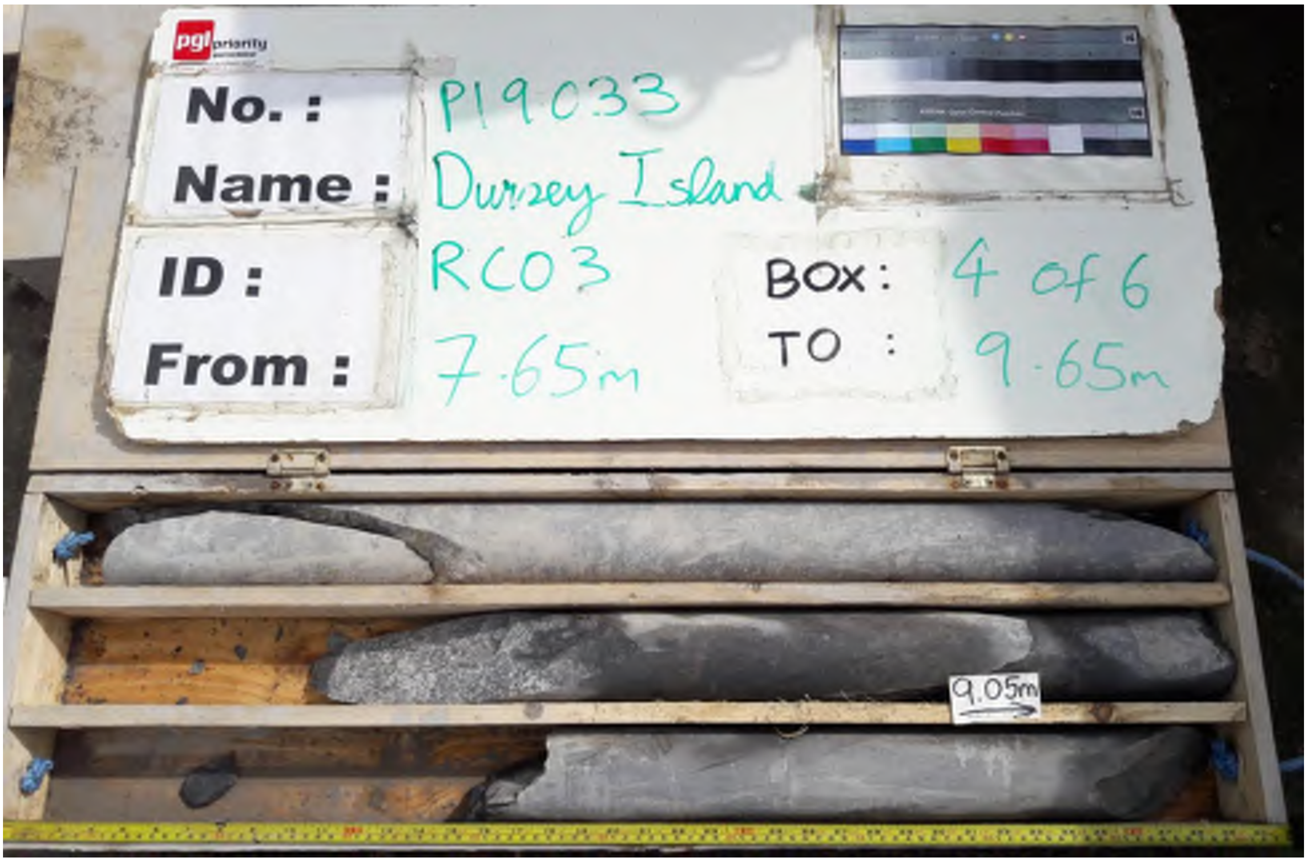




Number:	**RC03**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan

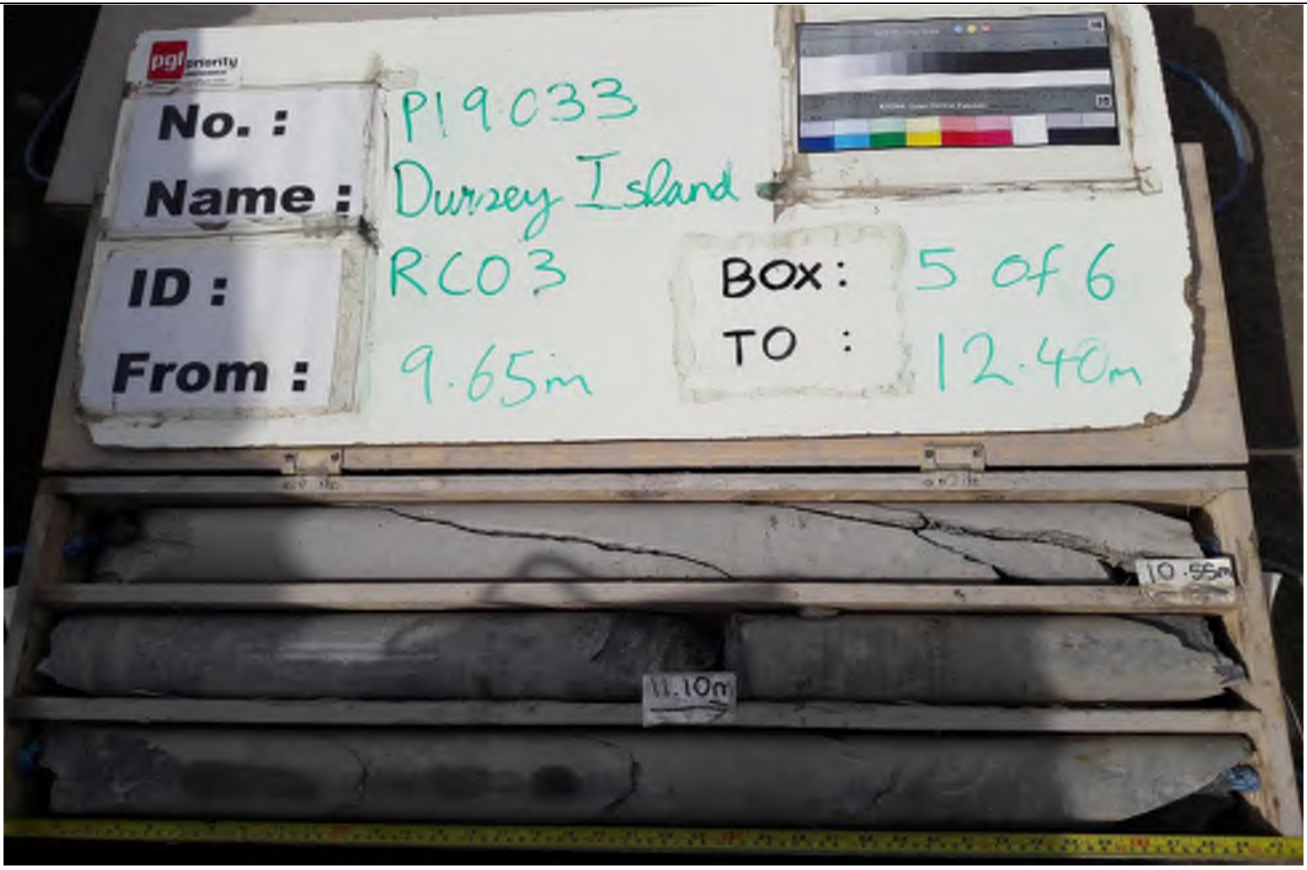
Photographic Record





Number:	**RC03**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan

Photographic Record



Number:	**RC03**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan	

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Drilled By:	**Logged By:**	Borehole No.
AK	OD	**RC04** Sheet 1 of 1

Project Name:	Dursey Island Cable Car & Visitor Centre	**Project No.** P19033	**Co-ords:**	50520E - 41619N	**Hole Type** Rotary cored
Location:	Dursey Island, Co. Cork.		**Level:**	20.90m OD	**Scale** 1:50
Client:	Cork County Council		**Dates:**	09/04/2019	09/04/2019

Well	**Water Strike (m)**	**Depth (m)**	**Type /Fs (min, max, avg)**	**Coring (%)** TCR	SCR	RQD	**Depth (m) / FI (/m)**	**Level (mOD)**	**Legend**	**Stratum Description**
										Driller described: PEAT.
							0.40	20.50		
		0 (50 for 5mm/0 for 0mm) (C) 0.40 - 1.40	100mm 450mm 200mm	100	100	0	7/m			Lithology; Medium strong, purple green, SILTSTONE. Weathering: Slightly weathered with light oxidation discoloration. Fractures: 1 set observed. Main set dips 70 to 80 degrees, close, planar to undulate smooth.
		1.40 - 2.90	140mm 550mm 370mm	100	100	19	4/m			
		2.90 - 3.90	160mm 350mm 270mm	100	100	10	6/m			
		3.90 - 5.50		100	100	22	5/m			
		5.50 - 7.00	200mm 760mm 300mm	100	100	30	4/m			
							7.00	13.90		End of Borehole at 7.000m

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
				None encountered.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
7.00	76	131

Equipment:	Deltabase 520.
Method:	Compressed air mist.

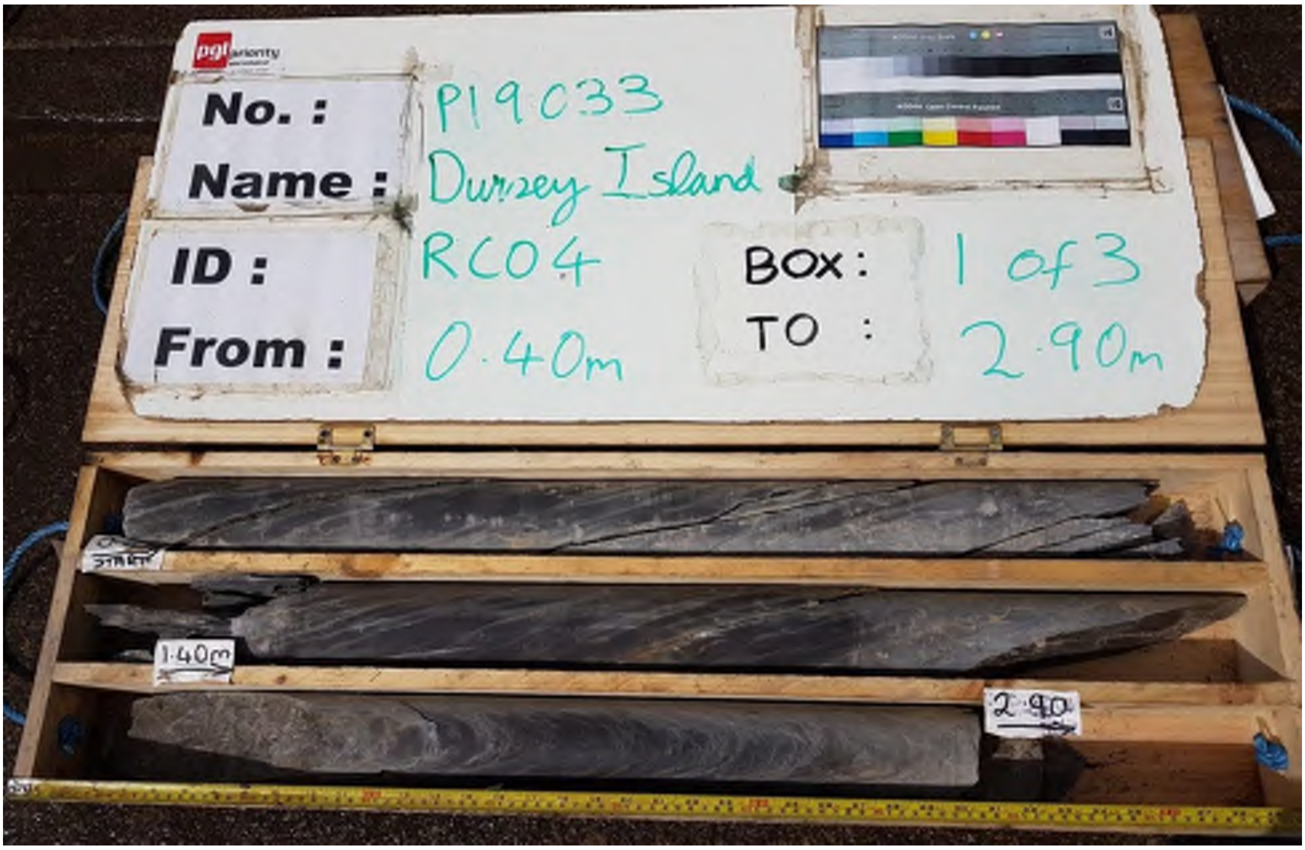
Remarks:

Borehole terminated at 7.00m bgl.

Shift Data:

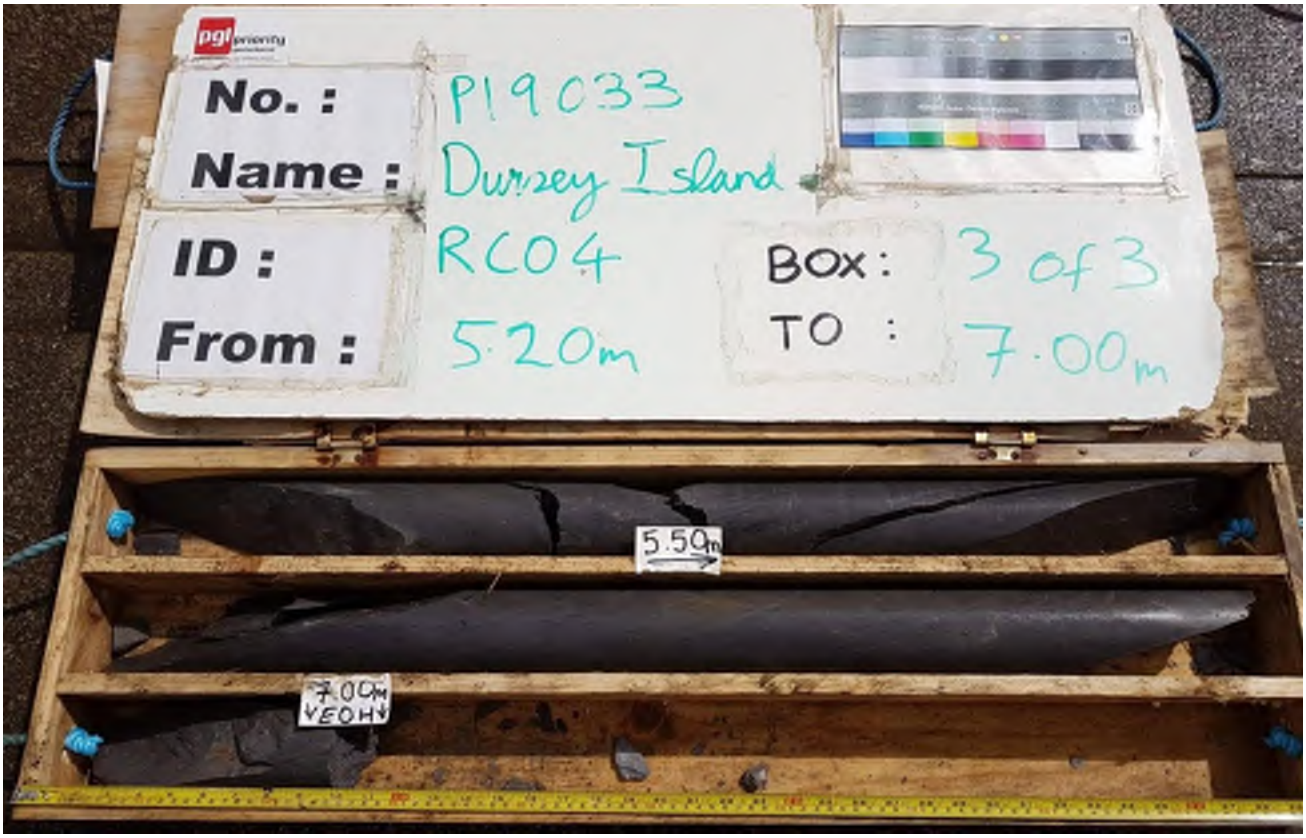
Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
0.0	09/04/2019 08:00	0.40	Start of shift.
	09/04/2019 18:00	7.00	End of borehole.

Photographic Record



Number:	**RC04**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan

Photographic Record



Number:	**RC04**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan	

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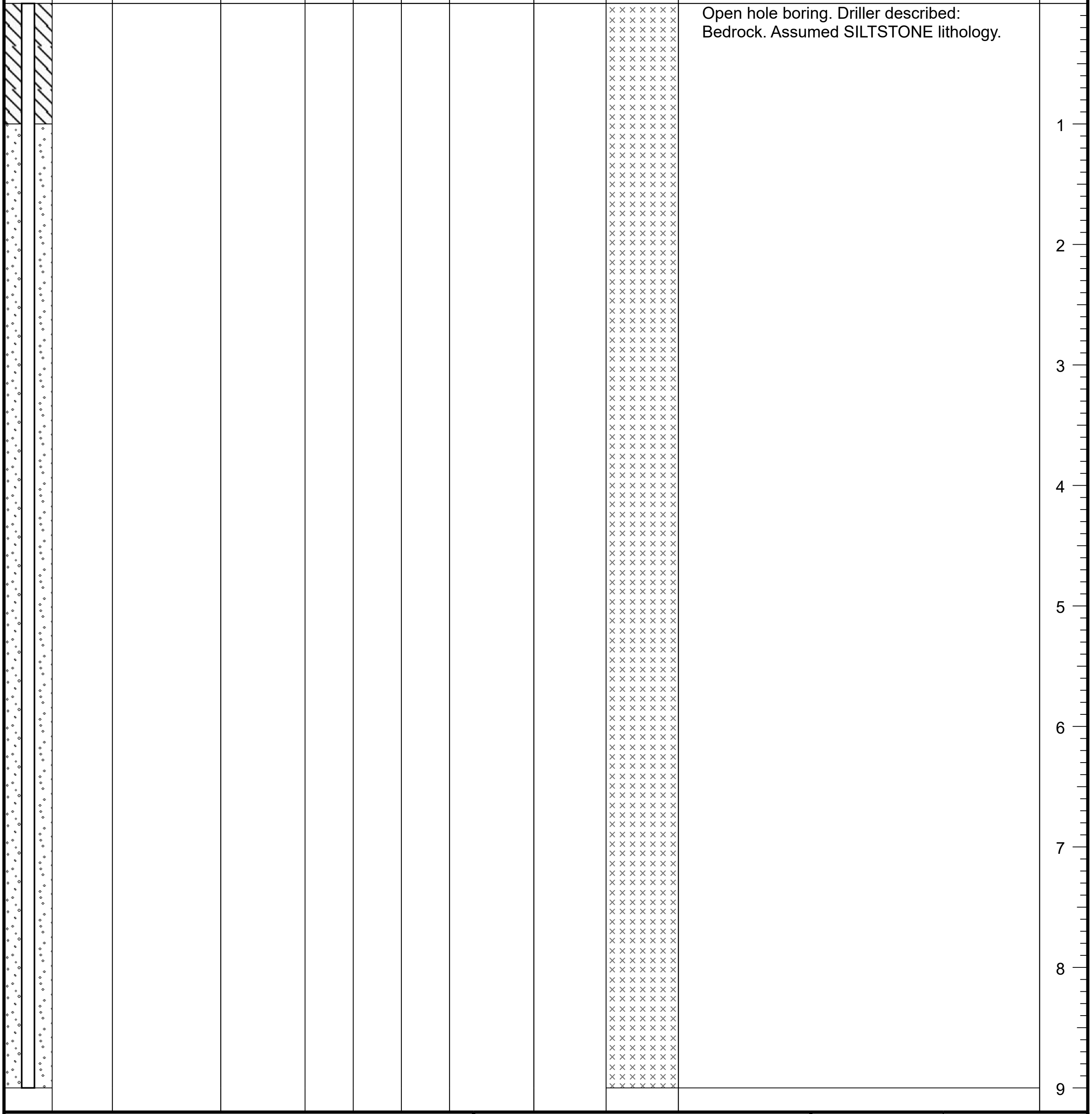
Drilled By:	AK
Logged By:	N/A
Borehole No.	**RCTW01**
	Sheet 1 of 3

Project Name:	Dursey Island Cable Car & Visitor Centre	**Project No.** P19033	**Co-ords:**	50778E - 41902N	**Hole Type** Rotary open hole
Location:	Dursey Island, Co. Cork.		**Level:**	23.70m OD	**Scale** 1:50
Client:	Cork County Council		**Dates:**	12/04/2019	13/04/2019

Well	**Water Strike (m)**	**Depth (m)**	**Type /Fs (min, max, avg)**	**Coring (%)** TCR	SCR	RQD	**Depth (m) / FI (/m)**	**Level (mOD)**	**Legend**	**Stratum Description**
										Open hole boring. Driller described: Bedrock. Assumed SILTSTONE lithology.



Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
25.50	140	140

Equipment:	Deltabase 520
Method:	Compresed air mist.

Remarks:

Borehole terminated at 25.50m bgl. Standpipe (50mm dia) installed from 0.0m to 25.50m bgl. Response zone from 9.00m to 25.50m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	12/04/2019 08:00	0.00	Start of shift.
Dry.	12/04/2019 18:00	5.00	End of shift.
4.0	13/04/2019 08:00	5.00	Start of shift.
0.0	13/04/2019 18:00	25.50	End of borehole.

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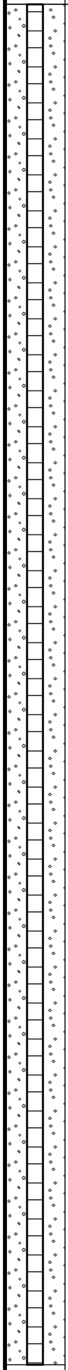
Project Name: Dursey Island Cable Car & Visitor Centre	**Project No.** P19033	**Co-ords:** 50778E - 41902N	**Hole Type** Rotary open hole
Location: Dursey Island, Co. Cork.		**Level:** 23.70m OD	**Scale** 1:50
Client: Cork County Council		**Dates:** 12/04/2019 13/04/2019	

Well	**Water Strike (m)**	**Depth (m)**	**Type /Fs (min, max, avg)**	**Coring (%)** TCR	SCR	RQD	**Depth (m) / FI (/m)**	**Level (mOD)**	**Legend**	**Stratum Description**	
									⊠	Open hole boring. Driller described: Bedrock. Assumed SILTSTONE lithology.	10 11 12 13 14 15 16 17 18

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
25.50	140	140

Equipment:	Deltabase 520
Method:	Compresed air mist.

Remarks:

Borehole terminated at 25.50m bgl. Standpipe (50mm dia) installed from 0.0m to 25.50m bgl. Response zone from 9.00m to 25.50m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	12/04/2019 08:00	0.00	Start of shift.
Dry.	12/04/2019 18:00	5.00	End of shift.
4.0	13/04/2019 08:00	5.00	Start of shift.
0.0	13/04/2019 18:00	25.50	End of borehole.

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Project Name:	Dursey Island Cable Car & Visitor Centre	**Project No.** P19033	**Co-ords:** 50778E - 41902N	**Hole Type** Rotary open hole
Location:	Dursey Island, Co. Cork.		**Level:** 23.70m OD	**Scale** 1:50
Client:	Cork County Council		**Dates:** 12/04/2019	13/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description	
										Open hole boring. Driller described: Bedrock. Assumed SILTSTONE lithology.	19 20 21 22 23 24 25
							25.50	-1.80		End of Borehole at 25.500m	26 27

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
25.50	140	140

Equipment:	Deltabase 520
Method:	Compressed air mist.

Remarks:

Borehole terminated at 25.50m bgl. Standpipe (50mm dia) installed from 0.0m to 25.50m bgl. Response zone from 9.00m to 25.50m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	12/04/2019 08:00	0.00	Start of shift.
Dry.	12/04/2019 18:00	5.00	End of shift.
4.0	13/04/2019 08:00	5.00	Start of shift.
0.0	13/04/2019 18:00	25.50	End of borehole.

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Drilled By:	Borehole No.
AK	**RCTW02**
Logged By:	
N/A	Sheet 1 of 3

Project Name:	Dursey Island Cable Car & Visitor Centre	**Project No.** P19033	**Co-ords:**	50498E - 41564N	**Hole Type** Rotary cored
Location:	Dursey Island, Co. Cork.		**Level:**	23.27m OD	**Scale** 1:50
Client:	Cork County Council		**Dates:**	05/04/2019	07/04/2019

Well	**Water Strike (m)**	**Depth (m)**	**Type /Fs (min, max, avg)**	**Coring (%)** TCR	SCR	RQD	**Depth (m) / FI (/m)**	**Level (mOD)**	**Legend**	**Stratum Description**	
▨									▨	Open hole boring. Driller described: Peat.	
▨							1.20	22.07	☒	Open hole boring. Driller described: Bedrock. Assumed Siltstone.	1
▨									☒		2
▨									☒		3
▨									☒		4
▨	▼								☒		
▨									☒		5
▨									☒		6
▨									☒		7
▨									☒		8
▨									☒		9

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
4.50				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
25.50	140	140

Equipment:	Deltabase 520
Method:	Compressed air

Remarks:

Borehole terminated at 25.5m bgl. 50mm dia. standpipe installed. Response zone from 10.0m to 20.5m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	05/04/2019 08:00	0.00	Start of shift.
Dry	05/04/2019 18:00	1.00	End of shift.
Dry	06/04/2019 08:00	1.00	Start of shift.
4.5	06/04/2019 18:00	13.00	End of shift.
4.5	07/04/2019 08:00	13.00	Start of shift.
0	07/04/2019 18:00	25.50	End of borehole.

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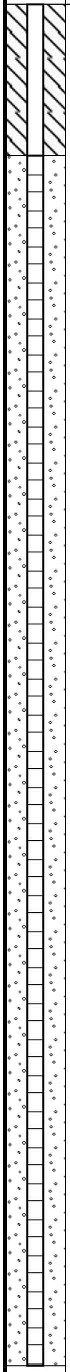
Drilled By:	AK
Logged By:	N/A
Borehole No.	**RCTW02**
	Sheet 2 of 3
Project Name:	Dursey Island Cable Car & Visitor Centre
Project No.	P19033
Co-ords:	50498E - 41564N
Hole Type	Rotary cored
Location:	Dursey Island, Co. Cork.
Level:	23.27m OD
Scale	1:50
Client:	Cork County Council
Dates:	05/04/2019 07/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description	
									☒	Open hole boring. Driller described: Bedrock. Assumed Siltstone.	10 11 12 13 14 15 16 17 18

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
4.50				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
25.50	140	140

Equipment:	Deltabase 520
Method:	Compressed air

Remarks:

Borehole terminated at 25.5m bgl. 50mm dia. standpipe installed. Response zone from 10.0m to 20.5m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	05/04/2019 08:00	0.00	Start of shift.
Dry	05/04/2019 18:00	1.00	End of shift.
Dry	06/04/2019 08:00	1.00	Start of shift.
4.5	06/04/2019 18:00	13.00	End of shift.
4.5	07/04/2019 08:00	13.00	Start of shift.
0	07/04/2019 18:00	25.50	End of borehole.

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Drilled By:	AK	Borehole No.	**RCTW02**
Logged By:	N/A		Sheet 3 of 3

Project Name:	Dursey Island Cable Car & Visitor Centre	**Project No.** P19033	**Co-ords:**	50498E - 41564N	**Hole Type** Rotary cored
Location:	Dursey Island, Co. Cork.		**Level:**	23.27m OD	**Scale** 1:50
Client:	Cork County Council		**Dates:**	05/04/2019	07/04/2019

Well	**Water Strike (m)**	**Depth (m)**	**Type /Fs (min, max, avg)**	**Coring (%)** TCR	SCR	RQD	**Depth (m) / FI (/m)**	**Level (mOD)**	**Legend**	**Stratum Description**	
									✕	Open hole boring. Driller described: Bedrock. Assumed Siltstone.	
											19
											20
											21
											22
											23
											24
											25
							25.50	-2.23		End of Borehole at 25.500m	
											26
											27

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
4.50				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
25.50	140	140

Equipment:	Deltabase 520
Method:	Compressed air

Remarks:

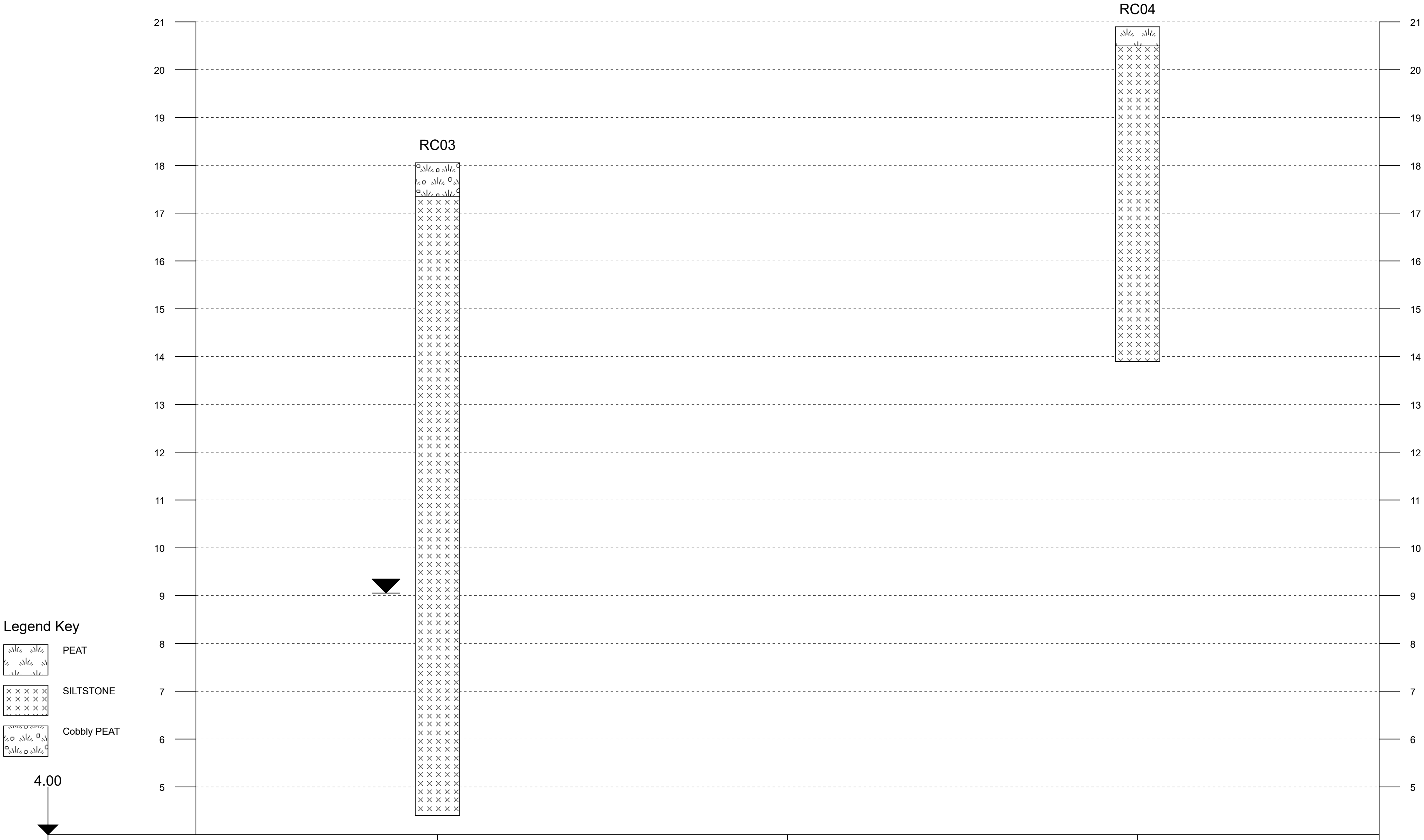
Borehole terminated at 25.5m bgl. 50mm dia. standpipe installed. Response zone from 10.0m to 20.5m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	05/04/2019 08:00	0.00	Start of shift.
Dry	05/04/2019 18:00	1.00	End of shift.
Dry	06/04/2019 08:00	1.00	Start of shift.
4.5	06/04/2019 18:00	13.00	End of shift.
4.5	07/04/2019 08:00	13.00	Start of shift.
0	07/04/2019 18:00	25.50	End of borehole.

Project Id: P19033
Project Title: Dursey Island Cable Car & Visitor Centre
Location: Dursey Island, Co. Cork.
Client: Cork County Council

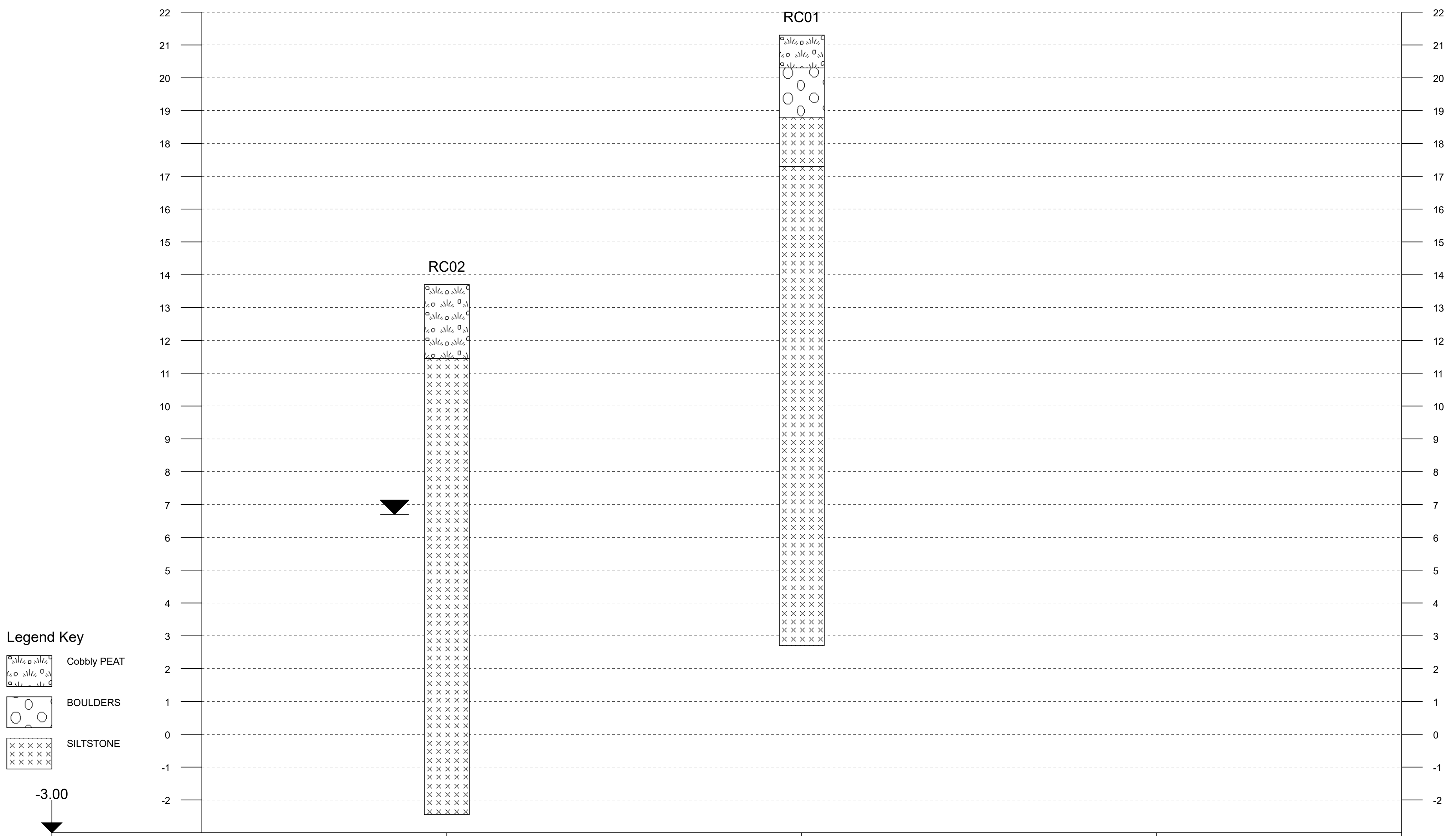
Title: Section line 2
Vertical Scale: 1:111
Horizontal Scale: Not to scale
Engineer: Roughan & O'Donovan



Chainage (m)	0.00	0.00	0.00	
Elevation (mAOD)	18.05	20.36	20.90	

Project Id: P19033
Project Title: Dursey Island Cable Car & Visitor Centre
Location: Dursey Island, Co. Cork.
Client: Cork County Council

Title: Section line 1
Vertical Scale: 1:164
Horizontal Scale: Not to scale
Engineer: Roughan & O'Donovan



Chainage (m)	82.71	82.71	82.71	
Elevation (mAOD)	13.70	21.30	20.80	

Job Name:	Dursey Island
job Number:	P19033
Test Carried Out By:	AO
Date:	10/04/19 to 12/04/19

Percolation "T" Test	**T1**	**T2**	**T3**

Depth from GL to top of hole (mm)	400	300	300
Depth from GL to base of hole (mm)	800	700	700
Depth of Hole (mm)	400	400	400
Dimensions			
Lengh (mm)	300	300	300
Width (mm)	300	300	300

Date/time Presoaked	10/04/2019	10/04/2019	10/04/2019

Tests			
Date	11/04/2019	11/04/2019	11/04/2019
Time filled to 400mm	12:35	15:00	13:00
Time water level 300mm	13:30	17:45	14:55
Time to drop 100mm (min)	55	165	115

Average	111.67

Standard Method	T1			T2			T3		
Fill no	Time at 300m	Time at 200mm	Δt	Time at 300m	Time at 200mm	Δt	Time at 300m	Time at 200mm	Δt
1	13:30	14:10	40	17:45	08:00	855	14:55	19:15	260
2	14:10	15:05	55	08:10	didn't reach		08:10	12:45	275
3	15:05	16:10	65				12:45	18:30	345
Average			53.33						293.33

Percolation "P" Tests	**P1**	**P2**	**P3**
Depth from GL to top of hole (mm)	0	0	0
Depth from GL to base of hole (mm)	400	400	400
Depth of Hole (mm)	400	400	400
Dimensions			
Lengh (mm)	300	300	300
Width (mm)	300	300	300

Date/time Presoaked	10/04/2019	10/04/2019	10/04/2019

Date	11/04/2019	11/04/2019	11/04/2019
Time filled to 400mm	17:50	17:54	18:04
Time water level 300mm	18:05	18:06	18:19
Time to drop 100mm (min)	15	12	15

Average	14

Standard Method	P1			P2			P3		
Fill no	Time at 300m	Time at 200mm	Δt	Time at 300m	Time at 200mm	Δt	Time at 300m	Time at 200mm	Δt
1	18:05	17:00	55	18:06	18:49	43	18:19	18:45	26
2	08:46	09:42	56	09:05	10:00	55	09:00	09:38	38
3	09:45	10:45	60	10:10	11:15	65	09:40	10:28	48
Average			57.00			54.33			37.33

Pavement Core Photographic Record and Log

	Layer No.	Depth		Thickness, mm	Material Description **	Binder	Aggregate		
		From	To				Agg'	Type	
	1	0.00	0.04	40	Bitumen with crushed rock and gravel. Gravel is varied lithology. Max clast size 20mm.	B	20	CR & G	

** Layer descriptions based on assumed function within the pavement structure. Based on visual inspection only.

Nominal diameter: mm

Binder:
B = Bitumen
T = Tar
C = Cement
N = None

Aggregate:

40 = 40mm max' aggregate size
28 = 28mm
20 = 20mm
14 = 10mm to 14mm
6 = 3m to 6mm

Aggregate Type (Type):
CR = Crushed Rock
G = Gravel
S = Slag
O = Other

E: 50762.88
N: 41865.42
Mod: 17.0

Pavement Core Number: PC01

Project	Dursey Island
Project No	P19033
Engineer	OD

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Pavement Core Photographic Record and Log

Layer No.	Depth		Thickness, mm	Material Description **	Binder	Aggregate	
	From	To				Agg'	Type
1	0.00	0.04	40	Bitumen with gravel. Gravel is varied lithology. Max clast size is 40mm.	B	40	CR

** Layer descriptions based on assumed function within the pavement structure. Based on visual inspection only.

Nominal diameter: mm

Binder:
B = Bitumen
T = Tar
C = Cement
N = None

Aggregate:

40 = 40mm max' aggregate size
28 = 28mm
20 = 20mm
14 = 10mm to 14mm
6 = 3m to 6mm

Aggregate Type (Type):
CR = Crushed Rock
G = Gravel
S = Slag
O = Other

E: 50816.14
N: 41865.42
mOD: 16.4

Pavement Core Number: PC02

Project	Dursey Island
Project No	P19033
Engineer	OD

Pavement Core Photographic Record and Log

	Layer No.	Depth		Thickness, mm	Material Description **	Binder	Aggregate		
		From	To				Agg'	Type	
	1	0.00	0.02	20	Bitumen with gravel. Gravel is varied lithology. Max clast size is 20mm.	B	20	GR	

** Layer descriptions based on assumed function within the pavement structure. Based on visual inspection only.

Nominal diameter: mm

Binder:
B = Bitumen
T = Tar
C = Cement
N = None

Aggregate:

40 = 40mm max' aggregate size
28 = 28mm
20 = 20mm
14 = 10mm to 14mm
6 = 3m to 6mm

Aggregate Type (Type):
CR = Crushed Rock
G = Gravel
S = Slag
O = Other

E: 50516.64
N: 41559.519
mOD: 22.37

Pavement Core Number: PC04

Project Dursey Island
Project No P19033
Engineer OD

Pavement Core Photographic Record and Log

	Layer No.	Depth		Thickness, mm	Material Description **	Binder	Aggregate		
		From	To				Agg'	Type	
	1	0.00	0.02	20	Bitumen with gravel. Max clast size is 20mm.	B	20	GR	

** Layer descriptions based on assumed function within the pavement structure. Based on visual inspection only.

Nominal diameter: mm

Binder:
B = Bitumen
T = Tar
C = Cement
N = None

Aggregate:

40 = 40mm max' aggregate size
28 = 28mm
20 = 20mm
14 = 10mm to 14mm
6 = 3m to 6mm

Aggregate Type (Type):
CR = Crushed Rock
G = Gravel
S = Slag
O = Other

E: 50523.449
N: 41591.488
mOD: 21.327

Pavement Core Number: PC05

Project	Dursey Island
Project No	P19033
Engineer	OD

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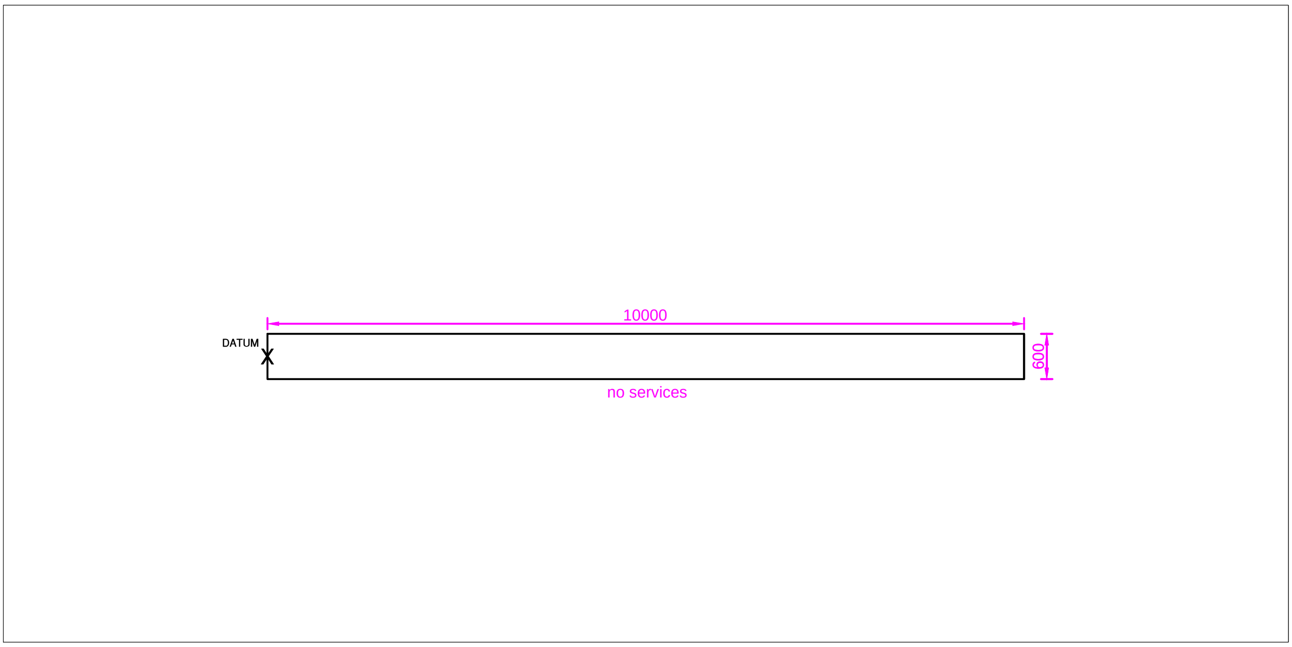
Trial Pit No
ST01
Sheet 1 of 1

Project Name: Dursey Island Cable Car & Visitor Centre	**Project No.** P19033	**Co-ords:** 50812E - 41855N **Level:** 20.80m OD	**Date** 11/04/2019
Location: Dursey Island, Co. Cork.		**Dimensions (m):** 10.00	**Scale** 1:25
Client: Cork County Council		**Depth:** 1.30m BGL	**Logged** AO.

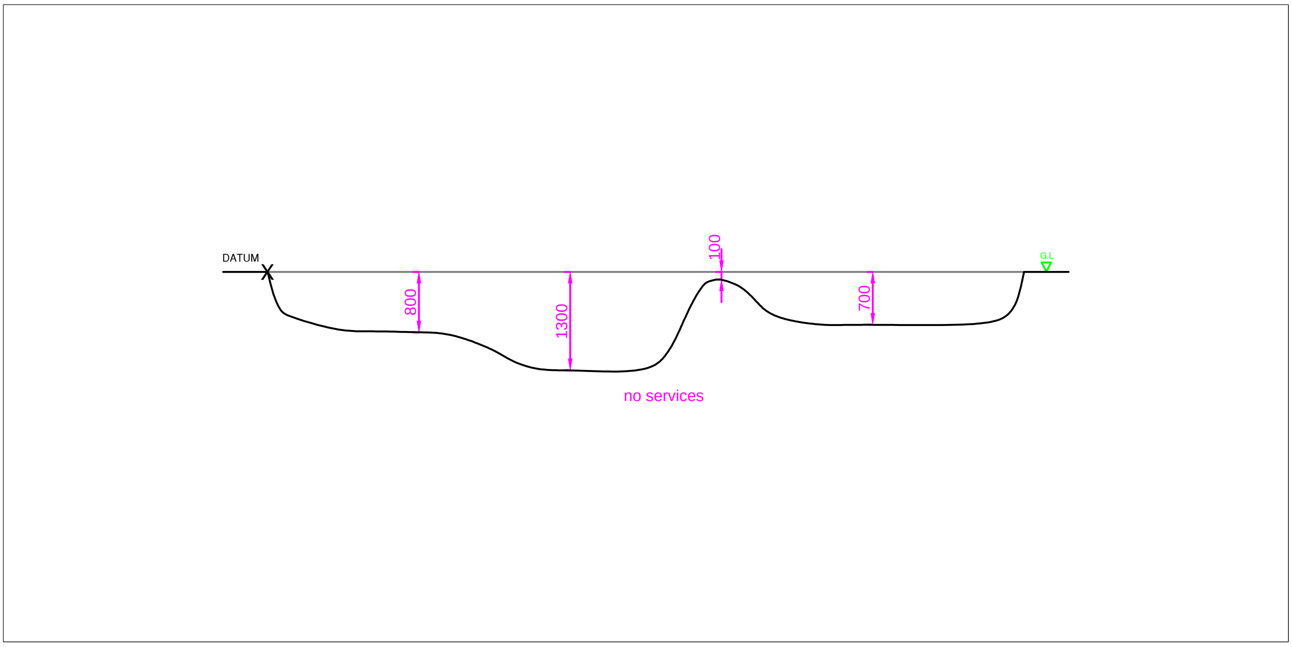
Water Strike & Backfill	Samples & In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description
	Depth (m)	Type	Results				
				0.15	20.65		(TOPSOIL) Black, organic clayey SAND.
	0.50 - 1.00	B					Brown grey, silty very sandy GRAVEL with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular, Siltstone. Cobbles are angular to sub-angular, Siltstone.
	1.00	D					
▼				1.30	19.50		
							SILTSTONE bedrock. End of Pit at 1.300m

Stability: Moderate. **Plant:** 8T track machine. **Backfill:** Arisings.	**Groundwater:** 1.30m: Seepage flow rate.

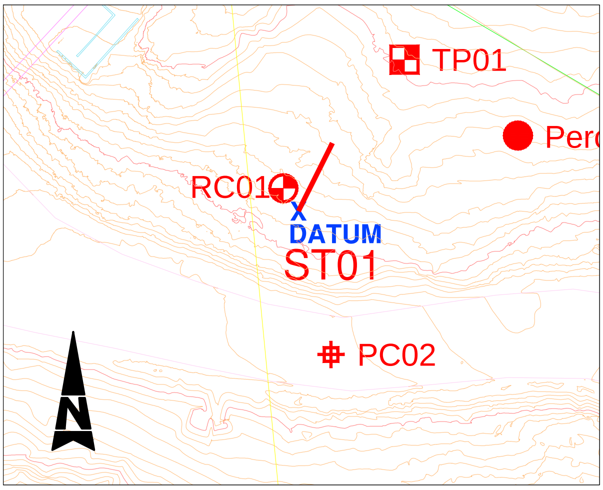
Remarks: Slit trench terminated at 1.30m bgl. Refer to DWG P19033 ST01 for cross sectional detail.



SLIT TRENCH PLAN, 1:100 ON A4



SLIT TRENCH SECTION, 1:100 ON A4



SLIT TRENCH LOCATION PLAN, 1:1000 ON A4

DATUM COORDINATES:

EASTING:	50811.8
NORTHING:	41855.3
LEVEL:	20.8mAOD

KEY:
DATUM: X

SLIT TRENCH DIMENSIONS:

LENGTH:	10.0m
WIDTH:	0.60m
DEPTH:	1.30m

STRATA SHOWN ON DETAILED LOG

DRAWN BY: Gary Curtin		DATE: 17/04/2019
LOGGED BY: A.O.		DATE: 11/04/2019
SCALE: AS STATED	APPROVED: GH	REVISION: D01

SLIT TRENCH NUMBER:

ST01

JOB NAME:
Dursey Island Cable Car & Visitor Centre Development

JOB NUMBER:
P19033

DRAWING NUMBER:
P19033-ST01

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Photographic Record

Number:	**ST01**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan

Photographic Record

Number:	**ST01**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan	

Number:	**ST01**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan

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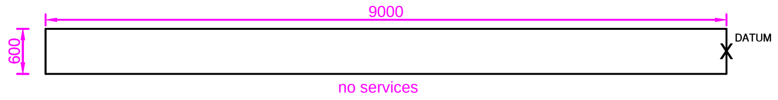
Trial Pit No
ST03
Sheet 1 of 1

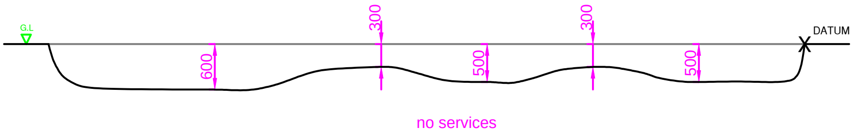
Project Name: Dursey Island Cable Car & Visitor Centre
Project No. P19033
Co-ords: 50550E - 41648N
Level: 17.47m OD
Date 09/04/2019
Location: Dursey Island, Co. Cork.
Dimensions (m): 9.00
Scale 1:25
Client: Cork County Council
Depth: 0.60m BGL
Logged AO.

Water Strike & Backfill	Samples & In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description
	Depth (m)	Type	Results				
▨						▨	(TOPSOIL) Dark brown, organic sandy CLAY.
▨	0.10 - 0.60	B		0.10	17.37	⁘	Grey brown, slightly sandy GRAVEL with high cobble content. Sand is fine to coarse. Gravel is angular, Siltstone, fine to coarse. Cobbles are angular, Siltstone lithology.
▼	0.50	D				⁘	
				0.60	16.87		SILTSTONE bedrock. End of Pit at 0.600m

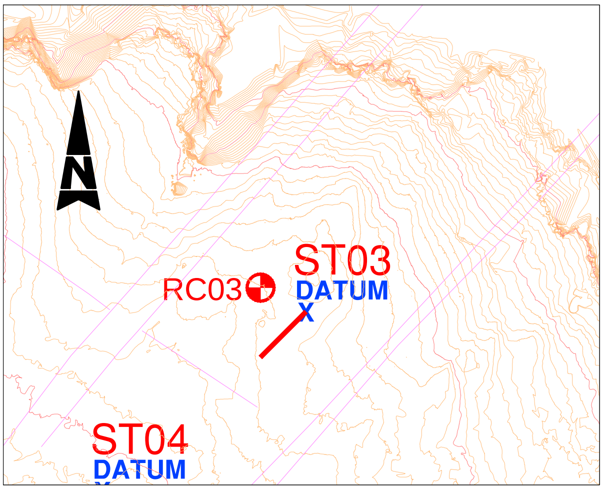
Stability: Moderate.
Plant: 3T mini digger.
Backfill: Arisings.
Groundwater: 0.60m: Seepage flow rate.
Remarks: Slit trench terminated at 0.60m bgl. Refer to DWG P19033 ST03 for cross sectional detail.



SLIT TRENCH PLAN, 1:100 ON A4



SLIT TRENCH SECTION, 1:100 ON A4



SLIT TRENCH LOCATION PLAN, 1:1000 ON A4

DATUM COORDINATES:

EASTING:	50550.0
NORTHING:	41648.3
LEVEL:	17.467mAOD

KEY:

DATUM: X

SLIT TRENCH DIMENSIONS:

LENGTH:	9.00m
WIDTH:	0.60m
DEPTH:	0.60m

STRATA SHOWN ON DETAILED LOG

DRAWN BY: Gary Curtin		DATE: 17/04/2019
LOGGED BY: A.O.		DATE: 09/04/2019
SCALE: AS STATED	APPROVED: GH	REVISION: D01

SLIT TRENCH NUMBER:

ST03

JOB NAME:

Dursey Island Cable Car & Visitor Centre Development

JOB NUMBER:

P19033

DRAWING NUMBER:

P19033-ST03

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Number:	**ST03**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan

Number:	**ST03**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan

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Trial Pit No
ST04
Sheet 1 of 1

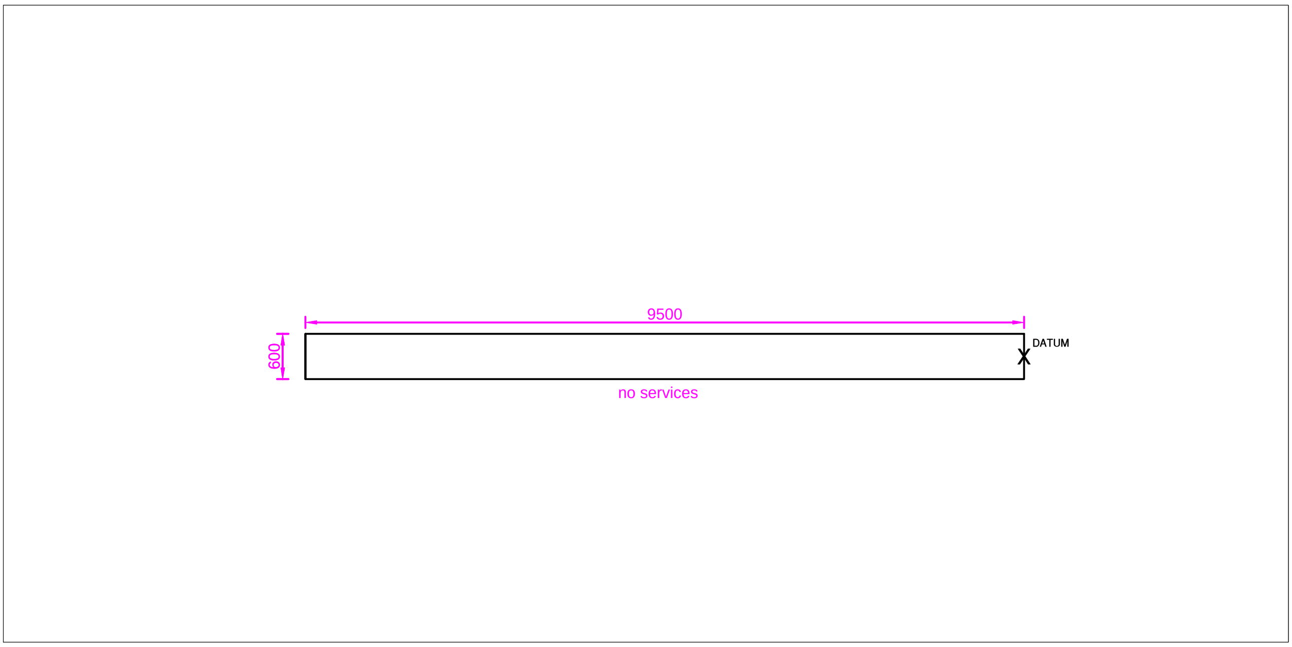
Project Name: Dursey Island Cable Car & Visitor Centre	**Project No.** P19033	**Co-ords:** 50523E - 41625N **Level:** 20.36m OD	**Date** 09/04/2019
Location: Dursey Island, Co. Cork.		**Dimensions (m):** 9.50	**Scale** 1:25
Client: Cork County Council		**Depth:** 0.60m BGL	**Logged** AO

Water Strike & Backfill	**Samples & In Situ Testing**			**Depth (m)**	**Level (m OD)**	**Legend**	**Stratum Description**
	Depth (m)	**Type**	**Results**				
▨						▨	(TOPSOIL) Black, slightly sandy slightly gravelly PEAT.
▼	0.20 - 0.60	B		0.20	20.16	▨	Brown, slightly gravelly sandy SILT with high cobble content. Gravel is fine to coarse, angular, Siltstone lithology. Cobbles are angular , Siltstone lithology.
	0.50	D					
				0.60	19.76		SILTSTONE bedrock.
							End of Pit at 0.600m

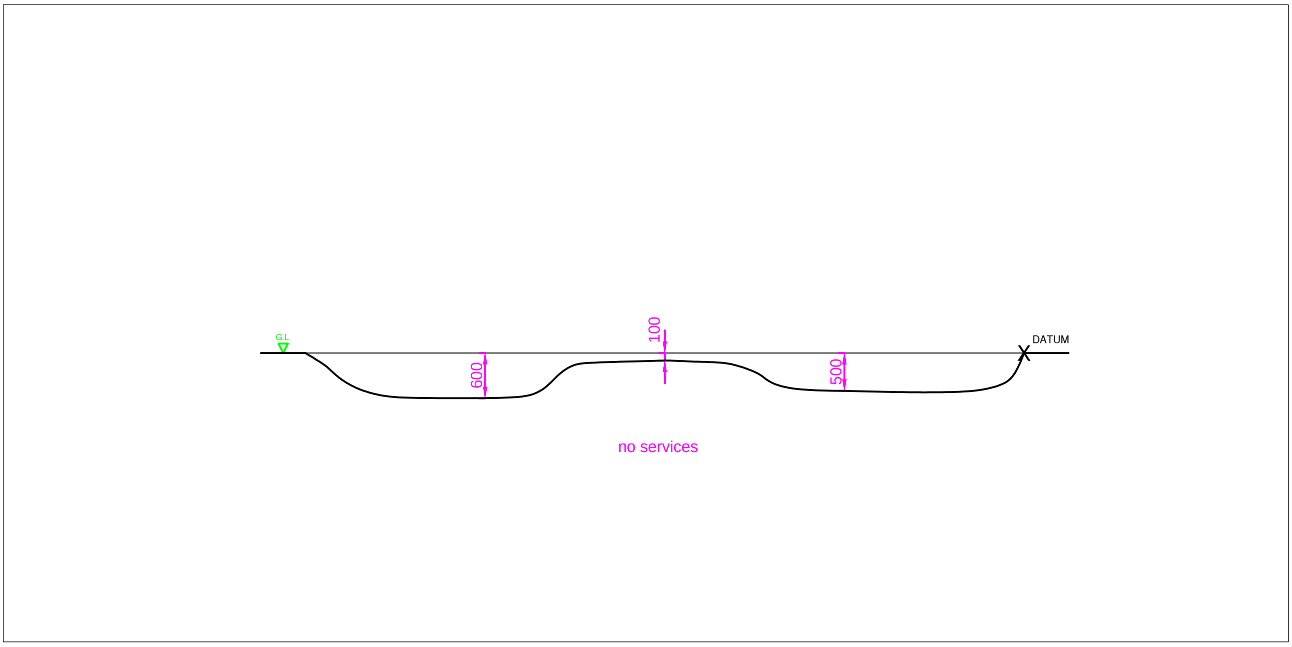
Stability: Moderate.
Plant: 3T mini digger.
Backfill: Arisings.

Groundwater: 0.20m: Seepage flow rate.

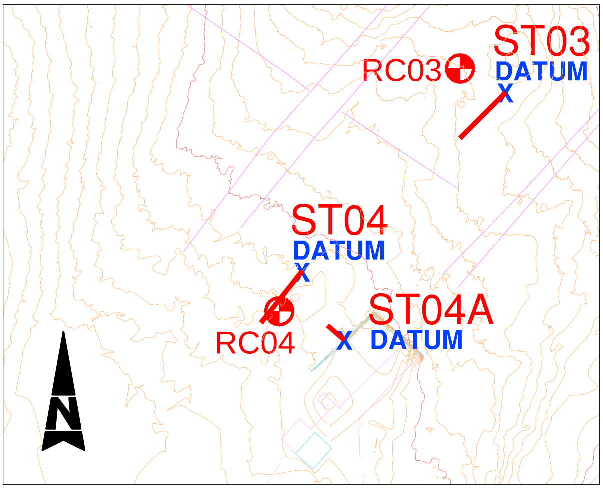
Remarks: Slit trench terminated at 0.60m bgl. Refer to DWG P19033 ST04 for cross sectional detail.



SLIT TRENCH PLAN, 1:100 ON A4



SLIT TRENCH SECTION, 1:100 ON A4



SLIT TRENCH LOCATION PLAN, 1:1000 ON A4

DATUM COORDINATES:

EASTING:	50523.1
NORTHING:	41624.6
LEVEL:	20.362mAOD

KEY:

DATUM: X

SLIT TRENCH DIMENSIONS:

LENGTH:	9.50m
WIDTH:	0.60m
DEPTH:	1.20m

STRATA SHOWN ON DETAILED LOG

DRAWN BY: Gary Curtin		DATE: XX/XX/2019
LOGGED BY: A.O.		DATE: YY/YY/2019
SCALE: AS STATED	APPROVED: GH	REVISION: D01

SLIT TRENCH NUMBER:

ST04

JOB NAME:

Dursey Island Cable Car & Visitor Centre Development

JOB NUMBER:

P19033

DRAWING NUMBER:

P19033-ST04

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Photographic Record

Number:	**ST04**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan	

Photographic Record

Number:	**ST04**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan	

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Project Name: Dursey Island Cable Car & Visitor Centre	**Project No.** P19033	**Co-ords:** 50529E - 41616N **Level:** 20.50m OD	**Date** 09/04/2019
Location: Dursey Island, Co. Cork.		**Dimensions (m):** 1.80	**Scale** 1:25
Client: Cork County Council		**Depth:** 0.40m BGL	**Logged** AO.

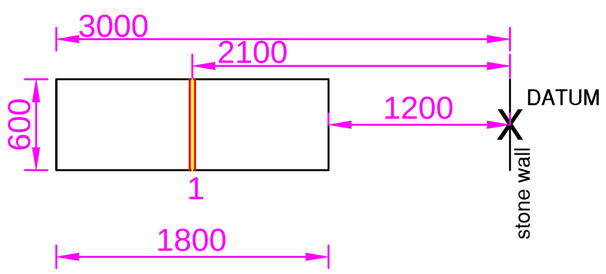
Water Strike & Backfill	**Samples & In Situ Testing**			**Depth (m)**	**Level (m OD)**	**Legend**	**Stratum Description**
	Depth (m)	**Type**	**Results**				
▨ ▼				0.40	20.10	▨	(MADE GROUND) Black, slightly sandy slightly gravelly PEAT with high cobble content.
							End of Pit at 0.400m

1
2
3
4
5

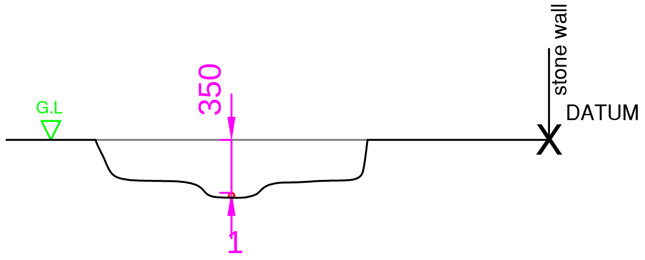
Stability: Moderate.
Plant: 3T mini digger.
Backfill: Arisings.

Groundwater: 0.40m: Seepage flow rate.

Remarks: Slit trench terminated at 0.40m bgl. Refer to DWG P19033 ST04A for cross sectional detail.

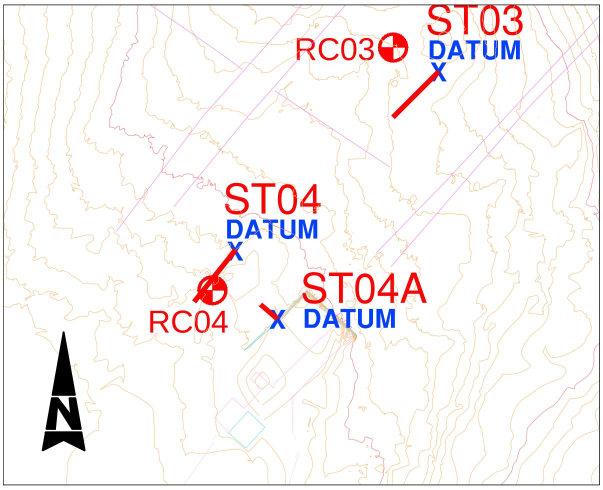


SLIT TRENCH PLAN, 1:100 ON A4



1. 35MMØ black ESB cable

SLIT TRENCH SECTION, 1:100 ON A4



SLIT TRENCH LOCATION PLAN, 1:1000 ON A4

DATUM COORDINATES:

EASTING:	50528.7
NORTHING:	41615.6
LEVEL:	20.502mAOD

KEY:

DATUM: X

SLIT TRENCH DIMENSIONS:

LENGTH:	1.80m
WIDTH:	0.60m
DEPTH:	0.35m

STRATA SHOWN ON DETAILED LOG

DRAWN BY: Gary Curtin		DATE: 17/04/2019
LOGGED BY: A.O.		DATE: 09/04/2019
SCALE: AS STATED	APPROVED: GH	REVISION: D01

SLIT TRENCH NUMBER:

ST04A

JOB NAME:

Dursey Island Cable Car & Visitor Centre Development

JOB NUMBER:

P19033

DRAWING NUMBER:

P19033-ST04A

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Photographic Record

Number:	**ST04A**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan

Photographic Record

Number:	**ST04A**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan

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Trial Pit No
TP01
Sheet 1 of 1

Project Name: Dursey Island Cable Car & Visitor Centre

Project No. P19033

Co-ords: 50826E - 41875N

Level: 25.30m OD

Date 11/04/2019

Location: Dursey Island, Co. Cork.

Dimensions (m): 2.00 × 0.40

Depth: 1.00m BGL

Scale 1:25

Client: Cork County Council

Logged AO

Water Strike & Backfill	Samples & In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description
	Depth (m)	Type	Results				
▨						▨	(TOPSOIL) Dark brown, organic slightly sandy CLAY. Sand is fine to coarse.
▨				0.25	25.05	▨	Grey, silty very sandy GRAVEL with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular, Siltstone.
▨	0.50 0.50 - 1.00	D B					
				1.00	24.30		SILTSTONE bedrock.
							End of Pit at 1.000m

Stability: Moderate.
Plant: 8T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Trial pit terminated at 1.00m bgl due to bedrock.

P19033 **Dursey Island** **11/04/2019**

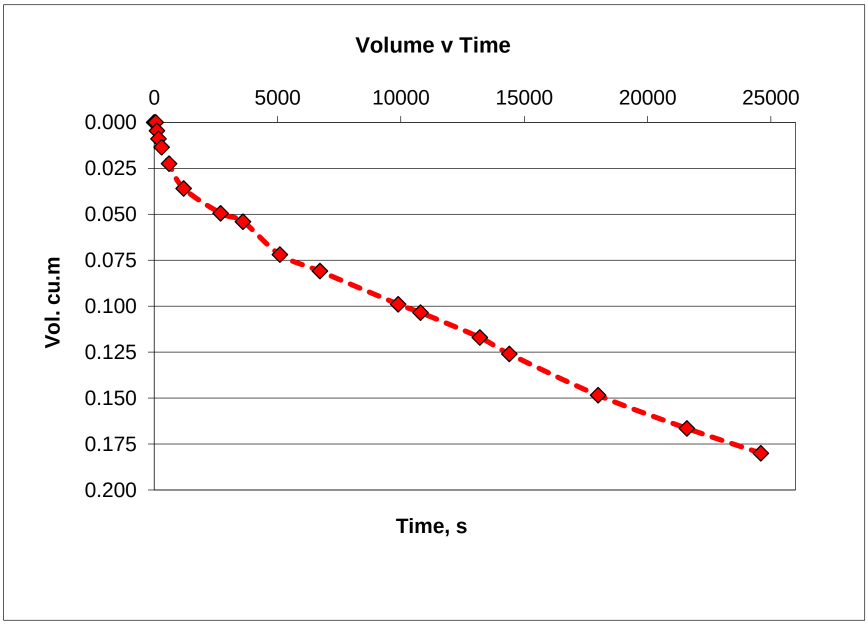
Test 1 **TP01**

l, m **1.5** b, m **0.3** d, m **0.8**
l_base, m **1.5** d_eff, m **0.50**
l_eff, m **1.5**

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.30	0	0.50	0.00	0.000
1	0.30	60	0.50	0.00	0.000
2	0.31	120	0.49	0.01	0.004
3	0.32	180	0.48	0.02	0.009
5	0.33	300	0.47	0.03	0.014
10	0.35	600	0.45	0.05	0.023
20	0.38	1200	0.42	0.08	0.036
45	0.41	2700	0.39	0.11	0.050
60	0.42	3600	0.38	0.12	0.054
85	0.46	5100	0.34	0.16	0.072
112	0.48	6720	0.32	0.18	0.081
165	0.52	9900	0.28	0.22	0.099
180	0.53	10800	0.27	0.23	0.104
220	0.56	13200	0.24	0.26	0.117
240	0.58	14400	0.22	0.28	0.126
300	0.63	18000	0.17	0.33	0.149
360	0.67	21600	0.13	0.37	0.167
410	0.70	24600	0.10	0.40	0.180

Area 0.45 m^2 $V_{p75-25\ theory}$ volume 0.1125 m^3
50% Area_eff, a_{p50} 1.35 m^2 $V_{p\ 75-25\ actual}$ volume 0.18 m^3
50% Area_act, a_{p50} 1.17 m^2 $t_{p\ 75-25\ actual}$ time 13590.00 s

Infiltration Coefficient *f* 1.13E-05 ms^-1



NOTES:
See TP01 log for detailed soil description.
No waterstrike encountered. Pit assumed unsaturated.

Photographic Record

Number:	**TP01**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan	

Photographic Record

Number:	**TP01**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan

Priority Geotechnical Ltd.
Tel: 021 4631600
Fax: 021 4638690
www.prioritygeotechnical.ie

Trial Pit No
TP02
Sheet 1 of 1

Project Name: Dursey Island Cable Car & Visitor Centre

Project No. P19033

Co-ords: 50793E - 41886N

Level: 23.30m OD

Date 12/04/2019

Location: Dursey Island, Co. Cork.

Dimensions (m): 0.35 × 0.35

Scale 1:25

Client: Cork County Council

Depth: 0.30m BGL

Logged AO

Water Strike & Backfill	Samples & In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description
	Depth (m)	Type	Results				
░				0.17	23.13	░	CONCRETE.
░	0.25	ES		0.30	23.00	▨	(MADE GROUND) Brown, clayey sandy GRAVEL. Gravel is fine to coarse, angular, Siltstone lithology.
							End of Pit at 0.300m

1
2
3
4
5

Stability: Moderate.
Plant: 8T track machine.
Backfill: Concrete.

Groundwater: None encountered.

Remarks: Trial pit terminated at 0.30m bgl due to bedrock.

Number:	**TP02**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan

Photographic Record

Number:	**TP02**	**Project** **Project No** **Engineer**	Dursey Island P19033 Roughan & O`Donovan

KEY TO SYMBOLS - LABORATORY TEST RESULT

U	Undisturbed Sample	
P	Piston Sample	
TWS	Thin Wall Sample	
B	Bulk Sample - Disturbed	
D	Jar Sample - Disturbed	
W	Water Sample	
pH	Acidity/Alkalinity Index	
SO_3	% - Total Sulphate Content (acid soluble)	
SO_3	g/ltr - Water Soluble Sulphate (Water or 2:1 Aqueous Soil Extract)	
+	Calcareous Reaction	
Cl	Chloride Content	
PI	Plasticity Index	
<425	% of material in sample passing 425 micron sieve	
LL	Liquid Limit	
PL	Plastic Limit	
MC	Water Content	
NP	Non Plastic	
Yb	Bulk Density	
Yd	Dry Density	
Ps	Particle Density	
U/D	Undrained/Drained Triaxial	
U/C	Unconsolidated/Consolidated Triaxial	
T/M	Single Stage/Multistage Triaxial	
100/38	Sample Diameter (mm)	
REM	Remoulded Triaxial Test Specimen	
TST	Triaxial Suction Test	
V	Vane Test	
DSB	Drained Shear Box	
RSB	Residual Shear Box	
RS	Ring Shear	
σ_3	Cell Pressure	
σ_1-σ_3	Deviator Stress	
c	Cohesion	
c_	Effective Cohesion Intercept	
ϕ	Angle of Shearing Resistance - Degrees	
ϕ_	Effective Angle of Shearing Resistance	
εf	Strain at Failure	
*	Failed under 1st Load	
**	Failed under 2nd Load	
#	Untestable	
##	Excessive Strain	
p_o	Effective Overburden Pressure	
m_v	Coefficient of Volume Decrease	
c_v	Coefficient of Consolidation	
Opt	Optimum	
Nat	Natural	
Std	Standard Compaction - 2.5kg Rammer	(¶ CBR)
Hvy	Heavy Compaction - 4.5kg Rammer	(§ CBR)
Vib	Vibratory Compaction	
CBR	California Bearing Ratio	
Sat m.c.	Saturation Moisture Content	
MCV	Moisture Condition Value	

Key sheet

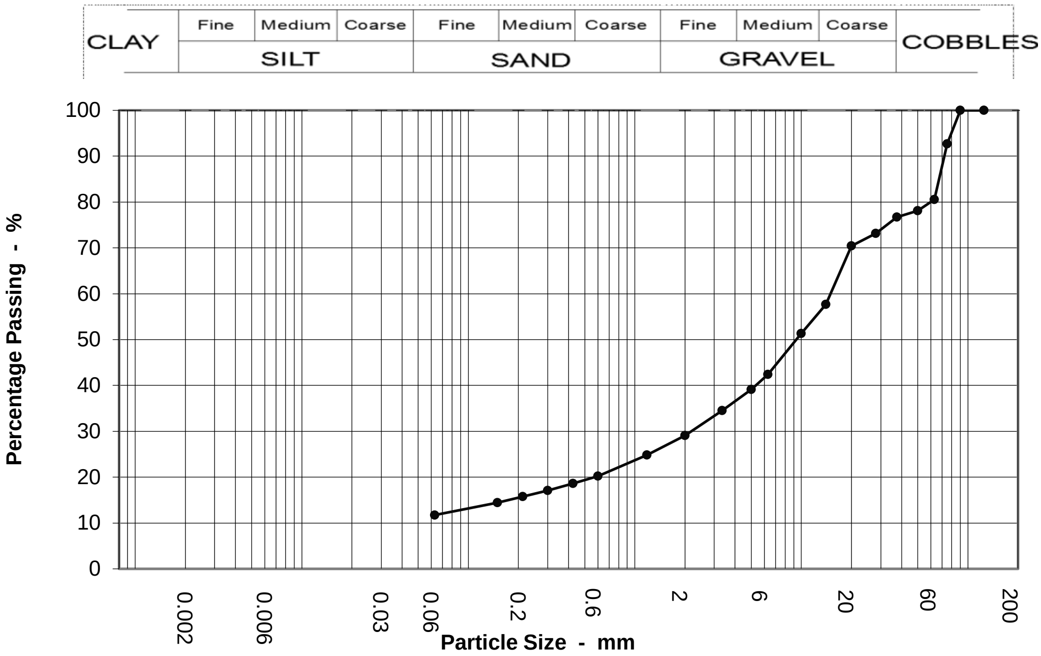
Natural Moisture Content/Atterberg Limits Summary

BS 1377 : Part 2 : 1990 : Clause 3

Location	**Dursey Island Cable Car & Visitor Centre**	**Job Ref** **P19033**

Hole ID	Sample Ref	Depth (m)	Sample Type	Sample Description	MC	LL	PL	PI	% Pass 425
ST01	1	0.5	B	Silty very sandy GRAVEL with medium cobble content	14	37	29	8	36.2
ST01	2	1	D	Silty very sandy GRAVEL	12				
ST03	2	0.5	D	Silty sandy GRAVEL with low cobble content	16	48	32	16	38.9
ST04	2	0.5	D	Slightly gravelly sandy SILT	22	52	34	18	56.5
TP01	1	0.5	B	Silty very sandy GRAVEL	12	47	32	15	33

	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Job Ref	P19033
		Borehole / Pit No	ST01
Location	**Dursey Island Cable Car & Visitor Centre**	Sample No	1
		Depth	0.50 m
Soil Description	Silty very sandy GRAVEL with medium cobble content	Sample type	B



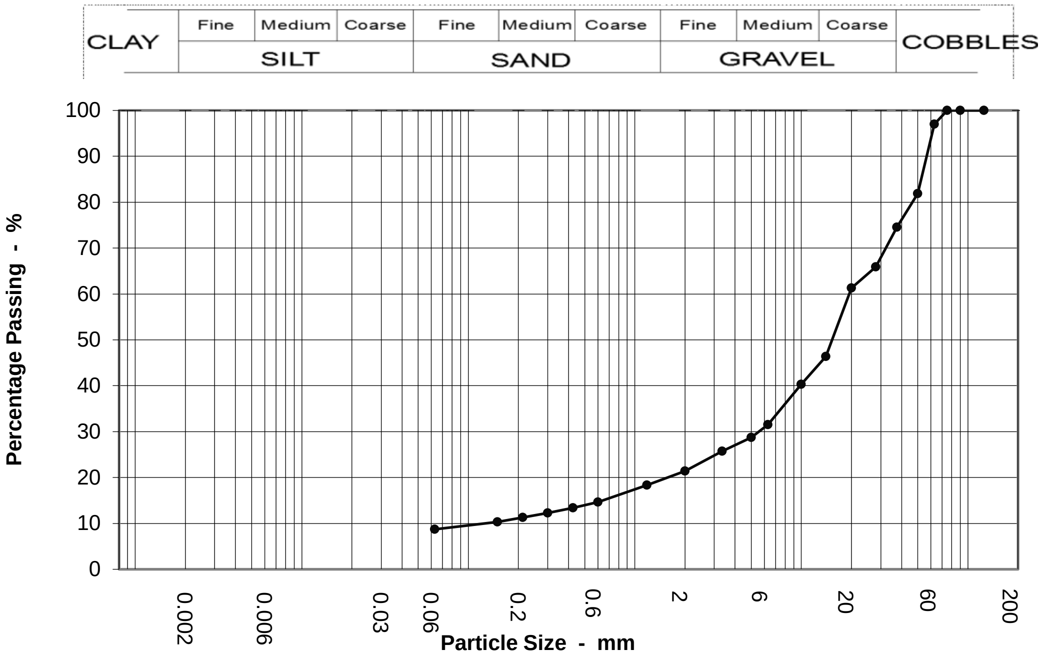
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	93		
63	81		
50	78		
37.5	77		
28	73		
20	70		
14	58		
10	51		
6.3	42		
5	39		
3.35	34		
2	29		
1.18	25		
0.6	20		
0.425	19		
0.3	17		
0.212	16		
0.15	14		
0.063	12		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

Sample Proportions	
Cobbles	19.0
Gravel	51.0
Sand	17.0
Silt & Clay	12.0

Grading Analysis	
D100	90.00
D60	14.90
D10	
Uniformity Coefficient	

pg priority geotechnical	**PARTICLE SIZE DISTRIBUTION** **BS 1377 : Part 2 : 1990 : Clause 9**	**Job Ref**	**P19033**
		Borehole / Pit No	ST03
Location	**Dursey Island Cable Car & Visitor Centre**	Sample No	2
		Depth	0.50 m
Soil Description	Silty sandy GRAVEL with low cobble content	Sample type	D



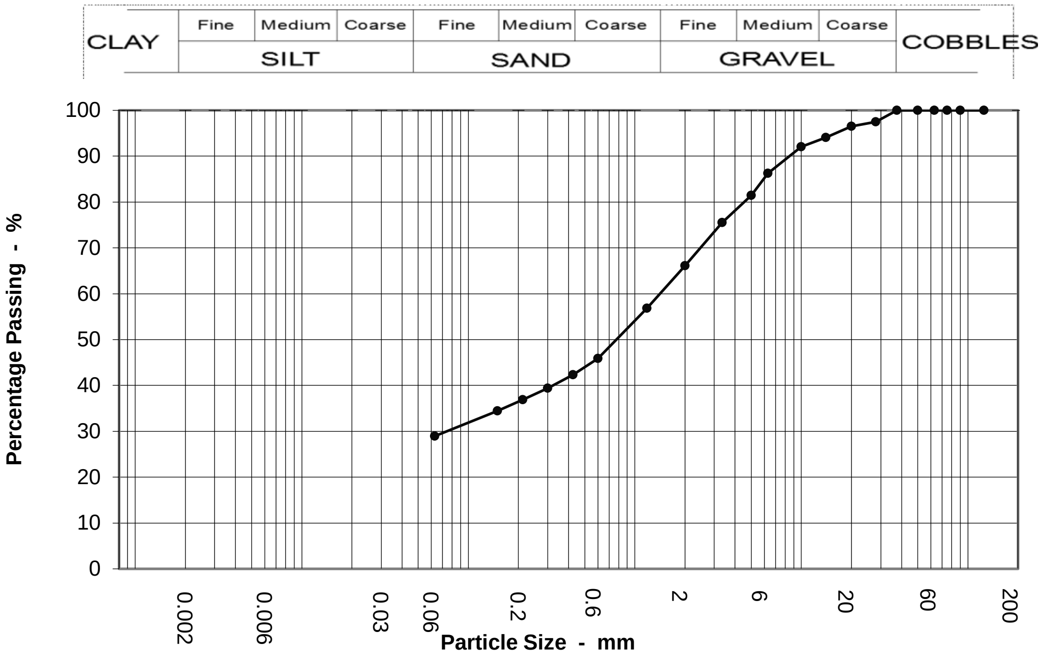
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	97		
50	82		
37.5	75		
28	66		
20	61		
14	46		
10	40		
6.3	32		
5	29		
3.35	26		
2	21		
1.18	18		
0.6	15		
0.425	13		
0.3	12		
0.212	11		
0.15	10		
0.063	9		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

Sample Proportions	
Cobbles	3.0
Gravel	76.0
Sand	13.0
Silt & Clay	9.0

Grading Analysis	
D100	75.00
D60	19.40
D10	0.13
Uniformity Coefficient	150.00

	PARTICLE SIZE DISTRIBUTION **BS 1377 : Part 2 : 1990 : Clause 9**	**Job Ref**	**P19033**
		Borehole / Pit No	ST04
Location	**Dursey Island Cable Car & Visitor Centre**	Sample No	2
		Depth	0.50 m
Soil Description	Slightly gravelly sandy SILT	Sample type	D



Sieving		**Sedimentation**	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	98		
20	97		
14	94		
10	92		
6.3	86		
5	81		
3.35	76		
2	66		
1.18	57		
0.6	46		
0.425	42		
0.3	39		
0.212	37		
0.15	34		
0.063	29		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	34.0
Sand	37.0
Silt & Clay	29.0

Grading Analysis	
D100	37.50
D60	1.41
D10	
Uniformity Coefficient	

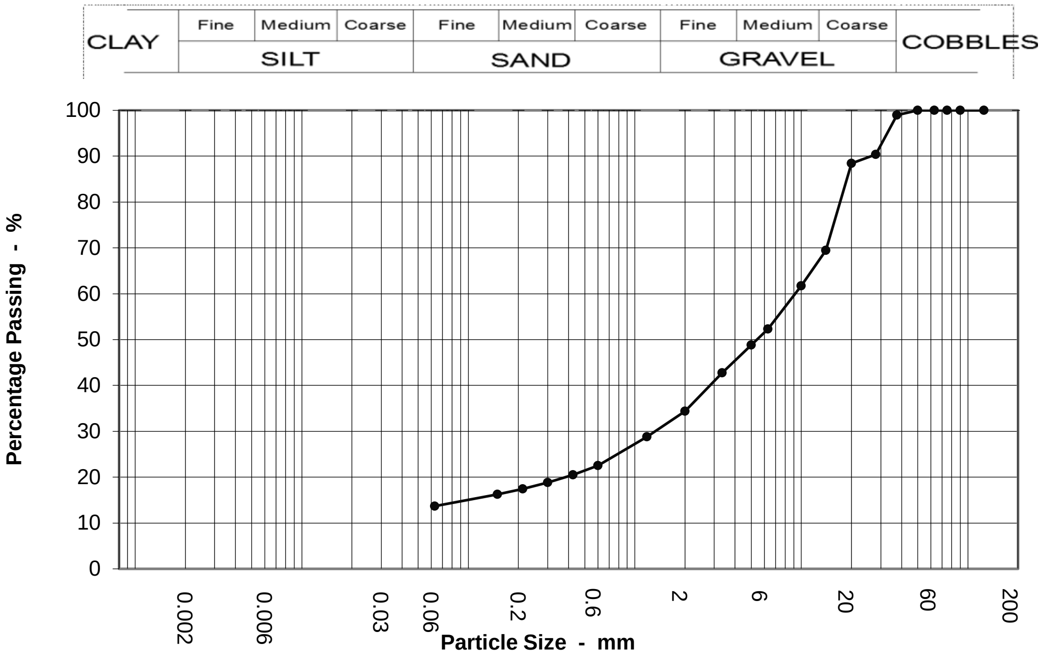
priority geotechnical

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Location	**Dursey Island Cable Car & Visitor Centre**
Soil Description	Silty very sandy GRAVEL

Job Ref	**P19033**
Borehole / Pit No	TP01
Sample No	1
Depth	0.50 m
Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	99		
28	90		
20	88		
14	69		
10	62		
6.3	52		
5	49		
3.35	43		
2	34		
1.18	29		
0.6	23		
0.425	21		
0.3	19		
0.212	17		
0.15	16		
0.063	14		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	66.0
Sand	21.0
Silt & Clay	14.0

Grading Analysis	
D100	50.00
D60	9.19
D10	
Uniformity Coefficient	

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Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	19-15525-1		
Initial Date of Issue:	14-May-2019		
Client	Priority Geotechnical Ltd		
Client Address:	Unit 12 Owenacurra Business Park Midleton County Cork Ireland		
Contact(s):	Colette Kelly		
Project	P19033 Dursey		
Quotation No.:		**Date Received:**	08-May-2019
Order No.:	11696	**Date Instructed:**	08-May-2019
No. of Samples:	2		
Turnaround (Wkdays):	7	**Results Due:**	16-May-2019
Date Approved:	14-May-2019		

Approved By:

Details: Robert Monk, Technical Manager

Results - Soil

Project: P19033 Dursey

Client: Priority Geotechnical Ltd				**Chemtest Job No.:**	19-15525	19-15525
Quotation No.:				**Chemtest Sample ID.:**	822348	822349
				Sample Location:	TP01	TP01
				Sample Type:	SOIL	SOIL
				Top Depth (m):	0.50	0.50
				Date Sampled:	02-May-2019	02-May-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Moisture	N	2030	%	0.020	11	10
pH	U	2010		N/A		7.9
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		< 0.010
Sulphate (Acid Soluble)	U	2430	%	0.010		0.021
Organic Matter	U	2625	%	0.40	0.91	

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Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	19-16234-1		
Initial Date of Issue:	21-May-2019		
Client	Priority Geotechnical Ltd		
Client Address:	Unit 12 Owenacurra Business Park Midleton County Cork Ireland		
Contact(s):	Colette Kelly		
Project	P19033 Dursey Island		
Quotation No.:		**Date Received:**	14-May-2019
Order No.:	11696	**Date Instructed:**	14-May-2019
No. of Samples:	4		
Turnaround (Wkdays):	7	**Results Due:**	22-May-2019
Date Approved:	21-May-2019		
Approved By:			
Details:	Martin Dyer, Laboratory Manager		

Results - Soil

Project: P19033 Dursey Island

Client: Priority Geotechnical Ltd	**Chemtest Job No.:**				19-16234	19-16234	19-16234	19-16234
Quotation No.:	**Chemtest Sample ID.:**				825698	825699	825700	825701
	Sample Location:				RC01	RC02	RC03	RC04
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.10	2.95	1.80	0.40
	Date Sampled:				10-May-2019	10-May-2019	10-May-2019	10-May-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Moisture	N	2030	%	0.020	0.096	0.22	0.35	0.057
Stones and Removed Materials	N	2030	%	0.020	< 0.020	< 0.020	< 0.020	< 0.020
pH	U	2010		N/A	9.2	9.4	9.2	9.5
Magnesium (Water Soluble)	N	2120	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Sulphur	U	2175	%	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Sulphate (Acid Soluble)	U	2430	%	0.010	< 0.010	< 0.010	< 0.010	< 0.010

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
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Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	19-13471-1		
Initial Date of Issue:	02-May-2019		
Client	Priority Geotechnical Ltd		
Client Address:	Unit 12 Owenacurra Business Park Midleton County Cork Ireland		
Contact(s):	Colette Kelly		
Project	P19033 Dursey Island		
Quotation No.:	Q17-09116	**Date Received:**	18-Apr-2019
Order No.:	11696	**Date Instructed:**	24-Apr-2019
No. of Samples:	1		
Turnaround (Wkdays):	7	**Results Due:**	02-May-2019
Date Approved:	02-May-2019		

Approved By:

Details: Robert Monk, Technical Manager

Results - Soil

Project: P19033 Dursey Island

Client: Priority Geotechnical Ltd	**Chemtest Job No.:**	19-13471
Quotation No.: Q17-09116	**Chemtest Sample ID.:**	813542
	Sample Location:	TP02
	Sample Type:	SOIL
	Top Depth (m):	0.25
	Date Sampled:	12-Apr-2019
	Asbestos Lab:	COVENTRY

Determinand	Accred.	SOP	Units	LOD	
ACM Type	U	2192		N/A	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-
Moisture	N	2030	%	0.020	8.5
Arsenic	U	2450	mg/kg	1.0	1.4
Barium	U	2450	mg/kg	10	13
Cadmium	U	2450	mg/kg	0.10	< 0.10
Chromium	U	2450	mg/kg	1.0	22
Molybdenum	U	2450	mg/kg	2.0	< 2.0
Copper	U	2450	mg/kg	0.50	6.4
Mercury	U	2450	mg/kg	0.10	0.47
Nickel	U	2450	mg/kg	0.50	31
Lead	U	2450	mg/kg	0.50	4.9
Selenium	U	2450	mg/kg	0.20	0.36
Zinc	U	2450	mg/kg	0.50	43
Chromium (Trivalent)	N	2490	mg/kg	1.0	22
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10
Benzene	U	2760	µg/kg	1.0	< 1.0
Toluene	U	2760	µg/kg	1.0	< 1.0

Results - Soil

Project: P19033 Dursey Island

Client: Priority Geotechnical Ltd	**Chemtest Job No.:**				19-13471
Quotation No.: Q17-09116	**Chemtest Sample ID.:**				813542
	Sample Location:				TP02
	Sample Type:				SOIL
	Top Depth (m):				0.25
	Date Sampled:				12-Apr-2019
	Asbestos Lab:				COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0
Naphthalene	U	2800	mg/kg	0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10
Acenaphthene	U	2800	mg/kg	0.10	< 0.10
Fluorene	U	2800	mg/kg	0.10	< 0.10
Phenanthrene	U	2800	mg/kg	0.10	< 0.10
Anthracene	U	2800	mg/kg	0.10	< 0.10
Fluoranthene	U	2800	mg/kg	0.10	< 0.10
Pyrene	U	2800	mg/kg	0.10	< 0.10
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10
Chrysene	U	2800	mg/kg	0.10	< 0.10
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10
Coronene	N	2800	mg/kg	0.10	< 0.10
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0
PCB 28	U	2815	mg/kg	0.010	< 0.010
PCB 52	U	2815	mg/kg	0.010	< 0.010
PCB 90+101	U	2815	mg/kg	0.010	< 0.010
PCB 118	U	2815	mg/kg	0.010	< 0.010
PCB 153	U	2815	mg/kg	0.010	< 0.010
PCB 138	U	2815	mg/kg	0.010	< 0.010
PCB 180	U	2815	mg/kg	0.010	< 0.010
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10	< 0.10

Results - Single Stage WAC

Project: P19033 Dursey Island

Chemtest Job No:	19-13471				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	813542						
Sample Ref:					**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP02						
Top Depth(m):	0.25						
Bottom Depth(m):							
Sampling Date:	12-Apr-2019						
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	U	%	< 0.20	3	5	6
Loss On Ignition	2610	U	%	1.3	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		9.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.022	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0012	< 0.050	0.5	2	25
Barium	1450	U	0.0024	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0018	< 0.50	4	50	200
Chloride	1220	U	3.7	37	800	15000	25000
Fluoride	1220	U	0.16	1.6	10	150	500
Sulphate	1220	U	4.6	46	1000	20000	50000
Total Dissolved Solids	1020	N	49	490	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	10	100	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	8.5

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS

Test Methods

SOP	Title	Parameters included	Method summary
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
640	Characterisation of Waste (Leaching)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

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I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com

UKAS TESTING
2183

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.: 19-13422-1

Initial Date of Issue: 30-Apr-2019

Client Priority Geotechnical Ltd

Client Address: Unit 12
Owenacurra Business Park
Midleton
County Cork
Ireland

Contact(s): Colette Kelly

Project P19033 Dursey Island

Quotation No.:

Date Received: 18-Apr-2019

Order No.: 11696

Date Instructed: 18-Apr-2019

No. of Samples: 7

Turnaround (Wkdays): 7

Results Due: 30-Apr-2019

Date Approved: 30-Apr-2019

Subcon Results Due: 14-May-2019

Approved By:

Details: Martin Dyer, Laboratory Manager

Results - Water

Project: P19033 Dursey Island

Client: Priority Geotechnical Ltd	**Chemtest Job No.:**				19-13422	19-13422	19-13422	19-13422	19-13422	19-13422	19-13422
Quotation No.:	**Chemtest Sample ID.:**				813437	813438	813439	813440	813441	813442	813443
	Sample Location:				Island Well	Station Well	TW01ES01	TW01ES02	TW02ES01	TW02ES02	TW02ES03
	Sample Type:				WATER	WATER	WATER	WATER	WATER	WATER	WATER
	Date Sampled:				16-Apr-2019	16-Apr-2019	16-Apr-2019	16-Apr-2019	16-Apr-2019	16-Apr-2019	16-Apr-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**							
E. coli (Subcon)	S		cfu/100ml	N/A	0	0		5			0
Total Coliforms (Subcon)	S		cfu/100ml	N/A	3	0		5			0
pH	U	1010		N/A	8.0	8.3	7.7	7.5	7.6	7.9	7.7
Electrical Conductivity	U	1020	µS/cm	1.0	410	980	680	690	570	530	540
Ammonia (Free) as N	U	1220	mg/l	0.050	0.21	0.28		0.074			0.11
Nitrite as N	U	1220	mg/l	0.010	0.012	0.011		0.011			0.010
Nitrate as N	U	1220	mg/l	0.50	< 0.50	< 0.50		< 0.50			< 0.50
Phosphorus (Total)	N	1220	mg/l	0.020	< 0.020	< 0.020		< 0.020			< 0.020
Phosphorus (Dissolved)	U	1220	mg/l	0.020	< 0.020	< 0.020		< 0.020			< 0.020
Nitrogen (Total Dissolved)	N	1340	mg/l	1.0	2.4	< 1.0		2.1			< 1.0
Total Hardness as CaCO3	U	1270	mg/l	15	71	270		81			120
Copper (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0		< 1.0			2.4
Iron (Dissolved)	N	1450	µg/l	20	< 20	77		140			510
Manganese (Dissolved)	U	1450	µg/l	1.0	9.4	230		120			2100
Zinc (Dissolved)	U	1450	µg/l	1.0	4.7	< 1.0		85			8.2
Total Organic Carbon	U	1610	mg/l	2.0	5.0	3.7		4.1			5.7
TPH >C6-C10	N	1670	µg/l	0.10	< 0.10	< 0.10		< 0.10			< 0.10
TPH >C10-C21	N	1670	µg/l	0.10	< 0.10	< 0.10		< 0.10			< 0.10
TPH >C21-C40	N	1670	µg/l	0.10	< 0.10	< 0.10		< 0.10			< 0.10
Total TPH >C6-C40	U	1670	µg/l	10	< 10	< 10		< 10			< 10

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1270	Total Hardness of Waters	Total hardness	Calculation applied to calcium and magnesium results, expressed as mg l-1 CaCO3 equivalent.
1340	Total Nitrogen in Waters	Total Nitrogen and organic Nitrogen	Persulphate digestion followed by colorimetry.
1415	Cations in Waters by ICP-MS	Sodium; Potassium; Calcium; Magnesium	Direct determination by inductively coupled plasma - mass spectrometry (ICP-MS).
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1670	Total Petroleum Hydrocarbons (TPH) in Waters by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO	Pentane extraction / GC FID detection

Report Information

Key

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N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
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B - Sample age exceeds stability time (sampling to extraction)
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D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

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All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Laboratory Report

Contract Number: 44299

Client Ref: **P19033**

Client PO: **11779**

Report Date: **06-06-2019**

Client **Priority Geotechnical Limited**
Unit 12
Owenacurra Business Park
Midleton
Co. Cork.

Contract Title: **Dursey Island**
For the attention of: **Colette Kelly**

Date Received: **20-05-2019**
Date Commenced: **20-05-2019**
Date Completed: **06-06-2019**

Test Description	Qty
Determination of the slake durability index, two cycles. ISRM Suggested Method For Determining Slake Durability - @ Non Accredited Test	4
Los Angeles Abrasion Value BS EN 1097-2 - * UKAS	4
Magnesium sulfate test soundness value. BS EN 1367-2 - * UKAS	4
Disposal of samples for job	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

Approved Signatories:
Emma Sharp (Office Manager) - Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager)
Sean Penn (Administrative/Accounts Assistant) - Shaun Jones (Laboratory manager) - Wayne Honey (Administrative/Quality Assistant)

Determination of Resistance to Fragmentation by the Los Angeles Test Method

BS EN 1097-2:2010 Cl 5

Contract Number	44299
Site Name	Dursey Island
Sample Preperation	Crushed Down Core Sample
Date Tested	20/05/2019

Hole Reference	Depth (m)			Size Fraction (Max)	Size Fraction (Min)	LA Value						Target Specification
RC01	7.80		17.10	14	10	20						N/A
RC02	4.00		16.10	14	10	21						N/A
RC03	7.65		12.70	14	10	20						N/A
RC04	0.80		5.00	14	10	20						N/A

Key	**Reported As**
Size Fraction Max	mm
Size Fraction Min	mm

Method of Sampling in accordance with BS932-1 General Requirements and Sample Preparation

Operators	Checked	05/06/2019	Ben Sharp	
JD	Approved	06/06/2019	Paul Evans	

GSTL

Determination of Slake Durability Index

ISRM Part 2.2

Contract Number	44299	
Site Name	Dursey Island	
Nature of Slaking Fluid	Water at 20°C	
Date Tested	24/05/2019	

Hole Reference	Depth (m)			Slake First Cycle	Slake Second Cycle	Appearance Of Material Retained In The Drum	Appearance Of Material Passing Through The Drum	
RC01	7.80	-	17.10	98.69	98.41	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.	
RC02	4.00	-	16.10	98.95	98.43	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.	
RC03	7.65		12.70	99.37	98.75	11 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.	
RC04	0.80		5.00	98.62	97.98	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.	

Key	Reported As
Slake First Cycle	%
Slake Second Cycle	%

Operators	Checked	05/06/2019	Wayne Honey	W. Honey
JD	Approved	06/06/2019	Ben Sharp	

GSTL

Determination of Thermal Weathering Properties of Aggregates
Magnesium Sulfate Test
BS EN 1367-2:1998

Contract Number	44299	
Site Name	Dursey Island	
Sample Preperation	Crushed rock core	
Date Tested	20/05/2019	

Hole Reference	Depth (m)			Size Fraction (Max)	Size Fraction (Min)	Mass of test portions	Magnesium Sulfate Value					Target Specification
RC01	7.80		17.10	14	10	420-430	25					N/A
RC02	4.00		16.10	14	10	420-430	23					N/A
RC03	7.65		12.70	14	10	420-430	19					N/A
RC04	0.80		5.00	14	10	420-430	23					N/A

Key	**Reported As**
Size Fraction Max	mm
Size Fraction Min	mm
Mass of test portions	g
Magnesium Sulfate Value	%

Method of Sampling in accordance with BS932-1 General Requirements and Sample Preparation

Operators	Checked	05/06/2019	Wayne Honey	W. Honey
JD	Approved	06/06/2019	Ben Sharp	

UKAS TESTING
2788

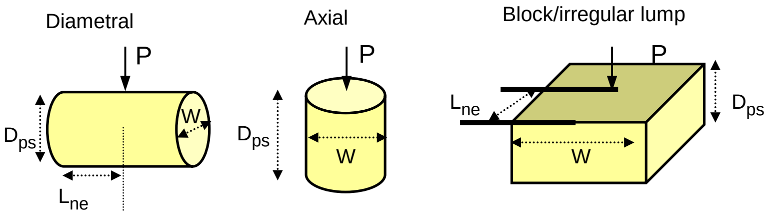
Point Load Strength Index Tests
Summary of Results

Project No.
P19033

Project Name
Dursey Island Cable Car & Visitor Centre

Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Depth m	Ref.	Type	Ref.	Depth m		Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm	kN	mm	Is MPa	Is(50) MPa	
RC01	1.10	RC	C			SILTSTONE	D	P	YES	100.0	76.0	76.0	66.0	6.8	70.8	1.4	1.6	Undulating Smooth
RC01	4.65	RC	C			SILTSTONE	D	L	YES	100.0	76.0	55.0	68.0	3.4	71.9	0.7	0.8	Undulating Smooth
RC01	8.00	RC	C			SILTSTONE	D	L	YES	35.0	76.0	76.0	65.0	3.3	70.3	0.7	0.8	Undulating Smooth
RC02	2.95	RC	C			SILTSTONE	D	P	YES	140.0	76.0	76.0	35.0	18.6	51.6	7.0	7.1	Planar Smooth
RC02	3.20	RC	C			SILTSTONE	D	P	YES	110.0	76.0	76.0	64.0	3.2	69.7	0.7	0.8	Undulating Smooth
RC02	4.45	RC	C			SILTSTONE	D	P	YES	78.0	76.0	76.0	45.0	5.6	58.5	1.6	1.8	Undulating Smooth
RC02	4.90	RC	C			SILTSTONE	D	P	YES	50.0	76.0	76.0	36.0	4.6	52.3	1.7	1.7	Undulating Rough
RC02	6.40	RC	C			SILTSTONE	D	P	YES	83.0	76.0	76.0	45.0	2.7	58.5	0.8	0.9	Undulating Rough
RC02	7.15	RC	C			SILTSTONE	D	P	YES	43.0	76.0	76.0	48.0	3.5	60.4	1.0	1.1	Undulating Smooth
RC02	9.70	RC	C			SILTSTONE	D	P	YES	0.0	76.0	76.0	6.2	4.3	21.7	9.1	6.2	Undulating Smooth
RC02	11.20	RC	C			SILTSTONE	D	L	YES	25.0	76.0	76.0	59.0	2.8	67.0	0.6	0.7	Undulating Smooth
RC02	11.35	RC	C			SILTSTONE	D	P	YES	100.0	76.0	76.0	44.0	4.5	57.8	1.4	1.4	Undulating Smooth
RC03	1.40	RC	C			SILTSTONE	D	P	YES	155.0	76.0	76.0	44.0	0.8	57.8	0.2	0.2	Undulating Rough
RC03	1.80	RC	C			SILTSTONE	D	L	YES	100.0	76.0	76.0	69.0	2.0	72.4	0.4	0.4	Planar Smooth
RC03	2.90	RC	C			SILTSTONE	D	P	YES	82.0	76.0	76.0	53.0	2.1	63.5	0.5	0.6	Planar Smooth
RC03	5.05	RC	C			SILTSTONE	D	P	YES	30.0	76.0	76.0	41.0	4.1	55.8	1.3	1.4	Planar Smooth
RC03	6.55	RC	C			SILTSTONE	D	L	YES	140.0	76.0	76.0	69.0	3.2	72.4	0.6	0.7	Undulating Smooth
RC03	10.75	RC	C			SILTSTONE	D	L	YES	140.0	76.0	76.0	68.0	4.8	71.9	0.9	1.1	Planar Smooth
RC04	0.45	RC	C			SILTSTONE	D	P	YES	65.0	76.0	76.0	45.0	20.0	58.5	5.9	6.3	Undulating Smooth
RC04	2.70	RC	C			SILTSTONE	D	P	YES	110.0	76.0	76.0	43.0	4.2	57.2	1.3	1.4	Undulating Smooth

Test Type
D - Diametral, A - Axial, I - Irregular Lump, B - Block
Direction
L - parallel to planes of weakness
P - perpendicular to planes of weakness
U - unknown or random
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure (see ISRM note 6)
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P



Test performed in accordance with ISRM Suggested Methods : 2007, unless noted otherwise
Detailed legend for test and dimensions, based on ISRM, is shown above.
Size factor, F = (De/50)0.45 for all tests.

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Point Load Strength Index Tests
Summary of Results

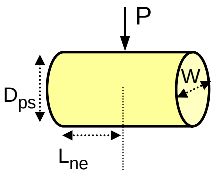
Project No.
P19033

Project Name
Dursey Island Cable Car & Visitor Centre

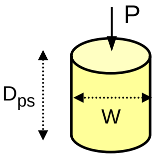
Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Depth m	Ref.	Type	Ref.	Depth m		Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm	kN	mm	Is MPa	Is(50) MPa	
RC04	3.00	RC	C			SILTSTONE	D	P	YES	59.0	76.0	76.0	49.0	1.6	61.0	0.4	0.5	Undulating Smooth
RC04	3.80	RC	C			SILTSTONE	D	L	YES	125.0	76.0	76.0	70.0	1.8	72.9	0.3	0.4	
RC04	5.45	RC	C			SILTSTONE	D	P	YES	33.0	76.0	76.0	53.0	2.7	63.5	0.7	0.8	

Test Type
D - Diametral, A - Axial, I - Irregular Lump, B - Block
Direction
L - parallel to planes of weakness
P - perpendicular to planes of weakness
U - unknown or random
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure (see ISRM note 6)
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P

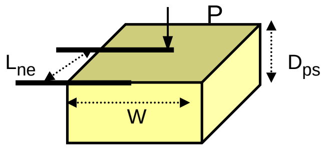
Diametral



Axial



Block/irregular lump



Test performed in accordance with ISRM Suggested Methods : 2007, unless noted otherwise
Detailed legend for test and dimensions, based on ISRM, is shown above.
Size factor, F = (De/50)0.45 for all tests.

Date Printed	Approved By	Table	
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		sheet	2

Unconfined Compressive Strength, UCS

Job Name	**Dursey Island Cable Car & Visitor Centre**	
Job Number	**P19033**	
Borehole:	**RC01**	
Depth:	**5.55**	**m**
Rock Type	**SILTSTONE**	
Bulk Density	**2.81**	**Mg/m3**
Load at Failure, P	**198.5**	**kN**
Stress at Failure	**44.97**	**MPa**

Job name: Dursey
Job number: P19033
Hole I.D: RC01
Depth: 5.55 m
Test type: UCS

Failure mode

Unconfined Compressive Strength, UCS

Job Name	**Dursey Island Cable Car & Visitor Centre**	
Job Number	**P19033**	
Borehole:	**RC01**	
Depth:	**7.1**	**m**
Rock Type	**SILTSTONE**	
Bulk Density	**2.74**	**Mg/m3**
Load at Failure, P	**68.2**	**kN**
Stress at Failure	**15.07**	**MPa**

Failure mode

Unconfined Compressive Strength, UCS

Job Name **Dursey Island Cable Car & Visitor Centre**
Job Number **P19033**

Borehole: **RC01**
Depth: **12.05** **m**
Rock Type **SILTSTONE**

Bulk Density **2.78** **Mg/m3**
Load at Failure, P **91.6** **kN**

Stress at Failure **20.77** **MPa**

Failure mode

Unconfined Compressive Strength, UCS

Job Name **Dursey Island Cable Car & Visitor Centre**
Job Number **P19033**

Borehole: **RC02**
Depth: **5.35** **m**
Rock Type **SILTSTONE**

Bulk Density **2.78** **Mg/m3**
Load at Failure, P **51** **kN**

Stress at Failure **11.57** **MPa**

Failure mode

Unconfined Compressive Strength, UCS

Job Name	**Dursey Island Cable Car & Visitor Centre**	
Job Number	**P19033**	
Borehole:	**RC02**	
Depth:	**8**	**m**
Rock Type	**SILTSTONE**	
Bulk Density	**2.78**	**Mg/m3**
Load at Failure, P	**61.9**	**kN**
Stress at Failure	**14.07**	**MPa**

Job name: Dursey
Job number: P19033
Hole I.D: RC02
Depth: 8.00m
Test type: UCS

Failure mode

Unconfined Compressive Strength, UCS

Job Name **Dursey Island Cable Car & Visitor Centre**
Job Number **P19033**

Borehole: **RC03**
Depth: **4.4** **m**
Rock Type **SILTSTONE**

Bulk Density **2.80** **Mg/m3**
Load at Failure, P **60.7** **kN**

Stress at Failure **13.77** **MPa**

Failure mode

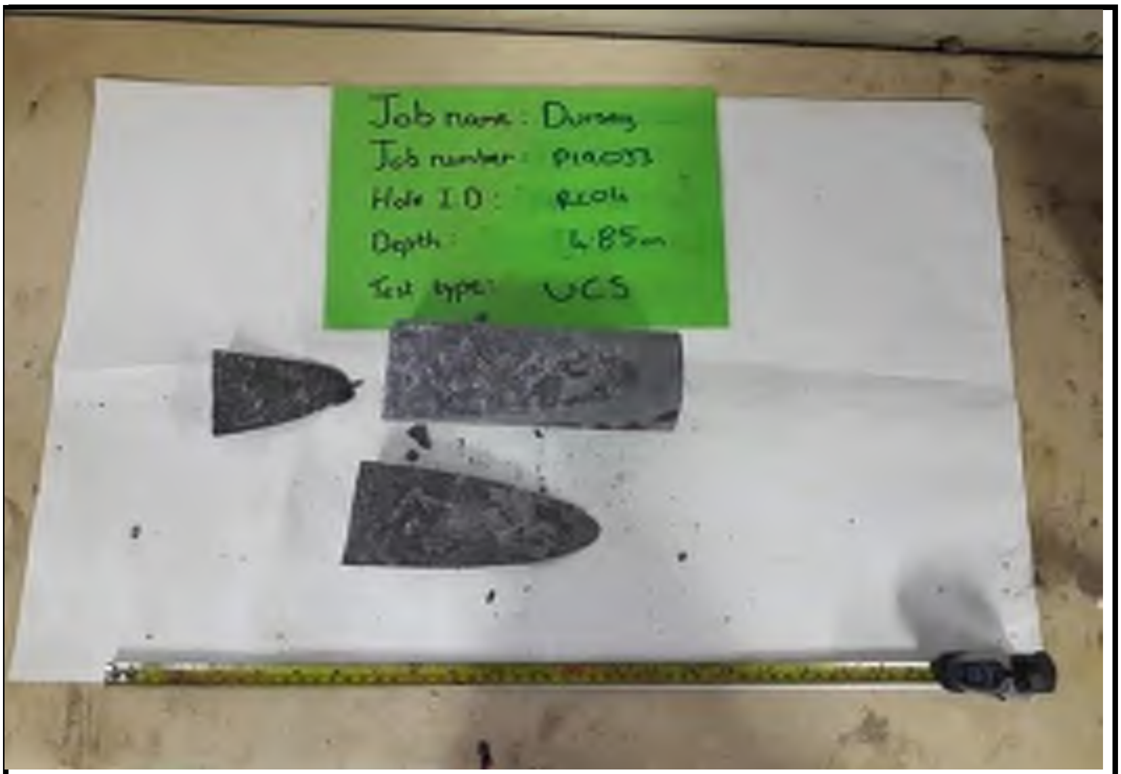
Unconfined Compressive Strength, UCS

Job Name	**Dursey Island Cable Car & Visitor Centre**	
Job Number	**P19033**	
Borehole:	**RC03**	
Depth:	**4.8**	**m**
Rock Type	**SILTSTONE**	
Bulk Density	**2.81**	**Mg/m3**
Load at Failure, P	**42.6**	**kN**
Stress at Failure	**9.67**	**MPa**

Failure mode

Unconfined Compressive Strength, UCS

Job Name	**Dursey Island Cable Car & Visitor Centre**	
Job Number	**P19033**	
Borehole:	**RC04**	
Depth:	**4.85**	**m**
Rock Type	**SILTSTONE**	
Bulk Density	**2.78**	**Mg/m3**
Load at Failure, P	**62.7**	**kN**
Stress at Failure	**14.27**	**MPa**



Failure mode

Unconfined Compressive Strength, UCS

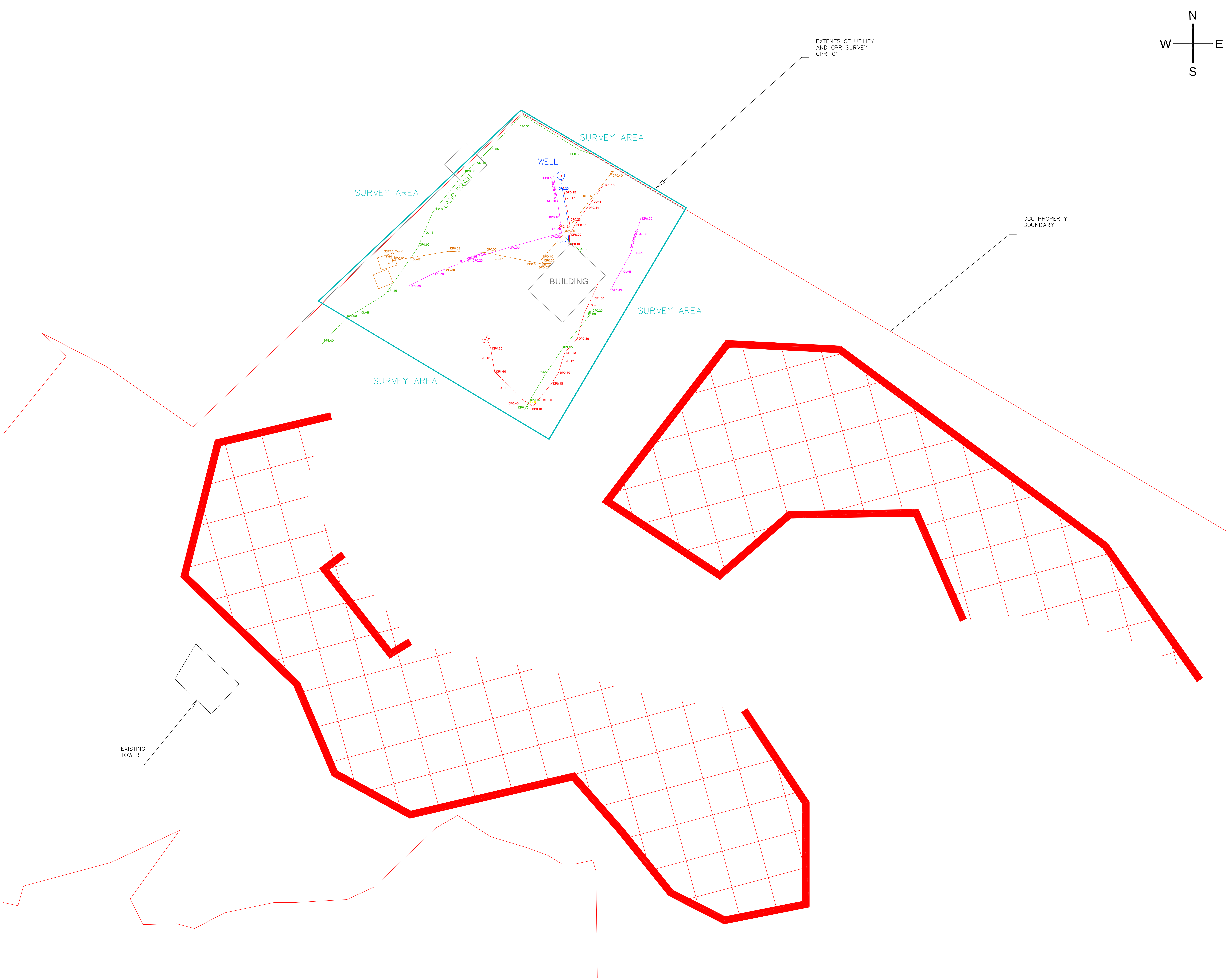
Job Name **Dursey Island Cable Car & Visitor Centre**
Job Number **P19033**

Borehole: **RC04**
Depth: **6.1** **m**
Rock Type **SILTSTONE**

Bulk Density **2.79** **Mg/m3**
Load at Failure, P **43.4** **kN**

Stress at Failure **13.77** **MPa**

Failure mode



SERVICES LEGEND

	FOUL DRAINAGE		FOUL AJ
FMH	FOUL DRAINAGE MANHOLE		100MMØ EIR DUCT
	STORM AJ		50MMØ EIR DUCT
	STORM DRAINAGE	TP	OVERHEAD LINE WITH POLE
SMH	STORM DRAINAGE MANHOLE		450MMØ AJ EIR CHAMBER
	ROAD GULLY		EIR CHAMBER
	WATER MAIN		UNDERGROUND ELECTRICITY LINE
SV	SLUICE VALVE	EMH	ELECTRICAL M/HOLE
HYD	FIRE HYDRANT	EP	OVERHEAD LINE WITH POLE
	WATER METER	MP	MINI PILLAR
ScV	SCOUR VALVE		OVERHEAD ELECTRIC
PRV	PRESSURE RELEASE VALVE	LP	6M HIGH STREET LIGHT
AV	AIR VALVE	BT	BT DUCTS
NRV	NON-RETURN VALVE	UNID	UNIDENTIFIED SERVICE
FUEL	FUEL LINE/TANK	CATV	CATV DUCT
GL 00.00	GROUND LEVEL	E	EARTH LINE AND RODS
	ENET	SV	GAS SV
DP1.50m	DEPTH TO TOP OF SERVICE	GAS	GAS LINE
UTO	UNABLE TO OPEN		SURVEYED AREA
CL 10.00	COVER LEVEL (METRES)	OSA	OUTSIDE SURVEY AREA
IL 10.00	INVERT LEVEL (METRES)		

Please note that the absence of services on this drawing is not solid proof that these services are not present in the ground. While every method of underground utility locating has been adhered to in this survey, some services may lie outside the range of the GPR and electro-magnetic locator signal. Poor ground conditions and or services situated underneath other services can also prove impossible to locate. Due to the fact that not all Utility Service Plans were provided to Metroscan by the contractor,Metroscan cannot be held responsible for any services that have not been identified. The contractor should not assume that all services have been identified and must exercise a duty of care when excavating.

Hand / vacuum excavation is advised to determine exact depth and position of service prior to excavation commencing.

Accuracy Levels

In ideal conditions the accuracy levels of the EML is +/-5% whilst the GPR outputs accuracy levels of 10% up to 2.5m depth. These accuracy levels can vary depending on ground conditions, depths of servcies, congestion of services (may cause signal to bleed on to other services).

Depths noted on drawings should be taken as indicative and hand / vacuum excavation is advised where exact depth are required. Diameter of services will be given where direct access is available through visual inspection, eg manhole.

Survey Limitations

Non-conductible services pose a difficult task to identify. Direct buried fibre optic cables are difficult to identify with GPR. They can easily be traced when placed in a conduit by the means of a sonde or cobra reel. PE gas mains can also prove difficult to identify.

If Metroscan cannot get an accurate signal from a service, it will be noted on the drawing that the service is "taken from records". If manholes cannot be opened on site, they with be marked on the drawing as UTO (unable to open).

Excluded from the survey unless otherwise stated :
Domestic services, Services above ground, Disconnected services where no signal can be obtained.

Notes

1. GPR scanning frequency 250 and 700 mhz
   Depth of investigation 2.5m, self calibrating.
2. Radio detection equipment:
   Vivax Metrotech VproLoc2 / RD7000
3. GPR scanning limited to smooth surfaces only no obstruction.
   Survey area marked on drawing
4. All depths stated are a indication of depth
   caution required when excavating.
5. All Utilities are classified QL- B1 unless noted otherwise.

PAS 128

Survey Type		Quality Level	Location Accuracy		Supporting Data
			Horizontal	vertical	
D	Desktop utility record search	QL-D	Undefined	Undefined	
C	Site Reconnaissance	QL-C	Undefined	Undefined	A segment of utility whose location is demonstrated by visual reference to street furniture, topographical features or evidence of previous street works.
B	Detection	QL-B4	Undefined	Undefined	A utility segment which is suspected to exist but has not been detected and is therefor shown as an assumed route
		QL-B3 QL-B3P	plus/minus 500mm	Undefined (no reliable depth)	Horizontal location only of the utility detected by one of the geophysical techniques used
		QL-B2 QL-B2P	plus/minus 250mm of the detected depth	Plus/minus 40% of the detected depth	Horizontal and vertical location of the utility detected by one of the geophysical techniques used
		QL-B1 QL-B1P	plus/minus 150mm of the detected depth	plus/minus 15% of the detected depth	Horizontal and vertical location of the utility detected by multiple geophysical techniques used
A	Verification	QL-A	plus/minus 50mm	plus/minus 15mm	Horizontal and vertical location of the top and/or bottom of the utility through trial holes/slit trench method

Client Name: Priority Geotechnical
Site Address: Dursey Island Cable Car

Drawing Title:
Underground Services Plan

Drawing No.:
1

Date:
21st March 2019

Sheet No.
1

Scale:
1:250 @ A1 (ITM Coordinates)

Revision No.

MUL metroscan utility locating))
Underground Utility Surveying

Address: Rathjarney
Piercestown
Co. Wexford
Tel (086) 8522298
(086) 1935847

Email: john@metroscan.ie
ciaran@metroscan.ie

Website: www.metroscan.ie

Chapter 9 Hydrogeology

9.1 Introduction

This Chapter presents an assessment of the construction and operational phases of the proposed development in relation to hydrogeology. The proposed development will predominantly be located on the mainland however, some limited works are also proposed for Dursey Island. The development incorporates the provision of a new cable car, a visitor centre, including amenities and retail, new vehicular access arrangements including parking, and the provision of waiting and welfare facilitates on Dursey Island. A new groundwater supply is proposed for potable use together with the provision of two new On-Site Wastewater Treatment Systems with disposal of secondary treated effluent to groundwater.

In addition to the cable car and the visitor centre, the proposed development also includes upgrades to the approach road, the R572, from the junction with the R575 to the cable car. These upgrades will include the widening of the carriageway at 11 locations (10 no. passing bays and 1 no. visibility splay) and further road improvements to include pavement and verge works at a number of other locations. A full description of the proposed development can be found in Chapter 4.

9.2 Methodology

This chapter has been prepared in accordance with the following guidelines:

- Institute of Geologists of Ireland (IGI) (2013). *Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements*;
- Transport Infrastructure Ireland (TII; formerly National Roads Authority (NRA)) (2008) *Environmental Impact Assessment of National Roads Schemes – A Practical Guide*;
- TII (2008). *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*;
- TII (2015). *Road Drainage and the Water Environment*;
- Environmental Protection Agency of Ireland (EPA) (1999). *Wastewater Treatment Manuals - Treatment Systems for Small Communities, Business, Leisure Centres and Hotels*;
- EPA (2009). *Code of Practice: Wastewater Treatment Systems for Single Houses*;
- EPA (2011). *Guidance on the Authorisation of Discharges to Groundwater*;
- EPA (2015). *Draft Advice Notes for Preparing Environmental Impact Statements*; and
- EPA (2017). *Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports*.

9.2.1 Desk Study

A desk study of the study area of the Proposed Development was carried out in order to establish baseline conditions. The desk study involved collecting all relevant geological, hydrological, hydrogeological and meteorological data for the area. This included consultation with the following:

- Geological maps, Geological Survey of Ireland (GSI) (www.gsi.ie);
- Groundwater quality status maps (watermaps.wfdireland.ie);
- Teagasc Subsoils map (gis.epa.ie/Envision);
- Water Features, Rivers and Streams, EPA (gis.epa.ie/Envision);
- National Parks and Wildlife Services Map Viewer (webgis.npws.ie/npwsviewer/);
- Historic Maps from the Ordnance Survey of Ireland (www.geohive.ie);
- Aerial Photography from the Ordnance Survey of Ireland (www.geohive.ie);

9.2.2 Site Investigations

A walkover survey of the site was undertaken by Roughan & O'Donovan in February/March 2019 and subsequently ground investigations were undertaken by Priority Geotech Ltd at the development site in April 2019. These ground investigations included the drilling of 6 No. cable percussion boreholes with rotary core follow on along with the excavation of 4 No. slit trenches and 2 No. Trial pits. In-situ field tests were also carried out during this investigation in order to establish existing hydrogeological conditions. This included falling head permeability tests, constant head pumping tests and soil infiltration tests in accordance with the EPA Code of Practise (2009). Environmental sampling of soil and groundwater was also carried out to establish baseline conditions.

9.3 Description of Receiving Environment

9.3.1 Soils & Subsoils

GSI Mapping

The Teagasc soil mapping identifies mainly shallow soils and exposed rock across the site. Some shallow soil deposits derived from non-calcareous rock or gravels with/without peaty surface horizon are mapped for the area On higher ground both on Dursey Island and further east on the mainland, Quaternary sediments are mapped as Tills derived from Devonian sandstones and any shallow soil/subsoil present across the area likely originate from these sediments.

Intrusive Site Investigations

Site Investigations identified peat and cobbles/bounders from weathered bedrock deposits with depths varying from 0.7m to 2.25m Below Ground Level (BGL) across the site.

In accordance with the EPA Code of Practise (EPA, 2009) a site suitability assessment was carried out. Falling head tests were carried out in the overburden adjacent to the location of the proposed polishing filter for disposal of effluent to groundwater. This enabled the standard "T" and "P" values for the soil to be established and enable an appropriate design to be progressed. Table 9.1 below summarises the results of the site suitability assessment.

Table 9.1 Summary of falling head test results

Parameter	Test Results (min/25mm)
T value	43.33
P value	12.38

The results of the site suitability assessment indicate that the site is suitable for a Secondary Wastewater Treatment System which could either be a:

- Septic tank and filter system constructed on-site and polishing filter; or,
- Packaged wastewater treatment system and polishing filter

Disposal of the treated effluent is, therefore, to groundwater via a polishing filter.

9.3.2 Bedrock Geology

GSI Mapping

According to GSI mapping for the proposed development site, the area is underlain by the Caha Mountain Formation which is described as Purple & green sandstone & siltstone. A fault line is mapped a short distance to the east of the proposed mainline development extending northeast to southwest across the headland running generally parallel to the development site. Further and less extendive faults are mapped on Dursey Island in a similar orientation extending from the direction of the centre of the island towards Dursey Sound. It is likely that historic faulting in the vicinity of the site has either extended existing fracturing and/or has created additional fractures in the rock. Refer to Figure 8.2 of Volume 3 of this EIAR for GSI bedrock geology mapping of the area.

Intrusive Site Investigations

Siltstone was encountered at depths varying from 0m to 2.25m Below Ground Level (BGL) across the site during the intrusive site investigations. A highly weathered zone of up to 2m thickness was generally encountered during the intrusive investigations.

9.3.3 Groundwater Bodies & Bedrock Aquifers

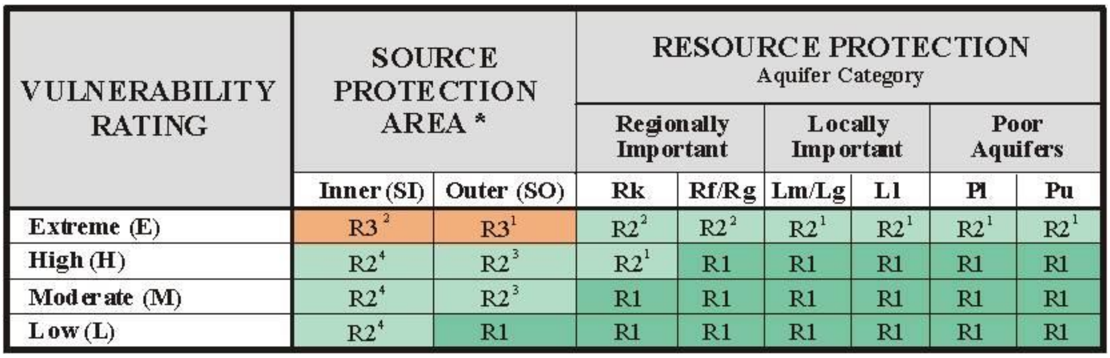
The site is located with the Beara Sneem Groundwater Body (IE_SW_G_019). The bedrock aquifer underlying the site is classified as a Poor Aquifer (PI) – Bedrock which is generally unproductive except for local zones. Refer to Figure 9.1 of Volume 3 of this EIAR for GSI Aquifer and Groundwater Body (GWB) mapping of the area.

9.3.4 Groundwater Vulnerabilities

Groundwater vulnerability mapping for the site indicates that groundwater is extremely vulnerability to pollution at the ground surface as a result of human activities. This is due to either a very shallow or absent moderately permeable overburden above the bedrock. Refer to Figure 9.2 of Volume 3 of this EIAR for GSI vulnerability mapping of the area. The intrusive site investigations generally encountered 0 – 2.25m of overburden at the site which is consistent with the GSI mapping.

The GSI has combined the importance of the groundwater resource (the aquifer) with the vulnerability of the resource to the potential contamination to produce a Groundwater Response Matrix for On-site Treatment Systems (see Plate 9.1). Given the fact that the site is underlain by a Poor Aquifer and is located in an Extreme Vulnerability area, the area is within the Resource Protection Zone PI/E

The groundwater protection response for the site is therefore R2[1] – "*Acceptable subject to normal good practice. Where domestic water supplies are located nearby, particular attention should be given to the depth of subsoil over bedrock such that the minimum depths required (EPA, 2000) are met and that the likelihood of microbial pollution is minimised*". The proposed development incorporates a sand polishing filter for the discharge of treated effluent. The proposed sand polishing filter is therefore located in an appropriate location and the required 1.2m of unsaturated subsoil beneath the distribution layer will be provided.



VULNERABILITY RATING	SOURCE PROTECTION AREA *		RESOURCE PROTECTION Aquifer Category					
			Regionally Important		Locally Important		Poor Aquifers	
	Inner (SI)	Outer (SO)	Rk	Rf/Rg	Lm/Lg	Ll	Pl	Pu
Extreme (E)	R3^{2}	R3^{1}	R2^{2}	R2^{2}	R2^{1}	R2^{1}	R2^{1}	R2^{1}
High (H)	R2^{4}	R2^{3}	R2^{1}	R1	R1	R1	R1	R1
Moderate (M)	R2^{4}	R2^{3}	R1	R1	R1	R1	R1	R1
Low (L)	R2^{4}	R1	R1	R1	R1	R1	R1	R1

Plate 9.1 Groundwater Response Matrix for On-site Treatment Systems (GSI, 1999)

9.3.5 Groundwater Recharge

Given that bedrock is either at, or very near, the ground surface high recharge coefficients of up to 0.85 are mapped for the area. However, given the relativity low storativity of the Caha Mountain formation and additionally the extremely steep nature of the surrounding topography, locally a lower rate of infiltration may occur annually.

9.3.6 Groundwater Abstractions

There are no recorded public groundwater supplies or group water schemes within the GSI database in the vicinity of the site. The existing visitor site on the mainland has a groundwater supply via a borehole located north of the existing cable car terminus. Potable water for Dursey Island is also supplied via groundwater with an existing spring located close to the village piped to a small water holding tank before distribution via the existing piped network. A new groundwater supply borehole is proposed for the mainland development.

9.3.7 Groundwater Quality

Under the requirements of the Water Framework Directive (WFD), the Beara Sneem Groundwater Body is classified as having an overall 'Good' status for water quality and quantity 2009-2015.

Routine groundwater sampling is carried out by the water services department of Cork County Council at the groundwater supply well on the mainland. Sampling of the public water supply on Dursey Island which is a groundwater spring is also carried out on a routine basis. The results from the most recent sampling event (15/10/2018) at both locations were obtained and are summarised in Table 9.2 below. It can be seen that groundwater quality both at the mainland and on Dursey Island is generally good with no visible signs of degradation present; however, it must be noted that not all applicable parameters of interest were analysed.

Table 9.2 Groundwater Water Monitoring Results (Cork Co. Co. – 15/10/2018)

Parameter	Sample Location		Limit Values	
	Mainland Station	Dursey Island Spring	Groundwater Regulations 2010 (S.I. 9 of 2010)	Drinking Water Directive (98/83/EC)
pH	7.4	6.8	N/a	6.5 < pH <9
Electrical Conductivity (μS/cm)	917	441	N/a	2500
Coliforms MPN/100ml	<1	<1	N/a	0
E.Coli MPN/100ml	<1	<1	N/a	0

In addition, groundwater sampling was also carried at the site by Priority Geotech Ltd. during the site investigation in April 2019. Samples were taken from the existing well on the mainland and also from the trial wells drilled during site investigations (TW01 & TW02) adjacent to the locations of the proposed polishing filters (mainland & Dursey Island sites) on the 16th of April 2019. The samples were analysed for chemical and bacteriological parameters in line with Drinking Water Regulations (SI 278 of 2007) and tested in an INAB accredited laboratory. The results of the groundwater sampling are compared against the Drinking Water Standards (S.I. No 278 of 2007) and the Groundwater Regulation Threshold Levels (as per S.I. No 9 of 2010). The key results applicable to this hydrogeological assessment are detailed below in Table 9.3.

Table 9.3 Groundwater Water Monitoring Results (16/04/19)

Parameter	Sample Location			Limit Values	
	Mainland Well	TW01	TW02	Groundwater Regulations 2010 (S.I. 9 of 2010)	Drinking Water Directive (98/83/EC)
Water Depth (mBGL)	4.55	0.53	0.08	-	-
pH	8.3	7.5	7.7	N/a	6.5 < pH <9
Electrical Conductivity (μS/cm)	980	690	540	N/a	2500
Total Ammoniacal Nitrogen as N (mg/l)	0.28	0.074	0.11	N/a	N/a
Nitrate as N (mg/l)	<0.50	<0.50	0.010	37.5	50
Nitrite as N (mg/l)	0.011	0.011	<0.5	N/a	N/a
Orthophosphate as P	<0.020	<0.020	<0.020	N/a	N/a
E.Coli MPN/100ml	<1	<1	<1	N/a	0

The groundwater quality results taken show clean unpolluted groundwater with low levels of ammonia, nitrate, phosphorus and bacteriological parameters. In this regard the underlying aquifer is shown to have adequate assimilative capacity to receive treated effluent from a polishing filter.

9.3.8 Groundwater Flow

The underlying rock has very limited primary porosity and, therefore, groundwater flow will occur through fractures, fissures and joints within the bedrock. These fractures and fissures would have developed during periods of deformation during historical geological events. Typically, an upper weathered zone of bedrock will exist which can be up to 2.25m in thickness. These weathered zones generally exhibit higher permeability rates when compared to deeper into the rock formation. Fracture and fault zones associated with deformation events will extend from the top of the rock and diminish with depth. The degree of interconnectivity between these zones will determine the flow paths and distances and also provides storage within the aquifer. Water was encountered at depths of 3.4 - 9m below ground level during drilling at the site with moderate water yields illustrating a non-homogenous distribution of fracturing within the rock with moderate to low interconnectivity.

A falling head infiltration test was carried out at borehole RC01 (mainland site) that resulted in a bedrock permeability (K) of 3.93x10^{-3} ms^{-1} being determined. This suggests a moderate to high bedrock permeability indicating relatively high acceptance of infiltrating water. Whist a falling head test was not carried out on the island, the bedrock encountered was similar and an examination of the cores indicated a similar degree of fracturing. Conservatively a bedrock permeability of 1x10^{-3} ms^{-3} is assumed for the island site.

The nature of the aquifer, with flow restricted to interconnected fissures, fractures and voids, restricts the flow of groundwater. Flow paths will, therefore, typically extend less than 300 metres. However, given the proximity to the sea a good level of connectivity discharged to the coast is expected. The steep nature of the mainland site towards the sea and Dursey Island itself, indicates that groundwater is moving in a south-westerly direction, reflecting both the regional topographical gradient and local surface water catchment with a calculated gradient of 0.1 m/m.

Using the aquifer flow and permeability characteristics described above, groundwater flow through the aquifer underlying the proposed sand polishing filter (see Section 9.4) can be estimated using Darcy's equation as summarised below:

Q_{gw}	= KiA	4.9 x 10^3 m^3/day
Where:	K is the aquifer permeability:	339 m/d
	i is the hydraulic gradient:	0.1 m/m
	A is the aquifer cross sectional area m^2:	145 m^2
	(Sand filter width: 14.5m width; assumed 10m deep saturated zone)	

The width of the proposed sand polishing filter will be 14.5m x 14.5m in breath. The maximum potential groundwater flow beneath the sand polishing filter is estimated at over 4.9 x 10^3 m^3/day. This assumed saturated conditions which likely do not exist. In a similar manner and for a cross-sectional area of 80m^2 beneath the island site, a maximum potential groundwater flow beneath the sand polishing filter is estimated at over 1 x 10^3 m^3/day.

9.3.9 Site Hydrology

The mainland site is bounded to the east by the Ballaghboy Stream. This stream does not form part of the EPA river network and discharges directly to the sea. The EPA, in meeting their obligations under the WFD, have categorised this stream as 'Not at Risk' from a quality perspective. There are a number of smaller mapped (and unnamed) local streams on Dursey Island which are generally short and discharge to the sea at a number of locations along the island's perimeter. None of these mapped local streams is located east of Knockaree Hill which is the side of the island on which the proposed cable car is to be located.

9.3.10 Groundwater Dependant Terrestrial Ecosystems (GWDTEs) and Special Areas of Conservation (SACs)

Sites designated under the Natura 2000 and within 2km are listed in Table 9.3.4 below:

Table 9.4 Designated Sites

Natura 2000 Sites	**Distance from Site**
Kenmare River SAC (002158)	Immediately adjacent to site
Beara Peninsula SPA SPA (004155)	Within site extents
Nationally Designated Sites	**Distance from Site**
Dursey Island NHA (000086)	Within site extents

None of the above sites are designed relating to groundwater attributes nor are any groundwater dependant (GWDTE). Water quality within the Kenmare River SAC (essentially the Atlantic Ocean in the vicinity of the subject site) could be impacted by any significant deterioration in groundwater quality beneath the island or mainline sites given that groundwater is likely discharged to the coast via submarine springs/seepages.

The Atlantic Ocean within the Dursey Sound (Kenmare River SAC) forms part of the South Western Atlantic Seaboard (HAs 21;22) Coastal Waterbody. This has been categorised as 'Not at Risk' by the EPA under the WFD RBMP 2009 – 2015.

9.3.11 Ground Contamination

As part of the intrusive ground investigations undertaken at the site, samples of the made ground (sample depth 0.25m below ground level) at the existing mainland development at the historic location of a diesel generator were taken within trial pit TP02 and were tested at a *Chemtest* accredited Laboratory facility in the UK.

No evidence of surface contamination was found surrounding the generator site.

9.4 Description of Potential Impacts

9.4.1 Construction Phase

During the construction phase the following activities may pose a potential impact:

- Excavation of made ground and bedrock;
- Contamination of soils; and
- Aquifer Contamination

9.4.1.1. Excavation of Made Ground

Excavation of made ground will take place during construction. The excavation of any localised areas of ground contamination will constitute a permanent, positive impact on the soil environment due to the requirement to remove the material off-site and dispose or treat it in accordance with relevant legislation. During the construction phase, any excavated contaminated material which is stored on-site awaiting removal for disposal will present a risk due to contaminated surface runoff. This would represent a moderate to significant impact due to the downstream receptor being a European Site. Any improvement to the quality of soils will have a corresponding benefit to the underlying groundwater resources due to the removal of a potential source of contamination for percolating water. Therefore, the magnitude of this impact is **Slight Permanent Positive** due to a minor improvement to the attributes quality.

9.4.1.2. Contamination of Soils

There is a potential risk of localised contamination from construction materials leeching into the underlying soils by exposure, dewatering or construction related spillages resulting in a Permanent Negative impact on the soils. In the case of soils, the magnitude of this impact is Small Adverse as the requirement of good construction practices will necessitate the immediate excavation/remediation of any such spillage resulting in a very low risk of pollution to the soils and consequently the underlying aquifers. The significance of this impact is **Slight Temporary**.

9.4.1.3. Aquifer Contamination

There is a potential risk of localised contamination of the surface water and groundwater bodies due to construction activities i.e. construction spillages, leaks from construction plant and material etc. resulting in a Permanent Negative impact on these water bodies. The main surface water body that would be affected is the Atlantic Ocean (Kenmare River SAC) which is immediately adjacent to the development site.

The excavation of material at the site will have the effect of locally increasing the vulnerability rating of the underlying aquifer (although the vulnerability rating is already X- Extreme); however, the majority of the areas where the material will be excavated will be covered in hardstanding, which will mitigate the potential for contaminants to enter the underlying aquifer from the surface. As such the potential impact may be deemed **Slight Temporary**.

9.4.2 Operational Phase

9.4.2.1 Road Runoff

The proposed development incorporates new entrance roadways together with parking facilitates. It is proposed to allow runoff from the entrance roads to drain to permeable parking bays where it will percolate through porous media and subsequently be collected via a subsurface collector drain. This drain will discharge to the adjacent Ballaghboy Stream via a petrol interceptor. The potential for contaminated road runoff to percolate and enter the underlying aquifer presents a very low risk due to the presence of the collector drain and the pre-treatment which will occur within the permeable porous media. The potential impact is therefore assessed as ***Permanent Slight***.

9.4.2.2 Foul Drainage

Domestic wastewater from the existing Dursey Island mainland development is currently treated on-site by means of a septic tank with the final treated effluent discharged directly to the sea via a short-piped outfall.

It is proposed that domestic wastewater at the proposed development be treated on-site by means of a proprietary Wastewater Treatment Plant (WWTP) with the final treated effluent discharged to groundwater through a sand polishing filter. The removal of primary treated effluent entering the Kenmare River SAC will therefore result in a ***Permanent Positive Impact*** in water quality.

The criteria for estimating the maximum additional wastewater hydraulic and BOD load based on the potential capacity of the proposed development was carried out having regard to expected growth and maximum allowable visitor numbers, approx. 25,000 monthly visitors in the peak summer season. The design criteria were in accordance with "EPA Wastewater Treatment Manual – Treatment Systems for Small Communities, Business, Leisure Centres and Hotels" using the design loading factors shown in Table 9.5, below.

The maximum monthly visitors to Dursey Island are to be limited to 12,835 (as detailed in Chapter 7 - Section 7.81). It was assumed that 50% of all visitors would use the proposed island toilet facilities which is considered reasonable given that the main development focus, including food and drink offerings, are to be located at the mainland site.

Table 9.5 Extract from Table 3 of the EPA Code of Practice (CoP) for Small Communities, Business, Leisure Centres and Hotels.

Situation	Source	Flow litres/day per person	BOD_5 grams/day per person
Amenity Sites	Restaurants (per visitor)	15	15
Pub/Restaurant	Day Staff (assume 10 full time)	60	30
Amenity Sites	Toilet Blocks (per use)	5	10

Table 9.6 Breakdown of estimated foul loading at the development site

Description	No.	Hydraulic Loading (litres/day)	Organic Loading (gBOD/day)
Mainland Development Site			
Staff – 10 full time	10	600	300
Visitors – (peak allowable)	807	12,105	12,105
Total Loading Rate		**12,705**	**12,405**
Dursey Island Development Site			
Toilet use (50% of peak allowable island visitors)	207	1,035	2,070
Total Loading Rate		**1,035**	**2,070**

Design Proposal – Mainland Development Site

Given the hydraulic loading rates established above, it proposed to install a WWTP on the mainland site with a Population Equivalent of 207PE which can cater for a maximum hydraulic load of 12.705m^3/day and a maximum organic load of 12.405kg BOD per day.

A design proposal for the proposed WWTP has been prepared by Wastewater Solutions and it is proposed to install this (or a similar approved system) as part of the development. The proposed system is a Denitrifying Wastewater Treatment Plant (DSAF) which incorporates anaerobic and biozone treatment with phosphate and alkalinity dosing systems. A maintenance agreement will be put in place between Cork County Council and Wastewater Solutions (or other approved installer) and this maintenance agreement will be subject to the relevant ongoing compliance checks by the Water Services Department of Cork County Council and the EPA.

The treated effluent will be discharged to a sand distribution area to be located in the northern portion of the site. It is proposed that this sand distribution area will have a plan area of 212m^2. The proposed plan area of the sand distribution area will provide adequate assimilative capacity in the underlying groundwater – see risk assessment below for details. It is proposed to construct the sand polishing filter at a depth of 300mm below the existing ground level at this area (P-value = 12.38). It is proposed to discharge the treated effluent to groundwater via the sand distribution area and underlying subsoil at a hydraulic loading rate of 29l/m^2/day over an area of 440m^2. The sand polishing filter will consist of 900mm of suitably graded sand. The upper layer will consist of coarse sand with effective sizes (D10) 0.25–0.75 (mm) and D60/D10 (Cu) < 4. The intermediate and lower layers of fine sand will comprise effective grain sizes (D10) 0.15 – 0.25mm; D60/D10 (CU) < 4) separated by pea gravel (10-20mm). The sand layers will be overlain by 100mm of washed gravel (distribution layer) and covered by 300 mm of topsoil which will be grassed. The final effluent at the base of the polishing filter will be discharged to a 300mm deep gravel distribution layer (pea gravel, 10-20mm). The existing material beneath the base of the gravel distribution layer has been shown to have a suitable permeability to receive the effluent during the site suitability assessment (P value = 12.38). This will provide a minimum of 1.2m of unsaturated suitable subsoil beneath the base of the gravel distribution area. The proposed sand polishing filter will be in designed and installed in accordance with the EPA CoP (2009) taking into account subsequent clarifications. Design details on how the system will be adequately pressurised together with plans/cross-sections have been provided by Wastewater Solutions and were reviewed during this assessment.

Design Proposal – Dursey Island Development Site

The Dursey Island development incorporates the required landing facilities for the new Cable Car with toilet facilities also provided for passengers use. It is anticipated that the majority of visitors will utilise the mainland toilet facilities before using the cable car given that all food and drink offerings are located at the mainland development site. For the purposes of this assessment, conservatively it was assumed that 50% of peak allowable island visitor numbers would utilise toilet facilities on Dursey Island.

Given the hydraulic loading rates established above, it is proposed to install a WWTP on the island site with a Population Equivalent of 35PE which can cater for a maximum hydraulic load of 1.035m^3/day and a maximum organic load of 2.07kg BOD per day. The proposed system will be a similar scaled down version of the proposals for the mainland site and will incorporate secondary treatment.

Given the limited subsoil present on Dursey Island at the location of the proposed landing site, the proposed sand polishing filter will be raised and bunded above existing ground level and formed from imported suitable material. The lack of subsoil negated the need to establish a permeability value through a conventional 'P-test' and, therefore, discharge of treated effluent will be to the weathered bedrock/water table via the sand polishing filter. The proposed sand distribution area is located in the northern portion of the site. It is proposed that this sand distribution area will have a plan area of 64m^2 (8m x 8m). The proposed plan area of the sand distribution area will provide adequate assimilative capacity in the underlying groundwater – see risk assessment below for details. The proposed construction details of the sand polishing filter (0.9m depth) will be as outlined in the preceding section for the mainland development site.

The final effluent at the base of the polishing filter will be discharged to a 300mm deep gravel distribution layer (pea gravel, 10-20mm). The existing material beneath the base of the gravel distribution layer will be excavated down to the weathered bedrock to allow sufficient infiltration capacity – this is likely close to the existing ground surface. The gravel distribution layer combined with the sand polishing filter will provide a minimum of 1.2m of unsaturated suitable subsoil beneath the base of the gravel distribution area. The proposed sand polishing filter will be designed and installed in accordance with the EPA CoP (2009) taking into account subsequent clarifications. It is proposed that discharge to the polishing filter will be achieved by gravity.

Assessment Methodology

As stated previously, the proposed WWTPs have been sized to accommodate potential future increases in foul loading associated with future growth in visitor numbers; the proposed sizing of both the WWTP and sand polishing filter were based on expected growth and maximum allowable visitor numbers. This EIAR assessment follows the required methodology for a Tier 2 Groundwater Risk Assessment as required by the EPA (EPA, 2011).

Groundwater Risk Assessment

The basis for this risk assessment is the Source-Pathway-Receptor (SPR) Model. Treated effluent from the proposed facilities will be discharged to ground via a sand polishing filter. Once it reaches the subsurface, the effluent infiltrates through the underlying unsaturated subsoil into the groundwater, within the bedrock. Once it reaches groundwater, dissolved contaminants can potentially migrate in the direction of groundwater flow towards potential receptors. This assessment identifies the potential risk of the proposed discharge from impacting on the identified receptors. The fate and transport of pollutants along the pathways determines the relative risk of impacts at the receptor (EPA, 2011).

Source - Pathway – Receptor

Source

The source of contamination from the proposed development is the discharge of treated effluent into the underlying bedrock/groundwater via a new sand polishing filter. The proposed new sand polishing filters are designed in accordance with the EPA Code of practice (EPA, 2009) with a maximum hydraulic loading of 60l per m^2 extending over an area of 212 m^2 (14.5 x 14.5m) on the mainland and 64 m^2 (8 x 8 m) on the island. The anticipated quality of the effluent from the sand polishing filters is set out in Table 9.7, below.

Given the nature of the discharge, the parameters of concern from a water quality perspective are nutrients (nitrogen and phosphorus) and faecal bacteria. It is expected that natural attenuation will occur within the unsaturated subsoil. The majority of phosphorus, bacteria and nitrogen will be broken down and attenuated within the first meter of unsaturated subsoil (EPA, 2011). The sand filter provides 0.9m of unsaturated granular material in partially aerobic conditions and thus facilitates a high level of treatment. The concentrations of the parameters of concern beneath the sand polishing filter will be significantly reduced compared to those in the treated effluent – the anticipated concentrations beneath the sand filter have been calculated below. Further breakdown will also occur in the subsoil beneath the sand filter through both attenuation and natural biodegradation. The final effluent which will reach the water table/weathered bedrock will be of high quality with significantly reduced levels of potentially harmful parameters. A site suitability assessment was carried out by Priority

Geotech Ltd. and the area was found to be suitable for such a discharge – see Section 9.3.1 above.

Table 9.7 Wastewater Treatment Emission Values

Parameter	Concentration in Effluent from WWTP (mg/l)
B.O.D.	20
T.S.S.	30
Total Ammoniacal Nitrogen as N (NH_3-N)	20
Nitrate as N (NO_{3}-N)	5
Ortho-Phosphate as P (P)	2

Pathway

The pathway of the treated effluent beneath the sand polishing filter is through the underlying subsoil. The underlying subsoil consists of peat and weathered rock of moderate permeability. Attenuation and biodegradation of potential contaminants occurs as the treated effluent flows through the subsoils both vertically and horizontally. The effluent is assumed to travel vertically through the unsaturated zone unless it meets a more impermeable layer where it may travel horizontally for a period.

Once the potential contaminates reach groundwater/weathered bedrock within the upper horizons of the bedrock formation they will become more mobile. Groundwater movement is through fissures, factures and faults within the bedrock and the extent and interconnection of these determines the permeability of the rock. Permeability characteristics of the bedrock beneath the site are demonstrated to be good with a permeability rate of 3.93×10^{-3} m/s found within the upper horizons. This is expected to reduce with depth. The bedrock aquifer is classified as poor aquifer (Pl) and as such the groundwater flow paths are expected to be in the order of a couple of hundred of metres (to the coast). The potential contaminates will travel horizontally in the direction of groundwater flow with further attenuation occurring through the process of dilution (mixing of pollutants with groundwater).

Receptor

There are two possible receptors for mobilised contamination within infiltrating water:

- The Atlantic Ocean (Kenmare River SAC) located along the south-western site boundary. This is a European Site, which is of Extremely High Attribute Importance.
- The bedrock aquifer beneath the site (Siltstone bedrock overlain by shallow (~2m) weathered zone). This is a poorly productive aquifer which is of Low Attribute Importance.

There is one proposed groundwater supply to the site, located on the mainland. The proposed supply borehole for the mainland development is located cross-gradient (and marginally up-gradient) to the sand polishing filter. It must be noted that the associated zone of contributions for the groundwater supply source does not extend across the proposed location of the polishing filter and, therefore, the on-site groundwater supply is not considered as a receptor.

Conceptual Site Model (CSM)

Groundwater flow primarily occurs in the upper weathered zone of the bedrock and in faults/fractures at greater depths. Groundwater gradients follow the steep topography of the area towards the Atlantic Ocean (Kenmare River SAC) with both the mainland and island sites only a few hundred meters from the likely discharge zone. Existing groundwater quality beneath the site is high due to the lack of intensive development or agriculture in the surrounding region and the high recharge rates. The Conceptual Site Model is shown in Plate 9.2 below.

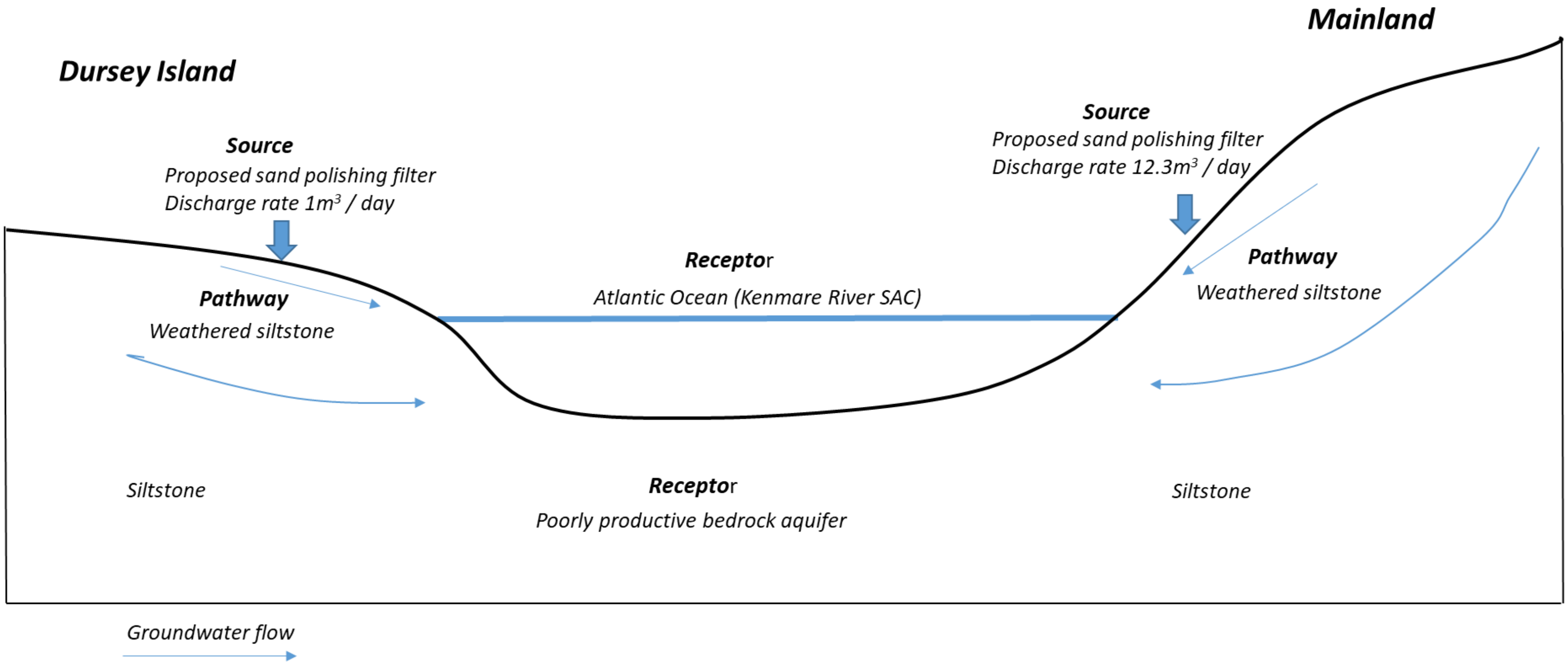
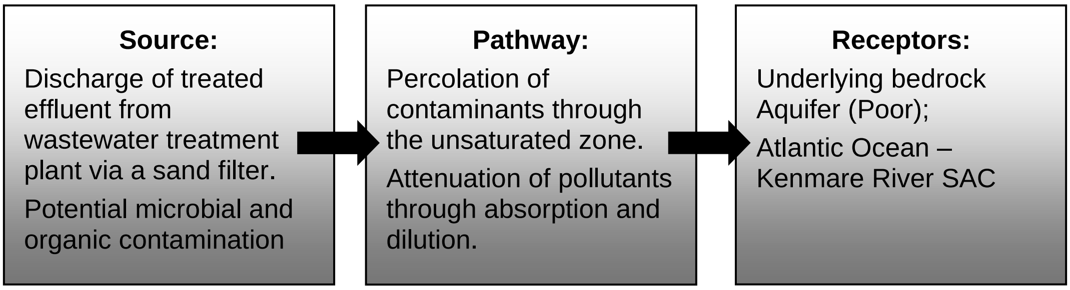


Plate 9.2 **Conceptual Site Model (CSM) for the proposed development**

The risk assessment included as part of this study identifies the potential sources of pollution, the pathways and the potential receptors and utilised the principals of the S-P-R model as illustrated below:

RISK ASSESSMENT



Mainland Development Site

The maximum potential flow of groundwater beneath the sand distribution area on the mainland site is estimated at 4.9 x 10^3 m^3/day – see Section 9.3.8 for details. The proposed development will involve a discharge rate of 12.3 m^3/day of high quality treated effluent. There is, therefore, adequate capacity for attenuation through the process of dilution.

Dursey Island Development Site

The flow of groundwater beneath the sand distribution area on the Dursey Island site is estimated to be > 1 x 10^3 m^3/day – see Section 9.3.8 for details. The proposed development will involve a discharge rate of 1 m^3/day of high quality treated effluent. There is again, therefore, capacity for attenuation through the process of dilution.

Both sites are situated immediately upgradient of the Atlantic Ocean and as such it is unlikely that groundwater will be abstracted immediately down-gradient of either site. Given the large capacity for dilution in the ocean and the high level of treatment which will have occurred prior to submarine discharge, the risk to water quality in the ocean (Kenmare River SAC) is considered ***Extremely Low***.

In order to determine the impacts of the proposed discharges an assimilative capacity calculation was carried out taking into account the maximum discharge from each of the proposed developments. Assimilative capacity calculations are used to determine potential increases that may occur in the background concentration of a specific contaminant. A summary of assimilative calculations carried out as part of this assessment are given in Table 9.8, below.

The individual parameter levels are assessed in accordance with their normal background concentrations found in the groundwater against proposed discharge concentrations from the treatment facility. This is based on the following equation:

$$C_{gw} = [(C_{in} \text{ x } Q_{in}) + (C_{gwu} \text{ x } Q_{gw})]/(Q_{in} + Q_{gw})$$

Where:

C_{gw}	Resulting concentration in groundwater mg/l
C_{in}	Concentration in infiltrating water mg/l
Q_{in}	Volumetric rate of infiltrating water m^3/day
C_{gwu}	Concentration in the aquifer mg/l
Q_{gw}	Groundwater flow rate through the aquifer m^3/day

Using this equation, the groundwater concentrations resulting from the discharge to groundwater activity were calculated and the results at each of the proposed sites are shown in Table 9.8 below.

Table 9.8 Calculated Groundwater Concentrations Beneath each of the proposed sand filters

Parameter	**Calculated C_{gw} (mg/l)**
Mainland Site	
BOD	0.050
NH_3-N	0.050
MRP-P	0.025
NO_3-N	0.023
NO_2-N	0.003
Dursey Island Site	
BOD	0.020
NH_3-N	0.020
MRP-P	0.022
NO_3-N	0.016
NO_2-N	0.001

The calculations above indicate what the resulting concentration in groundwater beneath the sand distribution filter will be. It can be seen that all of the resultant concentrations are below the required limits for drinking water quality. It is noted that further dilution will occur as the contaminates travel through the groundwater, prior to reaching any identified potential receptors.

Groundwater Response Matrix

As outlined previously, the groundwater responses matrix for on-site Wastewater Systems for Single Houses indicates a Response of R2[1] (underlying Bedrock Aquifer) for the site indicating that it is suitable for discharge to ground.

The recommended minimum distance from a receptor (i.e. supply well) and a Polishing Filter is 60 m for a public water supply. The sand polishing filter will be located approximately 200m cross gradient from proposed groundwater abstraction location on site and is not located within the Zone of Contribution.

Overall, this assessment is considered to be a **Neutral Risk Scenario**. The effluent has low levels of non-hazardous pollutants and is treated to a high level through primary and/or secondary and tertiary treatment. The proposed discharge is located a sufficient distance from identified receptors, and sufficient dilution is available to attenuate potential contaminates.

Cumulative Impacts

Cumulative impacts result from the interaction of a number of activities in the study area which may impact on the quality of the underlying groundwater. Within the study area, there are no other polluting activities other than limited low intensity agriculture. The groundwater quality monitoring undertaken at the site indicated no evidence of groundwater pollution with very high-quality groundwater found. It is, therefore, considered that groundwater in the area has not been impacted upon by existing pressures.

It should be noted that the mainland site is already discharging primary treated effluent directly to the ocean. There is, therefore, likely to be a positive cumulative impact on the quality of surface water in the bay in the site vicinity as a result of this proposed development with the removal of same.

Impact Assessment

A groundwater Discharge Licence for the above developments will be sought and obtained from the Local Authority once planning consent has been achieved – this is in accordance with EPA guidance. The proposed design for the treatment of foul discharge at the proposed development is deemed to be appropriate given the hydrogeological setting. Given that, small increases in groundwater parameters are calculated immediately downstream of each of the sand polishing filters (which in reality will be virtually imperceptible) the overall foul discharges from the proposed development are assessed as a ***Slight Permanent Impact***.

9.4.2.3 Groundwater Supplies

The proposed development will not impact existing groundwater supplies and therefore there will be an imperceptible impact. A risk assessment has been carried out for the proposed groundwater supply, which is located up-gradient of the proposed sand polishing filter. There is a negligible risk to it from the proposed discharge.

9.4.2.4 Surface Water Drainage

The surface water drainage system will comprise of sustainable drainage systems (SuDS). The proposed drainage system will comprise of SuDS components that will provide treatment to runoff and allow for limited infiltration to groundwater, as deemed acceptable by the groundwater risk assessment undertaken.

9.4.2.5 Contaminated Land

Preliminary Intrusive Ground Investigations undertaken at the site have identified no contaminated material present across the site. There is an imperceptible impact relating to contaminated land.

9.4.2.6 Aquifer Recharge

As a result of the proposed development, there will be an increase in the total impermeable area of the site and correspondingly a potential reduction in aquifer recharge. Permeable paving in lightly trafficked areas such as cul-de-sacs and parking areas will be provided along with infiltration SuDS components that will allow for a proportion of surface water to infiltrate to ground thus minimising the potential reduction in aquifer recharge. The potential impact to aquifer recharge is seen as imperceptible given the small reduction in overall catchment recharge.

9.5 Mitigation and Monitoring Measures

9.5.1 Construction Phase

A project-specific Environmental Operating Plan (EOP) will be prepared for the development. It will be maintained by the Contractor for the duration of the construction phase. The EOP will cover all potentially polluting activities and include an emergency response procedure. All personnel working on the site will be trained in the implementation of the procedures. As a minimum, the EOP for the proposed development will be formulated in consideration of the standard best practice. The EOP will include a range of site-specific measures which include:

- *Earthworks shall be carried out such that surfaces promote runoff and prevent ponding and flooding.*
- *Runoff will be controlled and treated to minimise impacts to surface and groundwater.*
- *All hazardous materials will be stored within secondary containment designed to retain at least 110% of the storage contents. Temporary bunds for oil/diesel storage tanks will be used on the site during the construction phase.*
- *Safe materials handling of all potentially hazardous materials will be emphasised to all construction personnel employed during construction.*
- *Mitigation measures during the construction phase will include implementing best practice during excavation works to avoid sediment entering the Atlantic Ocean (Kenmare River SAC).*

9.5.2 Operational Phase

All conditions of the Groundwater Discharge Licence (once granted) shall be adhered to in full including any and all compliance monitoring specified.

A maintenance agreement shall be entered into between the operator of the site and a suitably qualified wastewater provider for both On-Site Wastewater Treatment Systems. This maintenance agreement shall include for regular checks, up-keep and maintenance and on-going desludging.

All other potential impacts have been identified as slight in the operational phase and as such no long-term mitigation measures are proposed.

9.6 Residual Impacts

The incorporation of the mitigation measures outlined in Section 9.5 results in the magnitude of any impacts either during construction or operation to be considered as Negligible. As a result, the significance of all residual impacts is Imperceptible.

9.7 Difficulties Encountered

No difficulties were encountered in undertaking this hydrogeological assessment.

9.8 References

Geological maps, Geological Survey of Ireland (GSI) (www.gsi.ie);

Groundwater quality status maps (watermaps.wfdireland.ie);

Teagasc Subsoils map (gis.epa.ie/Envision);

Water Features, Rivers and Streams, EPA (gis.epa.ie/Envision);

National Parks and Wildlife Services Map Viewer (webgis.npws.ie/npwsviewer/);

Historic Maps from the Ordnance Survey of Ireland (www.geohive.ie);

Aerial Photography from the Ordnance Survey of Ireland (www.geohive.ie);

Priority Geotech Ltd. Ground Investigation Draft Factual Report – June 2019.

Chapter 10 Hydrology

10.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) presents the hydrological assessment of the proposed construction and operational phases of the Dursey Island Cable Car and Visitor Centre. This chapter sets out the methodology used in the assessment (Section 10.2), the likely significant impacts associated with the construction and operational phase of the project (Section 10.5), the proposed measures to mitigate identified significant impacts and monitoring regime (Section 10.6) and residual impacts post mitigation (Section 10.7).

10.2 Methodology

10.2.1 Guidelines

This chapter has been prepared having due regard to the relevant guidance documents which are listed below:

- Environmental Protection Agency (EPA) (2002). *Guidelines on the Information to be contained in Environmental Impact Statements*;
- EPA (2003). *Advice Notes on Current Practice (in the preparation of Environmental Impact Statements*;
- EPA (2015) *Draft Guidelines on the Information to be contained in Environmental Impact Statements*;
- Transport Infrastructure Ireland (TII; formerly National Roads Authority (NRA)) (2009). *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*; and,
- TII (2008). *Guidelines for the crossing of watercourses during the construction of National Road Schemes*.

10.2.2 Hydrology Assessment Methodology

The hydrological assessment includes an assessment of published literature available from various sources including a web-based search for relevant material. Site specific topographical information and aerial photography has been reviewed to locate any potential features of hydrological interest, and these have been investigated on the ground by a walkover survey in order to assess the significance of any likely environmental impacts on them.

Available topographical and hydrometric information (field and desk based) has been used to perform hydrological impact assessments of the proposed development. All watercourses and waterbodies which could be affected directly (i.e. crossed, discharged to or realigned/ diverted) or indirectly (i.e. generally lie within 250m of the development) were assessed through an initial walkover visit followed up by a detailed desk study and hydrological assessment.

10.2.3 Field Surveys

Field surveys and walkover assessments were carried out to assess the hydrological impacts of the proposed development. A detailed topographic survey was made at areas where hydrological impacts were likely to occur.

Existing Information

A desk study was completed in order to obtain information on Hydrology using the following sources:

- Geological Survey of Ireland (GSI) – Bedrock Geology;
- Teagasc – Subsoil Map;
- Aerial Photography;
- Environmental Protection Agency (EPA) Surface Water Quality;
- EPA Viewer WFD Scores for Rivers, Transitional Water Bodies and Coastal Waters;
- OPW Preliminary Flood Risk Assessment Mapping (pFRA);
- Irish Coastal Protection Strategy Study (ICPSS);
- OPW Catchment Flood Risk Assessment and Management Mapping (CFRAMs);
- Floodmaps web mapping and;
- GSI Web Mapping

10.3 Description of Site and Proposed Development

The location of the proposed development is directly adjacent to the existing cableway, which straddles the Dursey Sound, connecting the easternmost tip of Dursey Island with the townland of Ballaghboy, on the western end of the Beara Peninsula in west County Cork. The proposed cableway will run parallel to the existing alignment offset by approximately 14m to the north. The end-to-end length of the proposed cableway will be approximately 375m which is slightly shorter than the length of the existing cableway.

The proposed development will include the construction/completion of the following elements at the site of the existing Dursey Island cableway:

- A two-car desynchronised reversible ropeway cableway with a capacity of 200-300 passengers per hour in each direction;
- Two pylons– one each on the mainland and island;
- A mainland cableway station (including all necessary operating machinery, facilities for operating staff, and platform for embarking/disembarking);
- An island cableway station (including all necessary operating machinery, platform for embarking/disembarking, a sheltered waiting area and welfare facilities);
- A mainland-side Visitor Centre with gift shop;
- A mainland-side café with approx. 84 seats, toilet block and outdoor balcony area overlooking the Dursey Sound;
- A mainland-side visitor car park with approx. 100 no. parking spaces and 1 no. bus bay;
- Retention of a small island-side residents' car park (approx. 10 spaces);
- Upgrades of associated utilities infrastructure (including wastewater treatment systems and mainland-side telecommunications connectivity);
- Upgrades to the existing water supply distribution network on the Mainland including a new groundwater well, reservoir tanks and watermains;

- Rainwater harvesting to supply toilets on island;
- Road improvement works including the widening of the carriageway at 11 locations (10 no. passing bays and 1 no. visibility splay) and further road improvements to include pavement and verge works at a number of other locations on the mainland-side approach road (R572);
- Removal of existing cableway infrastructure, mainland-side visitor car park and island and mainland-side station buildings;
- The retention of certain aspects of the existing cableway (mainland pylon, section of mainland machinery and cable car itself) as relics of industrial architectural and cultural heritage value;
- Soft and hard landscaping; and
- All other ancillary works.

The visitor centre will be situated at +17m AOD, with the café and mainland station at +17.5m and +18m AOD respectively. The mainland pylon will be located approximately 40m south-west of the mainland station at an elevation of 6m AOD and overall height of 32.5m.

On the island site the new return station will be provided alongside the existing platform. The island station / platform will be constructed at existing grade (approximately 21.5m AOD) and the pylon will be located 35m northeast of the station building at an elevation of 18m AOD necessitating a 22m high pylon.

10.4 Description of the Receiving Environment

10.4.1 Regional and Local Hydrology

The proposed development spans the Dursey Sound, part of the North Atlantic Ocean. Dursey Island forms the most westerly extent of Kenmare bay to the North and Bantry Bay to the South. Surface water features located in the vicinity of the proposed development are located entirely within the South Western River Basin District. A minor watercourse discharges to the sea at the south east of the proposed development.

The proposed development is located within Hydrometric Area No.21 (Dunmanus-Bantry-Kenmare). This catchment includes the area within Counties Cork and Kerry draining to Ballinskelligs Bay, Kenmare Bay, Bantry Bay and Dunmanus Bay. The largest urban centre in the hydrometric area is the town of Bantry.

The proposed development site is within "Fanahy_SC_010" WFD sub-catchmnet which is within the Dunmanus-Bantry-Kenmare WFD catchment.

There is a groundwater well on site that provides a water supply to the existing welfare facilities at the mainland cable car station.

10.4.2 Existing Surface water Drainage

Surface water runs off the existing areas of hard standing and either infiltrates to ground in the grassed areas or continues as overland flow over the cliff faces before discharging to the sea.

A minor watercourse is culverted under the R572 at the site's eastern boundary. This subsequently discharges to sea over the cliff face.

10.4.3 Wastewater Treatment

The mainland cableway welfare facilities are being discharged to an on-site septic tank, which is periodically de-sludged.

There are no public toilets available to visitors on the island side of the site. There is no formal wastewater drainage and treatment system in place on the island. The island residences are serviced by private septic tanks.

10.4.4 Flood Risk

The flood risk at the proposed Dursey Island Cable Car and Visitor Centre has been assessed as part of this study. Previous flood studies have been undertaken as part of the PFRAMs & Irish Costal Protection Strategy Study.

10.4.4.1 OPW Preliminary Flood Risk Assessment

To inform the Flood Risk Assessment (FRA), the OPW Preliminary Flood Risk Assessment (PFRA) mapping was consulted as an initial screening. As required by the EU Floods Directive, the OPW carried out a PFRA to identify areas where the risk of flooding may be significant. The PFRA is a broad scale assessment based on historic flooding, predictive analysis and consultation with local communities and experts. As part of the PFRA, maps of the country were produced showing the indicative fluvial, pluvial and tidal flood extents. Areas for Further Assessment (AFA's) were identified.

The PFRA map at the proposed development location indicates that the site is located outside fluvial 0.1%AEP or coastal flood 0.1%AEP flood extents. The PFRA mapping also does not indicate any pluvial or groundwater flooding within or in the vicinity of the proposed crossing.

10.4.4.2 OPW Irish Coastal Protection Strategy Study (ICPSS)

The Irish Coastal Protection Strategy Study (ICPSS) is a national study that was commissioned in 2003 with the objective of providing information to support decision making about how best to manage risks associated with coastal flooding and coastal erosion.

The published tidal flood extent mapping indicates that the development site is outside the 1 in 1000 year tidal flood extents including climate change. The extreme water levels (including storm surge) calculated as part of the ICPSS are given in Table 10.1 below.

Table 10.1 Predicted Extreme Water Levels Associated with Combined Tide and Surge (ICPSS)

Return Period	Current Climate Scenario (mOD Malin)	Mid-Range Future Scenario (mOD Malin)	High-End Future Scenario (mOD Malin)
1 in 200 Year	2.39	2.89	3.39
1 in 1000 Year	2.53	3.03	3.53

10.4.5 EPA Monitoring River Programme

The EPA carries out water quality assessments of rivers, transitional and coastal water bodies as part of a nationwide monitoring programme. Data is collected from physico-chemical and biological surveys, sampling both river water and the benthic substrate (sediment).

Water sampling is carried out throughout the year and the main parameters analysed include: conductivity, pH, colour, alkalinity, hardness, dissolved oxygen, biochemical oxygen demand (BOD), ammonia, chloride, ortho-phosphate, oxidised nitrogen and temperature.

As is the case for rivers and lakes the impact of nutrient enrichment and the process of eutrophication is also a major concern in the tidal waters environment. The direct negative effects of excessive nutrient enrichment include increases in the frequency and duration of phytoplankton blooms and excessive growth of attached opportunistic macroalgae. The subsequent breakdown of this organic matter can lead to oxygen deficiency which in turn can result in the displacement or mortality of marine organisms. As such the effects of over enrichment can severely disrupt the normal functioning of tidal water ecosystems.

The status of individual riverine and coastal water bodies is assessed using the EPA's Trophic Status Assessment Scheme (TSAS). This assessment is required for the Urban Waste Water Treatment Directive and Nitrates Directive. The scheme compares the compliance of individual parameters against a set of criteria, indicative of trophic state (Table 10.2). These criteria fall into three different categories which broadly capture the cause effect relationship of the eutrophication process, namely nutrient enrichment, accelerated plant growth, and disturbance to the level of dissolved oxygen normally present.

Table 10.2 Biological River Water Quality Classification System

Trophic Status	Pollution Status	Condition
Unpolluted	Unpolluted	Unpolluted water bodies are those which do not breach any of the criteria in any category
Intermediate	Unpolluted	Intermediate status water bodies are those which breach one or two of the criteria
Potentially Eutrophic	Slightly polluted	Potentially Eutrophic water bodies are those in which criteria in two of the categories are breached and the third falls within 15 per cent of the relevant threshold value
Eutrophic	Polluted	Eutrophic water bodies are those in which criteria in each of the categories are breached, i.e. where elevated nutrient concentrations, accelerated growth of plants and undesirable water quality disturbance occur simultaneously

The Atlantic Sea at the proposed development site had an EPA Coastal Water Quality Status of "Unpolluted" from 2010-2012 and a Water Framework Directive (WFD) Status of "Unasigned" from 2010-2015.

The WFD 'Water Matters' website mapping section provides details on the assessments of the water bodies / sub catchments in the study area. This data was reviewed as part of this assessment and a summary is given in Table 10.3.

Table 10.3 WFD Classification of Coastal Waters Near the Proposed Dursey Island Cable Car and Visitor Centre (2010-2015 Sampling period, EPA)

Waterbody	Code	Status	Risk	Heavily Modified Status
Ballydonegan_010	IE_SW_21B040880	Unassigned	Not at risk	No
South Western Atlantic Seaboard	IE_SW_150_0000	Unassigned	Not at risk	No
Outer Bantry Bay	IE_SW_170_0000	High	Under Review	No
Outer Kenmare River	IE_SW_190_0000	Good	Not at risk	No

The minor watercourse which runs along the eastern boundary of the proposed development on the mainland is designated "Ballydonegan_010" under the WFD. It is yet to be assigned a status under the WFD. It must be noted that the WFD assessment considers the entire waterbody sub-catchment whereas the EPA monitoring results are point measurements at discrete locations.

10.5 Potential Impact Assessment

This section will describe the impacts associated with the proposed development before mitigation measures are applied. Both direct and indirect impacts will be addressed for the construction and operation of the proposed development. The nature, extent and duration of the impacts will also be assessed.

10.5.1 Methodology

The assessment of hydrological impacts for the proposed development has been based on the analysis and interpretation of the data acquired during the site specific investigations undertaken as part of the EIA, including the ecological study, intrusive site investigation, material assets survey, topographical survey and hydrological walkover and surveys. The procedure follows the guidelines set out in the publication 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes', NRA (TII).

Key hydrological receptors identified in the vicinity of the development include:

- The Kenmare SAC (European Designated Site);
- The Beara Peninsula SPA (European Designated Site);
- Ecologically sensitive surface water features and catchment systems; and,
- Flood Risk Areas.

10.5.2 Construction Impacts

Construction activities pose a significant risk to watercourses, particularly contaminated surface water runoff from construction activities entering the watercourse.

Construction activities within and alongside surface waters can contribute to the deterioration of water quality and can physically alter the watercourse bed, bank and coastal morphology with the potential to alter erosion and deposition rates in the vicinity of the development. Activities within or close to the watercourse channels can lead to increased turbidity through re-suspension of bed sediments and release of new sediments from earthworks. The potential impact is moderate to significant.

The main contaminants arising from construction runoff include:

- Elevated silt/sediment loading in construction site runoff. Elevated silt loading can lead to long-term damage to aquatic ecosystems by smothering spawning grounds and gravel beds and clogging the gills of fish. Increased silt load in receiving watercourses stunts aquatic plant growth, limits dissolved oxygen capacity and overall reduces the ecological quality with the most critical period associated with low flow conditions. Chemical contaminants in the watercourse can bind to silt which can lead to increased bioavailability of these contaminants. Should significant sediment loading occur in Dursey Sound the associated impact rating is assessed as moderate to significant.
- Spillage of concrete, grout and other cement based products. These cement based products are highly alkaline (releasing fine highly alkaline silt) and extremely corrosive and can result in significant impact to watercourses altering the pH, smothering the stream bed and physically damaging fish through burning and clogging of gills due to the fine silt. Construction spillages, if uncontrolled, represent a moderate impact on Dursey Sound.
- Accidental Spillage of hydrocarbons from construction plant and at storage depots / construction compounds. Construction spillages, if uncontrolled, represent a Moderate Impact to Dursey Sound.
- Faecal contamination arising from inadequate treatment of on-site toilets and washing facilities – this represents a slight impact to the waters of Dursey Sound.

10.5.2.1 Impact on Flooding

No works are to take place below the high-water mark. No area of the proposed development works has been identified to flood. The proposed construction works will have no impact on coastal flooding.

10.5.2.2 Human Health Impacts

Due to the location of the proposed development (including the boring of a new water supply well) close to an existing abstraction point in an extreme groundwater vulnerability area there is potential for groundwater contamination to occur during construction stage. There are no bathing waters located in proximity to the proposed development. There is a potential moderate to significant effect on Human health during the construction phase.

10.5.3 Operational Impacts

The potential impacts as a result of the operational phase of the development are outlined below.

10.5.3.1 Impact on Flooding

All components of the proposed development will be significantly above the 1 in 1000 year + climate change level of 3.53mOD as derived as part of the ICPSS hydraulic modelling. The proposed development will have no impact on coastal flooding.

10.5.3.2 Predicted Impact of Storm Discharge on Flooding / Morphology

The existing surface water drainage pathways on the site will be altered as a result of the development. However, source and receptors remain the same and as a result, the impact is deemed to be slight.

10.5.3.3 Hardstanding Runoff

As a result of the proposed development, increased runoff from hardstanding areas such as roads, parking bays, roofs and footpaths will be generated. Unmitigated, this would increase the rate of runoff from the site and as a result, the associated potential effect is deemed to be moderate to significant.

10.5.3.4 Foul Sewers / Treatment

The existing drainage network will be upgraded and expanded to accommodate the anticipated increase in visitors. New waste water treatment systems will be implemented at both the mainland and island facilities. Treated effluent will discharge to ground. The mainland WWTS will require pumping to a raised infiltration area. Due to the reliance on pumps, there is a potential moderate to significant effect on the receiving environment if the pumps fail.

10.5.3.5 Predicted impact of Storm Discharge of pollutants

Salt and grit applications to trafficked surfaces to mitigate icy conditions will result in an increased salinity, pH, conductivity and total dissolved solids concentrations to receiving aquatic system. Increased salinity of watercourses can alter the ecological balance of the aquatic system and increase the bioavailability of chemical contaminants. It is anticipated that the use of salts and grits will be minimal due to the light trafficking during the winter months.

The potential impact associated with discharging untreated surface water into Dursey Sound which is in close proximity to the Kenmare SAC & The Beara Peninsula SPA is considered moderate to significant, due to the environmental sensitivities of the area.

The proposed development also requires the draining of retaining walls, the retaining wall drainage will discharge to the minor watercourse on the eastern boundary of the site. Due to the potential preferential pathway for contaminates, the unmitigated impact on water quality is predicted to be slight to moderate.

10.5.3.6 Water Quality Impact - Accidental Spillage Risk Assessment

The risk of pollution to both surface and groundwater resulting from accidental spillage is considered to be negligible. The cableway traffic is limited to pedestrians. It is not anticipated that any chemicals or hydrocarbons will ever be transported across the cableway. There was no spillage risk identified as part of the spillage risk assessment.

10.5.3.7 Human Health Impacts

No potable water supply is to be provided at the Island cableway terminal. Toilets will be supplied by rainwater harvesting. Consumption of the rainwater by people could cause illness due to build-up of organic matter on collection surfaces. The unmitigated human health impacts are predicted to be moderate to significant.

10.6 Mitigation and Monitoring Measures

10.6.1 Construction Mitigation

As is normal practice with road infrastructure projects, a draft Environmental Operating Plan has been prepared for the Dursey Island Cable Car and Visitor Centre and the following will be implemented as part of this plan:

- A draft Incident Response Plan detailing the procedures to be undertaken in the event of spillage of chemical, fuel or other hazardous wastes, non-compliance incident with any permit of license or other such risks that could lead to a pollution incident, including flood risks.

- Implement the Environmental Operating Plan contained in Appendix 4.1 of Volume 2 of this EIAR.

A draft EOP has been developed and is provided in Appendix 4.1 of Volume 2 of this EIAR. These will be developed by the selected construction contractor to suit the detailed construction methodology and allocate responsibilities to individuals in the construction team. In doing so, the measures detailed in the appended reports will be considered minimum requirements to be considered and improved upon. The level of detail provided within the current drafts of the Plans is sufficient to allow an assessment of the anticipated impacts including residual impacts.

During construction, cognisance will have to be taken of the following guidance documents for construction work on, over or near water.

- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (Inland Fisheries Ireland).
- CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors.
- CIRIA C648 Control of Water Pollution from Constructional Sites.
- Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (NRA/TII, 2006).

Based on the above guidance documents concerning control of constructional impacts on the water environment, the following outlines the construction phasing and the principal mitigation measures that will be prescribed for the construction phase in order to protect waterbodies, the wider catchment and ecologically protected areas from direct and indirect impacts.

Proposed General Mitigation Measures

- Site works will be limited to the minimum required to undertake the necessary elements of the project;
- As far as is practicable, construction works shall proceed within predetermined Construction Areas on a phased basis. These areas will be determined by the contractor during the construction phase of the project.
- Surface water flowing onto the construction area will be minimised through the provision of berms, diversion channels or cut-off ditches.
- Management of excess material stockpiles to prevent siltation of surface waterbodies through runoff during rainstorms will be undertaken. This may involve allowing the establishment of vegetation on the exposed soil and the diversion of runoff water from these stockpiles to the construction settlement ponds.
- Protection of waterbodies from silt load will be carried out through the use of timber fencing with silt fences or earthen berms to provide adequate treatment of runoff to surface waterbodies.
- Settlement ponds, silt traps and bunds will be used. Where pumping of water is to be carried out, filters will be used at intake points and discharge will be through a sediment trap.
- The anticipated site compound/storage facilities will be fenced off at a minimum distance of 10m from the top of the edge of the sea/cliff edge. Any works

within the 10m buffer zone will require measures to be implemented to ensure that silt laden or contaminated surface water runoff from the compound does not discharge directly to the sea/watercourse. See the OCEMP within the EOP in Appendix 4.1.

- Protection measures will be put in place to ensure that all hydrocarbons used during the construction phase are appropriately handled, stored and disposed of in accordance with the NRA/TII document "Guidelines for the crossing of watercourses during the construction of National Road Schemes". All chemical and fuel filling locations will be contained within bunded areas and set back a minimum of 20m from watercourses.
- Foul drainage from all site offices and construction facilities will be contained and disposed of in an appropriate manner to prevent pollution;
- The construction discharge will be treated such that it will not reduce the environmental quality standard of the receiving waterbodies;
- Riparian vegetation (if present) along the minor watercourse will be fenced off at a distance of 3m either side of the proposed crossing point to provide a buffer zone for its protection;

Specific Mitigation Measures - Concrete Works

The use and management of concrete close to surface water bodies must be carefully controlled to avoid spillage which has a deleterious effect on water chemistry and aquatic habitats and species. As the use of concrete cannot be avoided the following control measures will be employed:

- Hydrophilic grout and quick-setting mixes or rapid hardener additives shall be used to promote the early set of concrete surfaces exposed to water;
- When working in or near the surface water and the application of in-situ materials cannot be avoided, the use of alternative materials such as biodegradable shutter oils shall be used;
- Any plant operating close to the water will require special consideration on the transport of concrete from the point of discharge from the mixer to final discharge into the delivery pipe (tremie). Care will be exercised when slewing concrete skips or mobile concrete pumps over or near surface waters;
- Placing of concrete near surface waterbodies will be carried out only under the supervision of the Ecological Clerk of Works (ECoW);
- There will be no hosing into surface water drains of spills of concrete, cement, grout or similar materials. Such spills shall be contained immediately and runoff prevented from entering surface waterbodies;
- Concrete waste and wash-down water will be contained and managed on site to prevent pollution of all surface waterbodies and lakes;
- On-site concrete batching and mixing activities will only be allowed at the identified construction compound areas;
- Washout from concrete lorries, with the exception of the chute, will not be permitted on site and will only take place at the construction compound (or other appropriate facility designated by the manufacturer);
- Chute washout will be carried out at designated locations only. These locations will be signposted. The Concrete Plant and all Delivery Drivers will be informed of their location with the order information and on arrival to site; and
- Chute washout locations will be provided with an appropriate designated, contained impermeable area and treatment facilities including adequately sized

settlement tanks. The clear water from the settlement tanks shall be pH corrected prior to discharge (which shall be by means of one of the construction stage settlement facilities) or alternatively disposed of as waste in accordance with the Contractor's Waste Management Plan.

10.6.1.1 Human Health Impacts

The risk to the groundwater supply will be mitigated by restricting the use of the existing groundwater well as a potable water supply during construction. Instead potable water shall be brought to site. In addition, with the application of standard construction methods, the EOP and mitigation measures detailed in this chapter, any impacts to water supply and quality are found to be unlikely and temporary in nature. Therefore, there is a slight impact on human health during the construction phase. Physico-chemical groundwater quality monitoring will be undertaken prior to and post construction (refer to Section 10.6.3 below).

10.6.2 General Operational Mitigation

10.6.2.1 Hardstanding Runoff

As a result of the increase in hardstanding areas on the mainland, runoff from the site will increase. The proposed surface water drainage system will comprise predominantly SuDS features which will attenuate and treat the surface water runoff from the site prior to discharge to sea. Permeable paving will allow infiltration to the underlying subsoils.

There will be no net increase of hardstanding area at ground level on the island side cableway station and thus the volume of surface water runoff will remain the same as currently.

These proposed mitigation measures reduce the associated impact from hardstanding runoff from slight/moderate to imperceptible. Treatment to runoff generated will be provided within the pavement layers through the processes of filtration, biodegradation, adsorption of pollutants and the settlement and retention of solids within the pavement layers.

10.6.2.2 Foul Drainage Infrastructure Failure

In the event of a pump failure at the proposed foul pumping station, mitigation measures have been proposed. The pumping station has been designed to provide 24-hour effluent storage in case of failure. Standby pumps will also be provided.

10.6.2.3 Impact of Storm Discharge of pollutants

It is proposed that surface water from the proposed development discharges to the Dursey Sound, which is an environmentally sensitive area. Mitigation measures that will be implemented include the design of a surface water drainage system to serve the proposed development. The proposed surface water drainage system will comprise predominantly SuDS features which will attenuate and cleanse the surface water runoff from the site prior to discharge to sea by percolation into the subsoil. The incorporation of a SuDS based approach will ensure that discharge will be controlled, and treatment of runoff will take place within the SuDS components. The implementation of these mitigation measures will reduce the associated impact from moderate/significant to imperceptible.

The proposed retaining wall drainage will incorporate a hydrocarbon separator prior to discharging to the minor watercourse. The implementation of this mitigation measure will reduce the associated impact from slight/moderate to slight. Physio-chemical water quality monitoring will be undertaken at the outfall location prior to and post construction (refer to Section 10.6.3 below).

10.6.2.4 Human Health Impacts

All rainwater outlets including sinks and faucets will bare clear warnings as to the hazard posed by rainwater consumption. The implementation of this mitigation measure will reduce the associated impact from moderate/significant to slight.

10.6.3 Monitoring

10.6.3.1 Surface water Monitoring

It is envisaged that surface water sampling and chemical testing will be undertaken immediately downstream of the proposed outfall location in the minor watercourse. Surface water samples will be tested for physical and chemical parameters to assess water quality and indicate possible contamination at the site. The water samples will be tested for the following parameters:

- Biochemical Oxygen Demand (BOD);
- Chemical Oxygen Demand (COD);
- pH value;
- Suspended Solids;
- Total Coliforms;
- Ammonia;
- Nitrate;
- Nitrite;
- Ortho Phosphate; and
- Hydrocarbons.

The surface water monitoring regime will be undertaken prior to, during and after completion of the proposed works. Samples will be taken at fortnightly intervals from the minor watercourse with a minimum of 4 samples taken prior to the works and 6 samples taken after completion of the works.

10.6.3.2 Groundwater Monitoring

Groundwater sampling will also be undertaken prior to, during and after completion of the proposed works form the existing and proposed groundwater well. Samples will be taken at fortnightly intervals from each well with a minimum of 4 samples taken prior to the works and 6 samples taken after completion of the works. The groundwater samples will be tested for a range of physical and chemical parameters (as listed in section 10.6.3.1 above) in order to assess water quality and indicate possible contamination at the site.

10.7 Residual Impacts

10.7.1 Construction Phase

Construction shall be undertaken in accordance with the measures outlined in the Environmental Operation Plan in Appendix 4.1 of Volume 2 of this EIAR. There will therefore be a slight residual impact during the construction of the Dursey Island Cable Car and Visitor Centre.

10.7.2 Operational Phase

The use of SuDS features will mitigate any potential impacts relating to changes in runoff rates and volumes whilst also maintaining quality of water the vicinity of Dursey Sound. There will, therefore, be an imperceptible impact from development in the operational phase.

10.8 Difficulties Encountered

There were no difficulties associated with this assessment.

10.9 References

EPA (2019). *EPA Maps*

GSI (2017). *Groundwater Data Viewer*

Natural Environment Research Council (NERC) (2017). *Bedrock Geology Map of the United Kingdom and Ireland*.

Office of Public Works (OPW) (2013). *Technical Report: Irish Coastal Protection Strategy Study Phase IV – South West Coast – Work Packages 2, 3 & 4A*. Report prepared by RPS for the OPW.

Teagasc (2019). *Soil Maps*

Chapter 11 Landscape and Visual

11.1 Introduction

The Landscape and Visual Impact Assessment (LVIA) prepared by CSR was informed by a desktop study and a survey of the site and receiving environment in August and October 2018. The assessment is in accordance with the methodology prescribed in the Guidelines for Landscape and Visual Impact Assessment, 3rd edition, 2013 (GLVIA) published by the UK Landscape Institute and the Institute for Environmental Management and Assessment.

11.2 Methodology

Ireland is a signatory to the European Landscape Convention (ELC). The ELC defines landscape as 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors'. This definition is important in that it expands beyond the idea that landscape is only a matter of aesthetics and visual amenity. It encourages a focus on landscape as a resource in its own right - a shared resource providing a complex range of cultural, environmental and economic benefits to individuals and society.

As a cultural resource, the landscape functions as the setting for our day-to-day lives, also providing opportunities for recreation and aesthetic enjoyment and inspiration. It contributes to the sense of place experienced by individuals and communities and provides a link to the past as a record of historic socio-economic and environmental conditions. As an environmental resource, the landscape provides habitat for fauna and flora. It receives, stores, conveys and cleans water, and vegetation in the landscape stores carbon and produces oxygen. As an economic resource, the landscape provides the raw materials and space for the production of food, materials (e.g. timber, aggregates) and energy (e.g. carbon-based fuels, wind, solar), living space and for recreation and tourism activities.

11.2.1 Forces for Landscape Change

Landscape is not unchanging. Many different pressures have progressively altered familiar landscapes over time and will continue to do so in the future, creating new landscapes. For example, within the receiving environment, the environs of the proposed development have altered over the last thousand years, from wilderness to agriculture and settlement.

Many of the drivers for change arise from the requirement for development to meet the needs of a growing population and economy. The concept of sustainable development recognises that change must and will occur to meet the needs of the present, but that it should not compromise the ability of future generations to meet their needs. This involves finding an appropriate balance between economic, social and environmental forces and values.

The reversibility of change is an important consideration. If change must occur to meet a current need, can it be reversed to return the resource (in this case, the landscape) to its previous state to allow for development or management for future needs.

Climate change is one of the major factors likely to bring about future change in the landscape, and it is accepted to be the most serious long-term threat to the natural environment, as well as economic activity (particularly primary production) and society.

The need for climate change mitigation and adaptation, which includes the management of water and more extreme weather and rainfall patterns, is part of this.

11.2.2 Guidance

Landscape and Visual Impact Assessment (LVIA) is a tool used to identify and assess the significance of and the effects of change resulting from development on both the landscape as an environmental resource in its own right and on people's views and visual amenity.

The methodology for assessment of the landscape and visual effects is informed by the following key guidance documents, namely:

- *Guidelines for Landscape and Visual Impact Assessment*, 3rd edition 2013, published by the UK Landscape Institute and the Institute of Environmental Management and Assessment (hereafter referred to as the GLVIA).
- References are also made to the '*Landscape and Landscape Assessment – Consultation Draft of Guidelines for Planning Authorities*' document, published in 2000 by the Department of Environment, Heritage and Local Government.

Use of the Term 'Effect' vs 'Impact'
The GLVIA advises that the terms 'impact' and effect' should be clearly distinguished and consistently used in the preparation of an LVIA. '*Impact*' is defined as the action being taken. In the case of the proposed works, the impact would include the construction of the proposed development. *'Effect'* is defined as the change or changes resulting from those actions, e.g. a change in landscape character, or changes to the composition, character and quality of views in the receiving environment. This report focusses on these effects.

11.2.3 Assessment of Both 'Landscape' and 'Visual' Effects

Another key distinction to make in a LVIA is that between landscape effects and the visual effects of development.

'Landscape' results from the interplay between the physical, natural and cultural components of our surroundings. Different combinations of these elements and their spatial distribution create distinctive character of landscape in different places. 'Landscape character assessment' is the method used in LVIA to describe landscape, and by which to understand the potential effects of a development on the landscape as 'a resource'. Character is not just about the physical elements and features that make up a landscape, but also embraces the aesthetic, perceptual and experiential aspects of landscape that make a place distinctive.

Views and 'visual amenity' refer to the interrelationship between people and the landscape. The GLVIA prescribes that effects on views and visual amenity should be assessed separately from landscape, although the two topics are inherently linked. Visual assessment is concerned with changes that arise in the composition of available views, the response of people to these changes and the overall effects on the area's visual amenity.

The assessment of landscape and visual effects included a desktop study, review of the proposed development drawings and visualisations, and a number of site visits which were carried out in November 2018 and January 2019.

11.2.4 Methodology for Landscape Assessment

In Section 11.4 of this report the landscape effects of the development are assessed. Landscape impact assessment considers the likely nature and scale of changes to the main landscape elements and characteristics, and the consequential effect on landscape character and value. Existing trends of change in the landscape are taken into account. The potential effect is assessed based on measurement of the landscape sensitivity against the magnitude of change which would result from the development.

11.2.4.1 Sensitivity of the Landscape Resource

Landscape Sensitivity: Landscape sensitivity is a function of its land use, landscape patterns and scale, visual enclosure and distribution of visual receptors, scope for mitigation, and the value placed on the landscape. It also relates to the nature and scale of development proposed. It includes consideration of landscape values as well as the susceptibility of the landscape to the proposed change.

Landscape values can be identified by the presence of landscape designations or policies which indicate particular values, either on a national or local level. In addition, a number of criteria are used to assess the value of a landscape. Landscape policies are described in Section 11.3.

Landscape susceptibility is defined in the GLVIA as *the ability of the landscape receptor to accommodate the proposed development without undue consequences for the maintenance of the baseline scenario and/or the achievement of landscape planning policies and strategies*. Susceptibility also relates to the type of development – a landscape may be highly susceptible to certain types of development but have a low susceptibility to other types of development.

For the purpose of assessment, five categories are used to classify the landscape sensitivity of the receiving environment.

Table 11.1 Categories of Landscape Sensitivity

Sensitivity	Description
Very High	Areas where the landscape exhibits a very strong, positive character with valued elements, features and characteristics that combine to give an experience of unity, richness and harmony. The character of the landscape is such that its capacity for accommodating change in the form of development is very low. These attributes are recognised in landscape policy or designations as being of national or international value and the principle management objective for the area is protection of the existing character from change.
High	Areas where the landscape exhibits strong, positive character with valued elements, features and characteristics. The character of the landscape is such that it has limited/low capacity for accommodating change in the form of development. These attributes are recognised in landscape policy or designations as being of national, regional or county value and the principle management objective for the area is conservation of the existing character.
Medium	Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong. The character of the landscape is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principle management objective may be to consolidate landscape character or facilitate appropriate, necessary change

Sensitivity	Description
Low	Areas where the landscape has few valued elements, features or characteristics and the character is weak. The character of the landscape is such that it has capacity for change; where development would make no significant change or would make a positive change. Such landscapes are generally unrecognised in policy and where the principle management objective is to facilitate change through development, repair, restoration or enhancement.
Negligible	Areas where the landscape exhibits negative character, with no valued elements, features or characteristics. The character of the landscape is such that its capacity for accommodating change is high; where development would make no significant change or would make a positive change. Such landscapes include derelict industrial lands or extraction sites, as well as sites or areas that are designated for a particular type of development. The principle management objective for the area is to facilitate change in the landscape through development, repair or restoration.

11.2.4.2 Magnitude of Landscape Change

The magnitude of change is a factor of the scale, extent and degree of change imposed on the landscape with reference to its key elements, features and characteristics (also known as 'landscape receptors'). Five categories are used to classify magnitude of landscape change.

Table 11.2 Magnitude of Landscape Change

Magnitude of Change	Description
Very High	Change that is large in extent, resulting in the loss of or major alteration to key elements, features or characteristics of the landscape (i.e. landscape receptors), and/or introduction of large elements considered totally uncharacteristic in the context. Such development results in fundamental change in the character of the landscape with loss of landscape quality and perceived value.
High	Change that is moderate to large in extent, resulting in major alteration or compromise of important landscape receptors, and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the landscape with loss of landscape quality and perceived value.
Medium	Change that is moderate in extent, resulting in partial loss or alteration of landscape receptors, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape but not necessarily reduction in landscape quality and perceived value.
Low	Change that is moderate or limited in scale, resulting in minor alteration of landscape receptors, and/or introduction of elements that are not uncharacteristic in the context. Such development results in minor change to the character of the landscape and no reduction in landscape quality and perceived value.
Negligible	Change that is limited in scale, resulting in no alteration to landscape receptors, and/or introduction of elements that are characteristic of the context. Such development results in no change to the landscape character, quality or perceived value.

11.2.4.3 Significance of Effects

In order to classify the significance of effects, the predicted magnitude of change is measured against the sensitivity of the landscape/viewpoint, using the following guide, from the EPA Draft Guidance (2017).

There are seven classifications of significance, namely: (1) imperceptible, (2) not significant, (3) slight, (4) moderate, (5) significant, (6) very significant, (7) profound.

Table 11.3 Significance of Effect (Landscape)

		Sensitivity of the Landscape Resource				
		Very High	**High**	**Medium**	**Low**	**Negligible**
Magnitude of Change	**Very High**	Profound	Profound-Very Significant	Very Significant-Significant	Moderate	Slight
	High	Profound-Very Significant	Very Significant	Significant	Moderate-Slight	Slight-Not Significant
	Medium	Very Significant-Significant	Significant	Moderate	Slight	Not Significant
	Low	Moderate	Moderate-Slight	Slight	Not significant	Imperceptible
	Negligible	Slight	Slight-Not Significant	Not significant	Imperceptible	Imperceptible
	Negligible	Slight	Slight-Not Significant	Not significant	Imperceptible	Imperceptible

The matrix above is used *as a guide only*. The assessor also uses professional judgement informed by their expertise, experience and common sense, to arrive at a classification of significance that is reasonable and justifiable.

Landscape effects are also classified as positive, neutral or negative/adverse. Development has the potential to improve the environment as well as damage it. In certain situations, there might be policy encouraging a type of change in the landscape, and if a development achieves the objective of the policy the resulting effect might be positive, even if the landscape character is profoundly changed.

11.2.5 Methodology for Visual Assessment

In Section 11.4.3 of this report the visual effects of the development are assessed. Visual assessment considers the changes to the composition character of viewsand the visual amenity experienced by visual receptors (groups of people). The assessment is made for a number of viewpoints selected to represent the range of visual receptors in the receiving environment. The significance of the visual effects experienced at these locations is assessed by measuring the visual receptor sensitivity against the magnitude of change to the view resulting from the development.

11.2.5.1 Sensitivity of the Viewpoint/Visual Receptor

Viewpoint sensitivity is a function of two main considerations:

- *Susceptibility of the visual receptor to change*. This depends on the occupation or activity of the people experiencing the view, and the extent to which their attention or interest is focussed on the views or visual amenity they experience at that location.

Visual receptors most susceptible to change include residents at home, people engaged in outdoor recreation focused on the landscape (e.g. trail users), and visitors to heritage or other attractions and places of community congregation where the setting contributes to the experience.

Visual receptors less sensitive to change include travellers on road, rail and other transport routes (unless on recognised scenic routes), people engaged in outdoor recreation or sports where the surrounding landscape does not influence the experience, and people in their place of work or shopping where the setting does not influence their experience.

- *Value attached to the view. This depends to a large extent on the subjective opinion of the visual receptor but also on factors such as policy and designations (e.g. scenic routes, protected views), or the view or setting being associated with a heritage asset, visitor attraction or having some other cultural status (e.g. by appearing in arts).*

Visual receptor susceptibility and value of the viewpoints which are assessed, are discussed further in Section 11.4.3. For the purpose of assessment, five categories are used to classify a viewpoint's sensitivity:

Table 11.4 Categories of Visual Receptor Sensitivity

Sensitivity	Description
Very High	Iconic viewpoints - towards or from a landscape feature or area - that are recognised in policy or otherwise designated as being of national value. The composition, character and quality of the view are such that its capacity for accommodating change in the form of development is very low. The principle management objective for the view is its protection from change.
High	Viewpoints that that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features focussed on the landscape). The composition, character and quality of the view may be such that its capacity for accommodating compositional change in the form of development may or may not be low. The principle management objective for the view is its protection from change that reduces visual amenity.
Medium	Viewpoints representing people travelling through or past the affected landscape in cars or on public transport, i.e. viewing but not focused on the landscape which is regarded as moderately scenic. The views are generally not designated, but which include panoramic views or views judged to be of some scenic quality, which demonstrate some sense of naturalness, tranquillity or some rare element in the view
Low	Viewpoints reflecting people involved in activities not focused on the landscape e.g. people at their place of work or engaged in similar activities such as shopping, or on heavily trafficked routes etc. The view may present an attractive backdrop to these activities but is not regarded as particularly scenic or an important element of these activities.
Negligible	Viewpoints reflecting people involved in activities not focused on the landscape e.g. people at their place of work or engaged in similar activities such as shopping where the view has no relevance or is of poor quality.

11.2.5.2 Magnitude of Change to the View

Classification of the magnitude of change takes into account the size or scale of the intrusion of development into the view (relative to the other elements and features in the composition, i.e. its relative visual dominance), the degree to which it contrasts or integrates with the other elements and the general character of the view, and the way in which the change will be experienced (e.g. in full view, partial or peripheral, or glimpses). It also takes into account the geographical extent of the change, the duration and the reversibility of the visual effects. Five categories are used to classify magnitude of change to a view.

Table 11.5 Categories of Visual Change

Magnitude of Change	Description
Very High	Full or extensive intrusion of the development in the view, or partial intrusion that obstructs valued features or characteristics, or introduction of elements that are completely out of character in the context, to the extent that the development becomes the dominant the composition and defines the character of the view and the visual amenity
High	Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.
Medium	Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.
Low	Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity
Negligible	Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity.

11.2.5.3 Significance of Visual Effects

As for landscape effects, in order to classify the importance of visual effects, the magnitude of change to the view is measured against the sensitivity of the viewpoint.

Visual effects are also classified as positive, neutral or negative. This is an inherently subjective exercise. Visual receptors' attitudes to development of various types varies and this affects their perception of the visual effects of development.

11.2.6 Quality and Timescale

The predicted impacts are also classified as <u>beneficial</u>, <u>neutral</u> or <u>adverse</u>. This is not an absolute exercise; in particular, visual receptors' attitudes to development, and thus their response to the impact of a development, will vary. However, the methodology applied is designed to provide robust justification for the conclusions drawn. These qualitative impacts/effects are defined as:

- Adverse – Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting or cause the quality of the landscape(townscape)/view to be diminished;
- Neutral - Scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality;
- Beneficial – improves landscape(townscape)/view quality and character, fits with the scale, landform and pattern and enables the restoration of valued characteristic features or repairs / removes damage caused by existing land uses.

Impacts/effects are also categorised according to their longevity or timescale:

- Temporary – Lasting for one year or less;
- Short Term – Lasting one to seven years;
- Medium Term – Lasting seven to fifteen years;
- Long Term – Lasting fifteen years to sixty years;
- Permanent – Lasting over sixty years.

11.2.7 Study Area

The main study area for both landscape and visual effects was determined through desktop study and site visits. Site visits were carried out in November 2018 and February 2019.

The study area is influenced by the likely landscape and visual effects, and is shown in Plate 11.1 below. The study area includes the eastern portion of Dursey Island, which will have visibility of the proposed development. On the mainland side, the study area includes the immediate vicinity of the proposed cable car station and visitor centre, as well as the approach road (and scenic route) R572 and part of Crow Head to the south.

It should be noted that this study area relates to the main elements of the development that are likely to have landscape and visual effects, and that other works including 10 no. proposed passing bays and 1 no. visibility splay along the R572, though not indicated below, are also included in this assessment.

Plate 11.1 **Study area**

11.3 Description of Receiving Environment – Policy Context

The following section includes policies and objectives from the Cork County Development Plan 2015-2021 (hereafter referred as the 'Development Plan') which relate to the site, including policies relating to landscape character, value and scenic routes.

Chapters 13 Green Infrastructure and Environment contains relevant policies and objectives which are listed below. This chapter recognises the landscape of County Cork as a key asset and notes its importance in terms of tourism and recreation.

A number of objectives relating to the landscape and developments in general are as follows:

> *a) Protect the visual and scenic amenities of County Cork's built and natural environment.*
>
> *b) Landscape issues will be an important factor in all landuse proposals, ensuring that a proactive view of development is undertaken while maintaining respect for the environment and heritage generally in line with the principle of sustainability.*
>
> *c) Ensure that new development meets high standards of siting and design.*
>
> *d) Protect skylines and ridgelines from development.*
>
> *e) Discourage proposals necessitating the removal of extensive amounts of trees, hedgerows and historic walls or other distinctive boundary treatments.*

11.3.1 Landscape Character and High Value Landscapes

The Draft Cork County Landscape Strategy, produced in 2007, has informed the Development Plan policy, and the information in terms of landscape character areas and types are referred to within the Development Plan. This document identified 76 character areas in County Cork, but amalgamated these into 16 landscape character types, which are a more general categorisation of the landscape based on similarities between the areas. Landscape Character Types (LCTs) are described in some detail in the Strategy, and detailed characteristics, opportunities and pressures are listed for each LCT.

The assessment also ascribes a landscape value to each character area, ranging from Low to Very High. Sensitivity of each LCT is also identified, ranging from Low to Very High. It should however be noted that as in Landscape and Visual Assessment, sensitivity is directly related to the type of development or change proposed.

Landscape Character Types which have a High or Very High Value, and High or Very High Sensitivity, and are also considered to be of County or National Importance, are classified as High Value Landscape (HVL). Figure 13.2 of the Development Plan contains an illustration of these areas, and indicates that the proposed development site is within an area of HVL. This is shown in Plate 11.2 below:

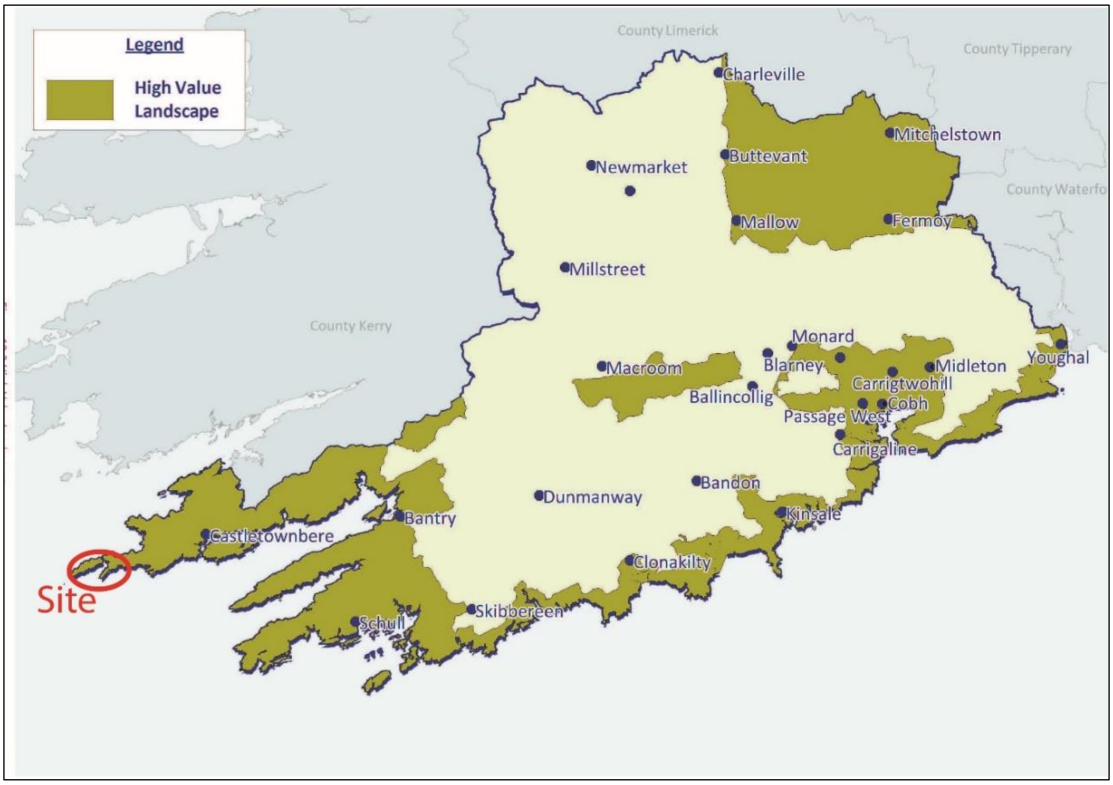


Plate 11.2 **High Value Landscapes with site Source: Cork County Development Plan**

The Development Plan notes that within these areas of HVL, considerable care is needed in locating large scale developments without them becoming unduly obtrusive. It notes that such developments should generally be supported by visual impact assessment and involve an evaluation of the visibility and prominence of the proposed development in its immediate environs and in the wider landscape.

The following objective is relevant:

> **GI 6-2: Draft Landscape Strategy:** *Ensure that the management of development of the County will have regard for the value of the landscape, its character, distinctiveness and sensitivity as recognised in the Cork County Draft Landscape Strategy and its recommendations, in order to minimize the visual and environmental impact of development, particularly in areas designated as High*

Value Landscapes where higher development standards (layout, design, landscaping, materials used) will be required.

11.3.2 Landscape Character Type, Value and Sensitivity

The site of the proposed development, Dursey Island and the Beara Peninsula within County Cork, is part of the LCT 4. Rugged Ridge Peninsulas. This LCT also includes the Sheep's Head and Mizen peninsulas, which lie south west of Dursey and the Beara Peninsula. All are similar in that they are peninsulas divided by deep inlets and have characteristic mountainous 'spines or higher' rocky ground.

This LCT is assigned a Very High value, Very High sensitivity, and a National landscape importance.

This landscape type is described in the Strategy as a series of rugged peninsulas with mountainous peaks, such as Hungry Hill on the Beara Peninsula. Shorelines are also rugged, with rocky promontories and islands extending out into the sea. These peninsulas are described as a mix of moorland and more fertile patches of farmland and woodland with some conifer plantations on higher ground. Farmsteads tend to be scattered on lower ground and towns, villages and hamlets are found along the coast, including Castletownbere, Allihies and Eyeries.

The Strategy notes that within this landscape type, there are 35 scenic routes. Within this LCT, there are several distinctive landscape character areas (LCA). Dursey Island is a distinct LCA.

The Stretegy notes that agriculture is likely to remain in important land use in the future. The Strategy also notes that this area is highly valued for tourism and recreation as a result of its scenic qualities and extensive coastline, but also its marine leisure, and note that tourism is likley to be a significant factor in the future development of the area.

The relevant recommendations are as follows for the LCT 4 Rugged Ridge Peninsulas:

- Encourage sustainable tourism by maximising the potential amenity value of water bodies within this LCT
- Recognise the importance of retaining areas of coastline, estuaries and dunes for their scenic and ecological value
- Protect the setting of existing promontories which are part of the unique setting of this coastline
- Ensure that new development, including comtemporary architecture, compliments the local vernacular in terms of scale and character and compliments the landscape setting
- Ensure that new development of any kind is sympathetic to the individual form and character of the island's landscapes and traditional building patterns

11.3.3 Views and Prospects

There a number of scenic routes in the vicinity of the site, including the access road leading to the existing cable car station. The Development Plan notes that each scenic route was examined individually and their location was related to the landscape type that is traversed and the key features which make these routes attractive were identified. Those routes within High Value Landscapes are considered particularly important to protect. However, the Development Plan also states that while it advocates the protection of scenic routes, it also recognises that landscapes are living and changing, and that this policy should not give rise to the prohibition of development, but that development along these routes, where permitted, should not hinder or obstruct these views or prospects and should be designed and located to minimise impact.

The following scenic route is also the main access road to the site:

S118 – Castletownbere via Cahermore to Garinish Point

This route is described in Table 5.1, Volume 2 of the Development Plan, as running through a High Value Landscape, adjoining the pNHA garnish Point and Kenmare River SAC. The overall landscape value is judged as Very High. The description of the features to be protected include the views of Bere Haven, Bere Island, Firkeel Bay, Dursey Sound and Island, the sea, Slieve Miskish Mountains and surrounding hills. It also noted that there is a sense of remoteness along the route, and that rural character is prevalent. The scenic route and the site location are illustrated in Plate 11.3 below:

Plate 11.3 Scenic Routes and site location (Source: Bing Maps)

The following policies are relevant:

GI 7-2: Scenic Routes*:* *Protect the character of those views and prospects obtainable from scenic routes and in particular stretches of scenic routes that have very special views and prospects identified in this plan. The scenic routes identified in this plan are shown on the scenic amenity maps in the CDP Map Browser and are listed in Volume 2 Chapter 5 Scenic Routes of this plan*.

GI 7-3: *Development on Scenic Routes*

a) *Require those seeking to carry out development in the environs of a scenic route and/or an area with important views and prospects, to demonstrate that there will be no adverse obstruction or degradation of the views towards and from vulnerable landscape features. In such areas, the appropriateness of the design, site layout, and landscaping of the proposed development must be demonstrated along with mitigation measures to prevent significant alterations to the appearance or character of the area.*

***b)** Encourage appropriate landscaping and screen planting of developments along scenic routes which provides guidance in relation to landscaping. See Chapter 12 Heritage – Objective HE-4-6.*

11.3.4 Implications of Landscape Policy

The Development Plan policy identifies a number of policies which indicate certain values to the site, and which should be considered as part of this Assessment. These include:

- The site is located in an area of high scenic quality and recognised in policy as a highly valued landscape. Designations include High Value Landscape which is the highest category of landscape designation within the County and denotes landscapes of a Very High value, Very High sensitivity, and a National landscape importance.
- A Scenic route (S118) is located in the immediate vicinity of the site and it the main approach road to the site.
- The scenic and ecological values of the coastline is recognised.
- The potential of tourism as a resource for the development of the area is recognised.
- The site is within the Beara Peninsula SPA and adjacent to the Kenmare River SAC. Dursey Island and the area to the north of the existing cable car station are within the Garinish Point pNHA.

11.3.5 Description of Site and Environs

The site and environs are described below in terms of its location and access, as well as its character in terms of landform, landcover, land use, cultural heritage, and overall character. Under each heading, the site and environs are first described, and then the wider context.

The extent of the site area, and further details of the proposed development are shown in the planning drawings. The study area is shown in Plate 11.1.

11.3.6 Site Location and Context

As illustrated in Plate 11.1, the site is located at the tip of the Beara Peninsula, in the south west of the County. Dursey Island lies across the narrow Dursey Sound.

The site consists of an existing cable car station, which includes a building and supporting structures on the mainland at Ballahgboy, as well as another on the eastern coast of Dursey Island. A car park is also located adjacent to the cable car station on the mainland. The cable car is used as a means of transport across the Dursey Sound, as shown in Plate 11.4 below:

Plate 11.4 **Site location and context – looking across sea towards Dursey Island**

11.3.7 Access and Location

The site is accessed from the R572 (also a scenic route) from Castletownbere, and the cable car is located at the end of this road. The cable car itself connects Dursey Island to the mainland. Dursey Island has one main local road.

11.3.8 Landform – Topography and Drainage

Site and Immediate environs

On the mainland (Ballaghboy) side, the landform is that of a rugged landscape of moorland and rock outcrops, sloping quite steeply towards the coast. The road approaching the cable car station skirts around the lower slopes of the peninsula. The car park and road are at a lower level than the cable car station and control building. Above this, the rugged ground rises to a ridge, as seen in Plate 11.5 below:

Plate 11.5 **Steeply sloping topography towards cable car infrastructure on both sides of Dursey Sound**

The landform on Dursey Island in the vicinity of the site is similar, though the slope is gentler to the south of the island, where the road is seen. A more dramatic slope lies to the north of the cable car landing. There is a small watercourse at the south-eastern boundary of the mainland side of the site, and the land drains towards the sea on both sides.

Wider Context

The landscape is well described by the term 'Rugged Ridge Peninsulas'. The tip of the Beara Peninsula and Dursey Island both fit this description. The landscape in the vicinity of the cable car station on the mainland is that of a rugged promontory, with a dramatic and indented rocky coastline. Dursey Island is similarly described, and considerable variations in topography are evident in the wider landscape both on Dursey Island and on the mainland.

11.3.9 Landcover – Vegetation and Built Form

Site and immediate environs

The landcover of the mainland site at Ballaghboy includes an existing hard surfaced car park at the end of the road, and the cable car control building itself. Below the car park is a small stone wall shelter with information signs. The steel lattice support structure for the cable car is located at a lower level, close to the coast. The land surrounding these areas is a mixture of coastal grassland, areas of heath and rock outcrops. Chapter 7 Biodiversity of this EIAR defines the habitat type at this location as dry-humid acid grassland, semi-natural grassland and heath.

Plate 11.6 **Car park along the access road to the cable car**

Plate 11.7 **Cable car control building and landing, and view over car park and information signs at lower level**

Plate 11.8 **Coastal grassland, rock outcrops and disturbed ground below the cable car control building and landing platform**

On Dursey Island, the landcover is similar. Areas of grassland, heath and rock outcrops are found in the vicinity of the cable car steel structure. A small building is located adjacent to the cable car landing point, and an informal car park is located next to this building. Plates 11.9 and 11.10 illustrate the landcover.

Dursey Sound is a narrow channel between the island and the mainland, and this seascape is also an important part of the character of the area.

Plate 11.9 **Grassland, heath, and rock outcrops are found around the cable car landing and associated structures on both sides of the Sound, with some agricultural land (on the mainland)**

Plate 11.10 **Car park, cable car landing and associated building and support structures**

Wider Context

On both sides of the Dursey Sound, landcover in the wider landscape is similar, consisting of rocky outcrops, areas of heath and grassland, with some of pockets of agricultural lands used for grazing. Roadways lead from both parking areas tend to be narrow.

On the Ballaghboy side, scattered dwellings and farm buildings are found along the roadside above, and agricultural lands are evident along the road (R572).

On Dursey Island, dwellings are less common and not found close to the cable car, a cluster of dwellings lies approximately 1 km to the southwest. Rocky coastlines, and the sea itself, are prominent elements in both areas. While some of the lands in the vicinity of the cable car station are used for grazing, improved agricultural land is not present in the immediate vicinity of the site, and is found, along with scattered dwellings, further to the south-west of the island as shown in Plate 11.11 below.

Plate 11.11 **Scrub and rocky outcrops in foreground with agricultural lands and scattered dwellings in background**

11.3.10 Structures and Cultural Heritage

Site and Immediate environs

The cable car itself and its history are a part of the area's cultural heritage. The buildings on both sites associated with the cable car are small buildings adjacent to the landing, which are raised concrete platforms surrounded by a wall (on the mainland site) and a railing on Dursey Island. The buildings are relatively recent and are not architecturally remarkable. On both sides also are supporting structures (pylons) for the cable car, which are located close to the coastline. These are important and distinctive features of the area which are clearly associated with the cable car and its history, which itself is now a well-known feature of the area. These supporting structures on the island are shown in Plate 11.10 above. On Dursey, cultural heritage elements close to the site include a church which is found close to the slipway, and its information display tells the story of O Sullivan Bere as well as the Dursey Massacre, referring to events since 1300.

Wider Context

There are numerous cultural heritage features on the island, both in terms of monuments to see, including the Signal Tower, as well as the history associated with the island. The Beara-Breifne Way trail starts from Dursey Island and it runs past the cable car station on the mainland side to connect to Garinish Point. This trail is related to the story of O Sullivan Bere and the historic march to Leitrim.

Plate 11.12 Ruins of monastic chapel and graveyard on Dursey Island

11.3.11 Land Uses

Site and Immediate vicinity

The main existing land use on the site can be described as transport, with a strong tourism dimension. The cable car connects Dursey Island with the mainland for locals but is a popular tourist attraction. Recreation is also a key land use, as the Beara-Breifne Way runs adjacent to the site on both the island and mainland sides. Grazing is also a land use observed adjacent to both the mainland and Dursey Island site.

Wider Landscape

In the wider landscape, agriculture is also a key land use, while tourism remains an important land use. Numerous tourist destinations are found in close proximity (within a number of kilometres) of the cable car station, and the route is along the Wild Atlantic Way, and the Beara-Breifne Way walking trail On Dursey Island, agriculture is the main land use, but the entire island is a popular tourist destination especially for walkers.

Visual Amenity

Both sites – on the mainland and on Dursey Island, are highly scenic. There are spectacular, often panoramic views of the rugged landscape and rocky coastline and the sea, from both sides of Dursey Sound. The R572 leading to the mainland station is a Scenic Route.

Views towards Dursey Island from the cable car park and landing are extensive, and views are across Dursey Sound to the island, as well as towards Crow's Head to the southwest, as shown in Plates 11.13 and 11.15 below:

Plate 11.13 **Scenic views across Dursey Sound towards Dursey island from the mainland site**

Plate 11.14 **Scenic views across Dursey Sound towards the Skelligs from the mainland site**

Plate 11.15 **Scenic views from Dursey Island to Crow's Head**

Views to the northwest are also available and in clear weather, the Skellig rocks can be seen from the mainland side. Views from Dursey Island across the Sound are similarly scenic, with views across Dursey Sound to the mainland, as well as view to Crow Head, as illustrated in Plates 11.9,11.11,11.12, 11.14 and 11.15.

11.3.12 Summary of Landscape Values

Policy clearly states that the landscape is highly valued for its character, scenic qualities and views, in the Landscape Strategy and the Development Plan. It is designated as High Value Landscape which denotes high landscape value, sensitivity and importance. The road which accesses the cable car station is also a Scenic Route.

However, landscape values of a site can be identified both through formal designations which infer landscape value, as well as values which are not enshrined in policy but are evident on the site.

These can be categorised in two ways – values which should be conserved, and those that provide opportunity for enhancement. The values to be conserved indicate those aspects of the receiving environment which are valued and sensitive and could be negatively impacted on by the proposed development. These values are generally of significance and should be considered the potential landscape and visual constraints to the proposed development.
These values are listed below. Criteria which denote landscape value which should be conserved, include:

- *Landscape Quality*: The landscape appears to be in good condition and in general, high quality and relatively intact. Some interventions in and around the site, such as the car parking area and the area around the existing cable car building and platform, are not of high quality and detract from the surroundings.
- *Sense of Wildness/Naturalness*: The site and surrounding landscape does have a very strong sense of wildness, and of naturalness. These diminish somewhat in the vicinity of the buildings and car park but the wider vicinity of the mainland site, and the whole of Dursey Island, has a strong sense of wildness and naturalness. The journey itself in the cable car also allows the experience the sense of wildness and naturalness. There is a remote character to the area, in particular the island.
- *Cultural /Heritage Value*: The areas has a strong sense of history and a number of built heritage features. Information boards recount the history of the cable car, of Dursey Island and important events. Walking trails with historic connections such as the Beara Breifne Way reinforce this strong sense of heritage and history.
- *Aesthetic Quality*: The area has a very strong scenic value, with panoramic views from the island and the mainland, of the rugged landscape, rocky shores and the sea itself.
- *Public Accessibility and Recreation Value*: Accessibility by the public is a key feature of both areas, the waymarked trail Beara-Breifne Way runs adjacent to both sites. The area is highly valued for recreation, in particular walking and hiking.

The landscape value of the sites and surrounds are considered to be High to Very High. This is defined as follows, based on guidance set out by the Guidelines on Landscape and Visual Assessment Landscape Institute (GLVIA) 2013;

A landscape whose values are clearly recognised in landscape policy or designations as being of national or international value and the principle management objective for the area is protection of the existing character from change.

11.3.13 Zone of Visual Influence and Potential Visual Receptors

In general, the views of the proposed development site are most evident looking across Dursey Sound, from both the island and the mainland, as well as other views over the sea. There are also likely to be some views towards the proposed development from the wider landscape.

In general, views of both cable car landing places, and views of both support structures, are visible from the same locations. The views of the cable car station on the mainland are somewhat less obvious but visible form Dursey Island. Plate 11.16 indicates the likely zone of visual influence, where the existing cable car structures are visible and are likely to be views where the proposed development is likely to be visible.

Plate 11.16 Predicted Zone of Visual Influence (Source: Bing Maps)

11.3.13.1 Potential Visual Receptors

Potentially sensitive visual receptors include local residents, which would be of high sensitivity, as well as tourists, and those involved in recreation along the walking and hiking trails or engaged in boating or sailing for recreation. Those travelling on the local road which is a scenic route are also of high sensitivity. Less sensitive visual receptors include those involved in work such as agricultural activities.

Potential visual receptors include viewers from local house clusters, roads, the cable car stations and areas close to the shore, as well as the scenic route leading to the cable car station and various locations along waymarked walking trails (Beara Breifne Way). There are a high proportion of sensitive receptors in the vicinity of the site.

11.3.13.2 Mainland Views

Views will be available from a short section (approximately 500m) of the R572 approach road and scenic route to the site of the proposed development on Dursey Island, but views of the development on both sides of the Sound will be available from approximately 300m along the road. Views further away on the approach road are hidden by the topography.

Other views of the proposed development from the mainland include views from the visitor car park, as well as from the cable car itself, and from the Beara-Breifne Way from the ridge above the cable car station. In the wider landscape, views from the local road and Beara-Breifne Way at Ballynacarriga, leading to Crow Head, and viewers from the Beara Breifne Way at Crow Head will also have visibility of the site.

11.3.13.3 Dursey Island Views

Views from Dursey Island are restricted to the area on the eastern part of the island, in the vicinity of the cable car, and from the slipway to the south of the island and from the Beara Way to the northwest of the cable car landing. Only a very short section of the local road, in direct proximity to the island landing point, has any visibility of the cableway. Views from the Beara Way are elevated, and the cableway is, therefore, clearly visible.

The views towards the proposed development of the cable car are of very high scenic quality.

11.4 Description of Potential Effects

11.4.1 Characteristics of the Proposed Development

Though the proposed development is described in detail in Chapter 4 of this EIAR, the main components of the development that are particularly relevant to landscape and visual effects include:

- The removal of the existing cableway structure, existing mainland visitor car park and both existing cable line station buildings;
- The retention of some existing cable car infrastructure on the mainland;
- A new cableway system, with supporting line structures;
- A mainland drive station and an island return station;
- Construction of an interpretive centre, ticketing area, shop and cafe on the mainland including a terrace overlooking Dursey Sound;
- A split-level visitor car park on the mainland with approx. 100 spaces and retention of a small existing residents' car park on the island; and,
- Road improvement works including the widening of the carriageway at 11 locations and further road improvements to include pavement and verge works at a number of other locations along the R572 approach road.

11.4.2 Design Rationale

Chapters 3 and 4 of this EIAR sets out the design evolution and approach, which was initially set out in the design brief as follows:

- *The development shall have "a design led integrated approach" […] "having regard to the unique and sensitive site context"*
- *It shall advance "integrated and innovative design solutions that will be specific to the site."*
- *The "external finishes and layout [of all structures] shall be sympathetic [and] in harmony with the surrounding landscape")*
- *All structures shall be "capable of withstanding a severe marine environment with minimal yearly maintenance"*
- *The site shall be "Fully landscaped [and] low maintenance"*

Several alternatives were considered for the scheme, with five options being initially produced as outlined in Chapter 3. The preferred scheme, Option 3A, further evolved and included issues arising from discussions with CCC's Project Steering Group, Failte Ireland and various scheme consultees.

The design seeks to replace the cable car and buildings and provide additional buildings and car parking on the mainland side, with a waiting, lookout area and limited parking on the island side. The proposal will replace basic, shed like structures with contemporary architectural buildings, with greater durability and a high quality appearance. Due to the location of the cable car, and the exposed nature of the location, the buildings and car park are not easily screened. Key aspects of the architectural design are as follows:

- The cableway will be supported by two pylons of functional tubular steel construction. Two passenger cabins will operate on the cableway.
- The proposed mainland buildings are low buildings which are set into the landscape and the proposed island station is a simple building. Materials used include robust contemporary and natural material which will weather well, and include cut stone, concrete and oxidised metal.
- The mainland side of the proposed development includes several buildings linked by courtyards with an outdoor terrace and viewing areas to maximise views.
- The car park is designed on two levels to minimise visual impact and rock cutting.
- Natural stone paving, stone faced car park and retaining walls, are features of the landscape design, while reinforced grasscrete car parking spaces and suitable vegetation will combine to create a character which fits in with the surrounding landscape.

11.4.3 Predicted Landscape Effects – Construction Phase

11.4.3.1 Landscape Sensitivity

The landscape sensitivity of the area including both the mainland site, island site, and surrounds, is considered to be High to Very High, and described in some more detail in the following paragraphs.

11.4.3.2 Magnitude of Change

The construction phase will involve demolition of station buildings, platforms and ropeways. Earthworks will be undertaken on the mainland site including excavation of rock and cutting of areas to facilitate the car park and visitor centre. Demolition of the cable station on the island and minor earthworks will be undertaken during this phase. During construction stage, there will be machinery working and entering and exiting from the mainland side, and noise and dust are likely to occur. There will also be works carried out along the R572 to construct the passing bays and visibility splay. As stated in Chapter 13 of Volume 2 of this EIAR – Air Quality and Climate – the sensitivity of the area to dust soiling as a result of the construction phase, under a worst case scenario, is considered to be low.

The construction phase is expected to last 18 months and this will result in **Short term, Slight, to Moderate adverse landscape effect** on both the mainland and the island site.

11.4.3.3 Predicted Landscape Effects – Operational Stage

Landscape Sensitivity

The site is located at the very tip of the Beara Peninsula, and on Dursey Island, in a relatively remote, rugged and highly scenic landscape and seascape, with a strong sense of naturalness.

The Draft Landscape Strategy ascribes a Very High value, Very High sensitivity, and a National landscape importance to the Landscape Character Type in which the site is located. The road to the site (R572) is a scenic route and the road on Dursey Island part of the Beara Breifne Way. Policy documents acknowledge the scenic and ecological values of the coastline, as well as the potential of tourism in the development of the area. The landscape sensitivity of the area including both the mainland site, island site, and surrounds, is considered to be High to Very High.

Magnitude of Change

The operational stage of the proposed development will result in the construction of a new cable car and associated equipment, to replace the existing cable car. Some of the infrastructure associated with the old cable car is to remain, as it is seen as part of the area's heritage and character. On the mainland side, an interpretative centre, ticket office and gift shop is also proposed along with a café building, and a cable car station, increasing the built form and the extent of this considerably compared to what is there at present. A larger car park is also proposed. Part of the development will utilise the existing car park hard surface, but some areas of heath will be removed for the development. Access is proposed to the slipway below from the development, and access to the Beara-Breifne Way will still be possible. The existing access to the Beara-Breifne way which runs to the north of the proposed development to Garinish Point is to be retained, and hikers will not be obliged to pay an entrance fee

Localised change in landscape character is likely, though over a limited area, including the site of the proposed development, and the eastern end of Dursey island, where the proposed development introduces a large element of built form into a relatively unchanged, remote and rugged landscape.

The magnitude of change of the development, on the mainland side, is considered Medium:

> *Change that is moderate in extent, resulting in partial loss or alteration of landscape receptors, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context*

The magnitude of change on the Island side is considered Low. Passing bays on the R572 on the approach road to the site are considered to have a Low magnitude of change;

Change that is moderate or limited in scale, resulting in minor alteration of landscape receptors.

Significance of Effect

The introduction of elements into a scenic landscape of high sensitivity are likely to result in effects on the landscape fabric but also on the landscape character. The significance of the effect on the landscape character of the study area on both sides of Dursey Sound, while relatively localised, is considered to **be Slight to Moderate**. The proposed development will cause a localised change in character due to the size and scale of the proposed development in this setting. The effects range from neutral to adverse in quality.

Adverse effects on the landscape character include a considerable increase in the hard surface footprint and built form on the mainland area, the removal of the open and expansive nature of the existing parking area/viewing area, with an emphasis on vehicular circulation, and the removal of areas of rock, heath and acid grassland habitat. These reduce the sense of naturalness and remoteness in the vicinity of the site.

The majority of the effects are considered neutral in quality –

> *Neutral - Scheme complements the scale, landform and pattern of the landscape and maintains landscape quality;*

These include the provision of a new cable car, retention of the existing mainland pylon and some of the infrastructure, and creation of access to the slipway and the reinstatement of part of the heath where the existing cable car building and hard surface is to be removed. The high quality design of the proposed buildings and their low form which assists integration into the landscape, reflects the unique landscape setting, and is seen as a neutral quality.

Measures included in the design that are proposed to reduce adverse effects, are described in Section 11.5 below.

11.4.3.4 Visual Effects

Visual Effects - Construction Stage

Visual effects during construction stage include demolition and construction works, earthworks. Earthworks will be undertaken on the mainland site including excavation of rock and cutting of areas to facilitate the car park and visitor centre as well as road improvements and passing bays. Visual effects are likely to be Short term, Slight adverse effects.

Visual Effects – Operational Stage

Visual effects were assessed based on site visits, study of the drawings, and assisted by the preparation of photomontages.

A number of photomontage locations were chosen based on the site visit, characteristics of the proposed development and the likely visibility. These are listed below in Table 11.6 below and included as Figures 11.2-11.21. A viewpoint location map is also included in Figure 11.1 of this EIAR.

Table 11.6 Viewpoint locations

Viewpoint Number	Description
1	View from end of local road on Beara-Breifne Way at Ballynacarriga, Crow Head
2	View from R472 and scenic route at Ballaghboy
3	View from R472 and scenic route at Ballaghboy
4	View from open landscape and Beara-Breifne Way to north of mainland site
5	View from ridge to north of mainland site at Ballaghboy

Viewpoint Number	Description
6	View from Beara-Breifne Way and ridge northwest of Dursey Island site
7	View from Beara-Breifne Way and local road south of Dursey Island Site
8	View from Beara-Breifne Way and local road south of Dursey Island Site
9	View from Bear-Breifne a Way and local road south of Dursey Island Site
10	View from pier south of Dursey Island Site

These represent viewers on the mainland, including on the R572 scenic route approaching the site of the existing cable car and proposed development, including views near residential receptors. A view from the local road and Beara-Breifne Way at Crow Head is also included. Views from the Beara-Breifne Way and landscape to the north of the island which are accessed only by pedestrians and hikers are included.

Views from the Dursey Island side include views from the local road and Beara-Breifne Way in the vicinity of the proposed development, as well as a view from the Beara-Breifne Way on the ridge north of the proposed development. A view from the slipway is also included.

Each photomontage is described in terms of the existing view, and proposed view. The visual receptor sensitivity and the magnitude of change are described in each case, which combine to give the significance of the visual effects.

Viewpoint 1 - View from end of local road on Beara-Breifne Way at Crow Head

Existing View

The existing view shows a view from the end of the local road which is also the Beara-Breifne Way at Crow Head. In the foreground are sloping fields, and the sea. There is a view across the sea towards Dursey Sound, with Dursey Island and Lamb's Head on the mainland side, clearly visible. There are few man-made elements in the view, with the landscape on both sides of the Sound composed of rugged terrain, some only some fields and some scattered dwellings visible on the mainland side. The existing cable car pylon is visible on the mainland, but the island pylon is less distinctive seen against the backdrop of the landscape. Wooden electricity poles are also visible, and the cable car station on the mainland is just discernible against the skyline.

Proposed View

Visual Receptor Sensitivity

Visual receptors include hikers along the Beara-Breifne Way, those using the local road and the view is considered highly scenic. These are considered to be of High sensitivity.

Magnitude of Change

The proposed development is visible in the view, and while more the elements are of greater size and scale than the existing, they still occupy a limited proportion of the view, and blend in well with the landscape colour and texture. The mainland cable car station protrudes slightly above the skyline, but does not obstruct the overall view. The retaining wall is somewhat visible but blends relatively well into the landscape.

The magnitude of change is considered to be Low –

> *Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context*

The predicted visual effect is considered **Slight, neutral** effect.

Viewpoint 2 - View from R572 at Ballaghboy

Existing View

This view represents one of the first locations where the site of the proposed development on both sides of the Dursey Sound, comes into view. The existing view shows a view towards Dursey Sound, a shed to the left in the foreground and the road sloping downhill away from the viewer, with two other dwellings and partly screened by the sloping topography. The mainland cable car platform and building are also partly visible to the right of the view. Across the Sound, Dursey Island is clearly visible. The existing cable car pylons on both sides are visible but blend in well against the landscape. The building and parked cars on the island are visible.

Proposed View

Visual Receptor Sensitivity

Visual receptors include those walking and driving the scenic route, and the view is considered highly scenic. Viewers would be considered of High sensitivity.

Magnitude of Change

The proposed view shows the proposed cable car station and parking area and replacement cable car pylon on Dursey Island are visible. The largest structures, the cable car building and pylon, are larger and more visible than the existing structures, but are set into the landscape and blend in well. The mainland visitor centre and cable car station are only partly visible, with the topography and dwellings screening some of these elements. The proposed pylon is more visible than the existing.

The magnitude of change is considered Low:

> *Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context*

The visual effect is considered **Slight, neutral effect.**

Viewpoint 3 - View from R572 at Ballaghboy

Existing View

The existing view shows a closer view than Viewpoint 2, along the R572 as one approaches the mainland site. The view shows the road in the foreground, the land on one side slopes towards the Sound. In the middle ground, the rough grassland and heath with rock outcrops is visible, with the car parking area at a lower level, and the cable car platform and building partly hidden by the topography. Beyond this, Dursey Sound and Dursey Island are visible. The existing pylons are visible but inobtrusive, and the island parking area and cable car building are visible but in no way obtrusive.

Proposed View

Visual Receptor Sensitivity

Visual receptors include those walking and driving the scenic route, and the view is considered highly scenic. Viewers would be considered of High sensitivity.

Magnitude of Change

The proposed view shows the proposed development on the mainland side is clearly visible. The car park is one of the main elements visible, appearing as a large area of hard surface, with the stone retaining walls also a noticeable feature. The car park and proposed buildings take up a larger footprint compared to the existing view, and introduce an element of enclosure to a previously open view. The visitor centre and cable car buildings partly obscure views across the Sound.

The magnitude of change is considered Medium –

> *Partial intrusion of the development in the view*

The significance of the effect is considered to be **Slight to Moderate**, while the quality of the effect is considered **Neutral to Adverse**. The extensive area of hard surface, car park, reduced vegetation and high walls appears as an adverse visual effect. This should be somewhat softened over time by the reinforced grasscrete surfacing on the car parking spaces. The buildings and pylon are considered to be of neutral quality, though distinctive, they blend in well in terms of materials and scale to the existing landform.

Viewpoint 4 - View from open landscape and Beara-Breifne Way to north of mainland site

Existing View

The existing view shows an open, simple and expansive landscape, with the landscape on both sides of Dursey Sound visible. The landcover of heath and rock outcrops in the foreground, on the mainland as well on Dursey Island, to the right, is distinctive and striking. A rock outcrop partly screens the existing cable car building and platform, and the pylon, cable car, and electricity poles are visible. In the distance, Crow Head is seen across the water.

Proposed View

Visual Receptor Sensitivity

Visual receptors would include those walking and hiking on the Beara-Breifne Way trail, and the view is considered highly scenic. Visual receptors are considered of High sensitivity.

Magnitude of Change

The proposed view shows the new cable car building and pylon which are the most obvious elements in the view, seen at relatively close proximity. The existing cable car building and platform are removed, with the machinery remaining and partly visible. The existing mainland pylon is partly obscured by the cable car building, and the cable car building is high but does not break the skyline. The pylon and cable car building on the Dursey Island are also visible.

The elements occupy a relatively limited proportion of the view, and though the cable car building restricts the views across to Crow Head, the remaining elements do not cause any obstruction and the simplicity of landcover and the open and expansive nature of the view, remain.

The magnitude of change is considered Low –

> *Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context*

The significance of the effect is considered **Slight, neutral effect**.

Viewpoint 5 - View from ridge (and Beara-Breifne Way) to north of mainland site at Ballaghboy

Existing View

The existing view shows an elevated, panoramic view from the ridge to the north of the proposed development. (This is also close to the Beara-Breifne Way route to Garinish). The view shows the landcover on both sides of the Sound is similar. In the foreground, areas of heath with rocky outcrops slope away from the viewer, down towards the existing cable car platform and control building, with the pylons and electricity poles evident. Around the building, parked cars, fences and containers are evident, and these create a minor element of visual clutter. The main car park is hidden from view. Across Dursey Sound, Dursey Island is visible, with the pylon and cable car building and carpark, discernible but unobtrusive. The sea is one of the main elements in the view, and the top of Crow Head is just visible to the left of the image.

Proposed View

Visual Receptor Sensitivity

Visual Receptors would be those walking and hiking in the area, and those using the Beara-Breifne Way trail which is in close proximity. The view is highly scenic, and viewers are considered of High sensitivity.

Magnitude of Change

The proposed view shows the development, including the lower tier of the car park, visitor centre and other buildings, and the cable car building to the right, though at a low level, are clearly visible from this view. The buildings and car park combine to create a considerably large spatial extent of hard surface. In contrast, the view of the proposed Dursey Island development shows though the pylon and building are of some height and visible, the development is of limited spatial extent and concentrated in one small area.

The magnitude of change in the view is considered to be Medium –

> *Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context*

The significance of the visual effect is considered Moderate to Significant. The quality of the visual effect has both beneficial and adverse aspects. The removal of the cable car buildings and hard standing area to allow for natural regeneration is considered a beneficial effect. While the buildings and some of the car park are set into the landscape, the increased visibility of the hard surfaced parking area and the considerable horizontal extent of hard surface and high walls in this view create an adverse effect. The overall effect is considered adverse.

Viewpoint 6 - View from Beara-Breifne Way and ridge northwest of Dursey Island site

Existing View

The existing view shows an elevated view from the Beara-Breifne Way at the ridge behind the cable car station on Dursey Island. In the foreground, an expanse of heathland slopes towards some cliffs and the existing pylon and cable car buildings and parking area are visible to the right of the image. Across Dursey Sound, the rugged landscape of the higher ground slopes to the sea, with agricultural fields on the lower ground. The cable car station and visitor car park are visible, as is the road and scattered dwellings which run parallel to the coast. In the distance, the slopes of Lackacrouaghan and Loughanemore hills are visible.

Proposed View

Visual Receptor *Sensitivity*

The viewers would include those walking the Beara-Breifne Way, and the view is considered highly scenic. The visual receptor sensitivity is considered to be High.

Magnitude of Change

The proposed view shows the replacement pylon and cable car station visible on the island to the right of the image. Across Dursey Sound, the proposed development is clearly visible and consists of a number of low buildings and a distinctive retaining wall. The spatial extent is considered medium in the context of the overall view, but the development is clearly visible as a new element in the view. The magnitude of change is considered to be Medium.

> *Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context,*

The significance of the visual effect is considered to be **Moderate,** and the quality of the effect is considered to be have both neutral and adverse aspects. The mainland development does appear as a large area of unbroken hard surfacing, particularly the retaining walls, which has an adverse effect. The island development is considered to have a neutral effect. The mainland development is well set into the landscape, and the building form relates well to the landscape. The overall effect is considered **neutral.**

Viewpoint 7 - View from Beara-Breifne Way and local road south of Dursey Island Site

Existing View

The existing view shows the view along the local road and Beara-Breifne Way on Dursey Island. The view is relatively close to the existing cable car building and car parking area, which is visible at the end of the road. The existing pylon and electricity poles are also visible in the centre of the image. The land on either side of the road is rugged and open, with a covering of heath, and Dursey Sound and the mainland landscape which is also rugged and composed of rock outcrops with a covering of heath, are visible in the background. The existing mainland cable car station and parking area are visible, but not obtrusive. There are no other buildings visible on the mainland in this view, with the exception of a shed to the right of the image.

Proposed View

Visual Receptor Sensitivity

Visual receptors include walkers, tourists, and local residents, and the view is considered highly scenic. Visual receptor sensitivity is considered to be High.

Magnitude of Change

The proposed view shows the proposed island cable car station is prominent in the view, visible at the end of the road. This building is considerably larger than the existing. The island pylon is also obtrusive from this view. The proposed mainland development is visible from this view and occupies a considerable proportion of the view. The retaining walls and buildings combine to create a large area of built form and hard surface form this view. The magnitude of change is considered Medium –

> *Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context,*

The visual effect is considered to be **Moderate** visual effect.

The quality of the view contains both neutral and adverse qualities. The large expanse of built form and hard surface where there were no previous structures appears as a large element of hard surface in this view. However, the building form and use of metal materials provide a change of texture as well as fitting in to the landscape. The quality of the effect is considered **neutral.**

Viewpoint 8 - View from Beara-Breifne Way and local road south of Dursey Island Site

Existing View

The existing view shows a view taken further away from the proposed development, then Viewpoint 7, along the same local road on Dursey Island, from a slightly elevated location. This view shows a slightly elevated view, with the road and the open, sloping, heath covered landscape in the foreground. The existing cable car building and car parking area and pylon are barely visible to the left of the image, while across Dursey Sound, the rugged and rocky landscape of the mainland is visible, with the cable car building and adjacent parking area just discernible but not obtrusive. To the left of the image, the peninsula to the north is visible across the sea. The view is considered highly scenic.

Proposed View

Visual Receptor Sensitivity

Visual receptors include walkers, tourists, and local residents, and the view is considered highly scenic. Visual receptor sensitivity is considered to be High.

Magnitude of Change

The proposed view shows the proposed island cable car station is less prominent in this view, than in View 7. Similarly, the proposed building is considerably larger than the existing which is barely discernible in this view. Both pylons are visible from this view. The proposed mainland development occupies a considerable proportion of the view, and the retaining walls and buildings combine to create a large are of built form and hard surface from this view. The magnitude of change is considered Medium –

> *Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context,*

The significance of the visual effect is considered to be **Moderate,** visual effect.

The quality of the visual effect is considered to vary from neutral to adverse. The retaining walls, combined with the concrete building walls increase the spatial extent and have an adverse visual effect, creating an area of considerable spatial extent which is hard surfaced. The proposed low level, form and simple high quality buildings sit well into the landscape, both on the mainland and the building on Dursey Island. The effect is considered neutral.

Viewpoint 9 - View from Beara-Breifne Way and local road south of Dursey Island Site at Ballynacallagh

Existing View

The existing view shows a view, also from the local road and Beara-Breifne Way in the townland of Ballynacallagh, further form the proposed island development than views 7 and 8. This shows the road in the foreground curving around the hill, with sloping heath to the left of the narrow road. Beyond this, the rugged mainland landscape is visible, with the rugged heath covered rock on the higher ground, sloping to some agricultural land and scattered buildings along the road. The existing cable car station and platform and some buildings to the right of the image are the only buildings visible.

Proposed View

Visual Receptor Sensitivity

Visual receptors include walkers, tourists, and local residents, and the view is considered highly scenic. Visual receptor sensitivity is considered to be High.

Magnitude of Change

The proposed view shows the island development is not visible from this location, with just the top of the island pylon visible behind the topography. The mainland site is almost completely visible in this view, and occupies a considerable extent of the view. The buildings are low, and well set into the landscape, and a mixture of materials are used. The proposed retaining walls and concrete walls combine to give a large area of hard surface visible from this location.

The magnitude of change is considered Low to Medium from this location, as the proposed development is at some distance from the viewer, the island development is hidden from view, and the mainland development occupies a smaller proportion of the view.

The significance of the visual effect is considered to be **Slight to Moderate,** effect. As is the case with views 7 and 8, the view has both adverse and neutral visual effects but considered neutral overall

Viewpoint 10 - View from pier south of Dursey Island Site

Existing View

The existing view shows the view from the pier on Dursey Island. This view is from a lower level and would be similar to views of those leaving the island by boat. The view shows the pier and rocky coastline in the foreground, while to the left, the sloping island topography partly screens the island pylon. A small stone building is seen on the left of the image. To the right of the view, Dursey Sound and the rugged mainland landscape is visible, including the cable car station and surroundings.

Proposed View

Visual Receptor Sensitivity

Visual receptors include walkers, tourists, and local residents and those using and operating and accessing boats. The view is considered highly scenic. Visual receptor sensitivity is considered to be Moderate to High.

Magnitude of Change

The island cable car building is partly hidden by the topography, and the pylon is visible. The mainland buildings, and retaining wall are visible but they occupy a small proportion of the view. The low level and form of the buildings sit well into the landscape, the walls being the most obvious feature.

The magnitude of change is considered to be Low.

The visual effect is considered **Slight,** and the effects are considered **neutral.**

Summary of Visual Effects

Table 11.7 below summarises the visual effects:

Table 11.7 Summary of Visual Effects

Viewpoint Number	Significance of Visual Effect
1	Slight, neutral effect
2	Slight, neutral effect
3	Slight/ Moderate, neutral to adverse effect
4	Slight, neutral effect
5	Moderate/Significant, adverse effect
6	Moderate, adverse effect
7	Moderate, neutral effect
8	Moderate, neutral effect
9	Slight/Moderate, neutral effect
10	Slight, neutral effect

Views from the mainland towards the proposed development

A selection of mainland views are represented by Viewpoints 1-5. Visual effects are considered Slight, neutral from 3 viewpoints, (1,2,4). From elevated views 3 and 5, View 3 is considered Slight/Moderate and neutral to adverse and Moderate/Significant, adverse from Views 5. Visual effects are relatively localised, the furthest mainland view taken is View 1 to the south of the development in Ballynacarriga.

Views of both island and mainland developments from the mainland towards the proposed development will be available from the southwestern part of the R572, as one approaches the existing cable car station, as well as from Crow Head to the south.

Views are available from the local road at Ballynacarriga, to the south east, leading to Crow Head, as seen in Viewpoint 1, and along the Beara-Breifne Way at Crow Head. These views however are at some distance, and the visual effect is considered to be Slight and neutral from this area. This would also be the case from the Beara Breifne way along Crow Head.

The whole development on both sides of the Sound is not visible from the R572 until relatively close to the cable car station, as shown in Views 2 and 3, so views are relatively localised in this area. These views range from Slight to Slight/Moderate as the development comes into view.

Other views from the mainland include Views 4 and 5, which represent those on foot, including those along the Beara-Breifne Way to the northwest of the proposed development and from the ridge directly north behind the development where there are extensive panoramic views. View 4 shows that for viewers along the lower levels to the northwest, the setting of the building ensures that the topography screens the majority of the proposed development and, as such, this is also considered a Slight neutral effect.

The more elevated views include Views 3 and 5 where the visual effects are more pronounced. View 5 shows a considerable change in the view, and the extent of hard surface car park, buildings and walls is considered to have a Moderate/Significant, adverse effect. Similarly, view 3 which is slightly elevated, also shows the considerable extent of hard surface car park and area of walls, and is considered a Slight/Moderate, neutral to adverse effect.

It should be noted that in reality, all of these views are extensive and panoramic views, where views of the sea and landscape are extensive. The proposed development does not intrude on these extensive views.

Views from Dursey Island

The views 5-10 represent Dursey island views.

Views from Dursey Island area towards the proposed development are restricted to the area on the eastern part of the island, approximately 500m along the local road from the cable car station. These views show that the entire mainland development is clearly visible from these views. Visual effects on the island range from Slight and neutral (View 10) but the majority of views are considered Moderate and the effects range from neutral to adverse.

The site is clearly visible from the elevated views from the Beara-Breifne Way up to the ridge overlooking Dursey Sound (View 6) to the west of the proposed development.

It should be noted that to the west of View 9, as illustrated on viewpoint map, Figure 11.1 of this EIAR, the proposed development is hidden by topography. Views 7,8,9 show the changing views from the local road, where views are in the direction of both the mainland and island developments. Plate 11.17 below illustrates the point, approximately 500m southwest of the island cable station, where the development will not be visible due to topography and shown in outline.

Plate 11.17: **Views of development screened by topography 500m south west of site (development outlined in white)**

View 10 from the pier, is at a lower level and the mainland development occupies a lesser extent of the view. The appearance of the mainland station would be similar to the view form a boat leaving the island slipway, and boats crossing the Sound would experience views at a lower level, where the retaining walls and visitor centre walls would be in close proximity to the mainland slipway.

The island development, while visible, is relatively small in extent and confined to a small area while the mainland development has a considerable horizontal extent.

The walls of the visitor centre, car park and retaining walls combine to increase the horizontal extent of the development and hard surface, as visible in Views 7, 8 and to a lesser extent in View 9 and the horizontal extent of hard surface results in an adverse visual effect. View 6, an elevated view from the ridge, also shows the considerable extent of hard surfacing.

The mainland buildings are however set in well to the topography, with a low horizontal profile and a range of materials, including weathered metal, and the cable car building and café site well into the landscape, and these aspects have a neutral visual effect.

It should be noted that these views, and in views 7,8,9, there are wide ranging and extensive views of the sea, mainland and over to Crow Head. The developments do not affect these views.

11.5 Mitigation and Monitoring Measures

11.5.1 Landscape Mitigation measures – Construction Phase

- Removal of cable car platform, building and hard surfacing, on the mainland side to be carried out, and the natural regeneration of area around the existing cable car station on the mainland side is to be facilitated. This is to be carried out by appropriate storage of topsoil to avoid compaction during construction, and the soil re-spread following construction. No seeding other than a sowing of red fescue to re-establish surface covering is to be carried out.

11.5.2 Landscape Mitigation measures – Operational Phase

Measures included in the design are proposed to reduce adverse effects which include

- The proposed development has been designed to minimise cut and fill, and to sit the development into the landscape, working with the topography where possible.
- Proposed built form is low to blend into the landscape.
- Natural materials are proposed to be used to blend the buildings into the landscape.
- The new visitor car park is presented at two levels to minimise cutting and thus optimise integration in the landscape. The parapet style walls which are provided to screen vehicles will be finished out stone effect to reflect the local dry-stone walling styles. The parking spaces are to be finished out with a reinforced grass system which will have a softening green effect on these significant spaces.
- The landscape plan for the mainland site indicates a simple approach with minimal intervention, indicating surface treatments which will include natural stone paving, exposed aggregate, and native planting to the scheme.
- Further softening of the hard surfaced areas and car park with vegetation (small trees/shrubs, climbers etc. and walls can be explored at detailed design stage to further reduce the visual effects of the large areas of hard surface.
- The green roof to the energy building slightly reduces the hard surface area.

11.6 Residual Effects

The replacement cable car pylons and cable car, though visible, are of a simple, and contemporary design, with an emphasis on functionality, and have less of a visual effect than the built form and car park elements of the design.

The design approach aims to replace the low-quality shed-like buildings with buildings of a high-quality design and with contemporary and local materials which are suitable for this exposed landscape. These buildings on the mainland side are considerably larger than the existing mainland structures and occupying a wider horizontal extent which has an adverse visual effect from some views. However, the high-quality design and use of materials and the low-level built form and viewing areas are positive elements that correspond well to the topography.

In summary, the more elevated viewpoints close to the site on the mainland and on Dursey Island will experience pronounced residual visual effects. Residual visual effects from more distant and less elevated views will be much less pronounced.

The proposed development is an intervention in a highly scenic and sensitive landscape. A development of this nature is likely to result in a change to the landscape and to the views and there are both beneficial and adverse aspects to the visual effects. The visual effects range from Slight to Moderate/Significant visual effect in one view and the majority are neutral in quality. The high-quality design, use of materials and the low-level built form and viewing areas are positive elements that correspond well to the topography. In general, the residual visual effects are relatively localised, and will not affect a wide area.

11.7 Difficulties Encountered

No particular difficulties were encountered during the completion of this landscape and visual impact assessment.

Chapter 12 Noise and Vibration

12.1 Introduction

This chapter, prepared by AWN Consulting, presents an assessment of the impacts of the proposed Dursey Island Cable Car and Visitor Centre in terms of noise and vibration of the local environment as defined in the following Environmental Protection Agency guidance documents:

- Advice Notes on Current Practice in the Preparation of EIS (2003);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports Draft August 2017; and
- Guidelines on the Information to be Contained in Environmental Impact Statements, 2002

The study has been undertaken using the following methodology:

- Baseline noise monitoring has been undertaken in the vicinity of the proposed development in order to characterise the existing noise environment;
- A review of the most applicable standards and guidelines has been conducted in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the proposed development;
- Predictive calculations have been performed for the construction phase of the project at the nearest sensitive locations to the development site;
- Predictive calculations have been performed to assess the potential impacts associated with the operation of the development at the nearest sensitive locations. A schedule of mitigation measures has been proposed to reduce, where necessary, the identified potential outward impacts relating to noise and vibration from the proposed development.

The following British Standards were also consulted when carrying out this assessment:

- BS 4142:2014 *Methods for Rating and Assessing Industrial and Commercial Sound*;
- BS 5228 (2009 +A1 2014) Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2; and
- BS 8233:2014 *Guidance on Sound Insulation and Noise Reduction for Buildings*.

This chapter of the Environmental Impact Assessment Report (EIAR) has been prepared by Dr Stephen Smyth BA BAI MIEI MIOA, Associate at AWN Consulting who has over 12 years' experience as an environmental consultant specialising in Acoustics, Impact Assessment and Management.

12.2 Receiving Environment

A baseline environmental noise survey was conducted in the vicinity of the proposed development in order to quantify the existing noise environment at the nearest noise-sensitive locations that may be affected by the proposed development.

A baseline survey of vibration along the proposed development was not undertaken as existing levels in the vicinity of the proposed development are not expected to be of a magnitude sufficient to cause disturbance to people or structural damage to property. Furthermore, vibration was not perceptible at any of the noise survey locations.

12.2.1 Survey Periods

An attended noise survey was conducted at 3 locations on 25 February 2019 between 11:30 and 14:45 hours. Note that the purpose of the baseline noise survey is to establish the baseline noise environment during the quietest period of the season in order that any subsequent construction and operational noise criteria set are suitable for all times of the year, including off season.

12.2.2 Measurement Locations

The measurement location descriptions are presented in Table 12.1 below and illustrated in Plate 12.1.

Table 12.1 Baseline Noise Monitoring Locations

Survey Location	Description
AN1	In the vicinity of the nearest residential property to the existing cable car
AN2	At the existing cable car carpark
AN3	On Dursey Island at a location considered representative of the nearest residential properties to the cable car on the island

Plate 12.1 Baseline Noise Monitoring Locations

12.2.3 Instrumentation

The measurements were performed using a Brüel & Kjær Type 2250 Sound Level Meter. Before and after the survey the measurement apparatus was check calibrated using a Brüel & Kjær Type 4231 Sound Level Calibrator.

12.2.4 Procedure

Measurements were conducted on a cyclical basis at the locations noted above. Sample periods for the noise measurements were 15 minutes at each location with each location sampled three times. The results were noted onto an Environmental Noise Survey Record Sheet immediately following each sample, and were also saved to the instrument memory for later analysis where required. Survey personnel noted the primary noise sources contributing to noise build-up.

12.2.5 Weather

The weather was dry and mild (10°C) but breezy with windspeeds of 10 to 15 m/s. Wind speeds were noted to be much lower only a few kms inland.

12.2.6 Measurement Parameters

The noise survey results are presented in terms of the following five parameters:

$L_{Aeq, T}$	is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the period T. It is typically used as a descriptor for ambient noise.
L_{Amax}	is the instantaneous maximum sound level measured during the sample period.
L_{Amin}	is the instantaneous minimum sound level measured during the sample period.
L_{A10}	is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.
L_{A90}	is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to 2×10^{-5} Pa.

12.2.7 Results of Noise Surveys

Table 12.2 presents the results of the attended measured noise levels for each of the three survey locations. The results of the survey have indicated that baseline noise levels at all locations assessed are dominated by sea and wind noise. The existing cable car is silent in its operation.

At location AN1 the noise climate was dominated by sea and wind noise with some bird calls audible. There were 1 or 2 car movements past the survey location during the course of the measurements. Ambient noise levels were measured in the range of 50 to 51 dB L_{Aeq}. Background noise levels were in the range of 48 to 49dB L_{A90}.

At location AN2 the noise climate was also dominated by sea and wind noise with some bird calls audible. Ambient noise levels ranged from 52 to 62 dB L_{Aeq}, the highest value measured during a particularly gusty period. Background noise levels were in the range of 50 to 56 dB L_{A90}.

At location AN3 the noise climate was dominated by sea and wind noise with some bird calls audible. No man-made noise sources were audible at this location. Ambient noise levels ranged from 52 to 53 dB L_{Aeq}. Background noise levels were in the range of 49 to 50 dB L_{A90}.

Table 12.2 Baseline Noise Monitoring Results

Survey Location	Start time	Measured Noise Levels (dB re.2x10^{-5}Pa)					Notes
		L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	
AN1	11:30	51	64	47	52	49	Sea and waves main contributing noise source. Wind noise also contributed. Seagulls and 2 cars passed survey location. Cable car not audible at this location.
	11:45	50	65	47	52	49	Sea and waves main contributing noise source. Wind noise also contributed. Seagulls. Cable car not audible at this location.
	13:45	50	66	46	51	48	Sea and waves main contributing noise source. Wind noise also contributed. 1 car passed survey location. Cable car not audible at this location.
AN2	12:15	62	77	52	66	56	Measurement taken at cable car launch area. Cable car did not contribute to measured noise level/ambient noise. Wind and sea main contributors. Elevated and exposed location.
	14:10	53	73	48	53	50	Measurement taken at lower location in public car park underneath cable car. Cable car not audible. Sea and wind main contributing noise source.
	14:30	52	59	48	53	50	Measurement taken at lower location in public car park underneath cable car. Cable car not audible. Sea and wind main contributing noise source.
AN3	12:40	52	67	48	53	49	No man-made noise sources audible including cable car. Sea and wind noise.
	12:55	53	71	47	54	50	As above
	13:10	53	70	48	55	50	As above

12.3 Methodology

12.3.1 Construction Assessment Criteria

Noise

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. In lieu of statutory guidance, an assessment of significance has been undertaken as per British Standard *BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise*.

The approach adopted here calls for the designation of a noise sensitive location into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates a significant noise impact is associated with the construction activities.

BS 5228-1:2009+A1:2014 sets out guidance on permissible noise levels relative to the existing noise environment. Table 12.3 sets out the values which, when exceeded, signify a significant effect at the façades of residential receptors.

Table 12.3 Example Threshold of Potential Significant Effect at Dwellings

Assessment category and threshold value period	Threshold value, in decibels (dB) ($L_{Aeq, T}$)		
	Category A[A]	Category B[B]	Category C[C]
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
Evenings and weekends [D]	55	60	65
Night-time (23:00 to 07:00hrs)	45	50	55

[A] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

[B] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

[C] Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

[D] 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

For the appropriate assessment period (i.e. daytime in this instance) the ambient noise level is determined through a logarithmic averaging of the measurements for each location and then rounded to the nearest 5dB. If the construction noise exceeds the appropriate category value, then a significant effect is deemed to occur. Table 12.4 presents the assigned *BS 5228-1:2009+A1:2014* categories and threshold values for each baseline location.

Table 12.4 Defined Construction Noise Thresholds

Survey Location	$L_{Aeq, T}$	Ambient Noise Level Rounded to Nearest 5 dB L_{Aeq}	BS 5228-1:2009+A1:2014 Category	Construction Noise Threshold Value (dB) ($L_{Aeq, T}$)
AN1	50	50	A	65
AN2	55-60	60	A	65

Survey Location	$L_{Aeq, T}$	Ambient Noise Level Rounded to Nearest 5 dB L_{Aeq}	BS 5228-1:2009+A1:2014 Category	Construction Noise Threshold Value (dB) ($L_{Aeq, T}$)
AN3	55	55	A	65

Vibration

In terms of vibration, *BS 5228-2:2009+A1:2014* recommends that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (PPV) (in frequency range of predominant pulse) of 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above. The standard also notes that below 12.5 mm/s PPV the risk of damage tends to zero. It is therefore common, on a cautious basis, to use this lower value. Taking the above into consideration the vibration criteria in Table 12.5 are recommended.

Table 12.5 Defined Construction Vibration Thresholds for Structurally Sound Buildings

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:-		
Less than 15Hz	**15 to 40Hz**	**40Hz and above**
15 mm/s	20 mm/s	50 mm/s

Note that the above thresholds are specified for transient or intermittent vibrations. Some construction activities may give rise to continuous vibrations. In these instances, the guidance recommends that the previously defined thresholds are reduced by at least 50%.

12.3.2 Operational Assessment Criteria

Vehicular Noise

The main potential source of outward noise associated with the development is noise due to vehicular traffic accessing the development. In order to assist with the interpretation of the noise associated with vehicular traffic on existing public roads, Table 12.6 offers guidance as to the likely impact associated with any particular change in traffic noise level (Source Design Manual for Roads and Bridges (DMRB), 2011).

Table 12.6 Likely Impact Associated with Change in Traffic Noise Level

Change in Sound Level (dB L_{A10})	Subjective Reaction	Magnitude of Impact
0	Inaudible	No Impact
0.1 – 2.9	Barely Perceptible	Negligible
3 – 4.9	Perceptible	Minor
5 – 9.9	Up to a doubling of loudness	Moderate
10+	Doubling of loudness and above	Major

Table 12.6 presents the DMRB (2011) likely impacts associated with change in traffic noise level. The corresponding significance of impact presented in the *EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports*

(EIAR), Draft, August 2017 is presented in Table 12.7 for consistency in wording and terminology for the assessment of impact significance.

Table 12.7 Likely Impact Associated with Change in Traffic Noise Level

Change in Sound Level DMRB, 2011 (dB L_{A10})	Subjective Reaction DMRB, 2011	Impact Guidelines for Noise Impact Assessment Significance (Institute of Acoustics)	Impact Guidelines on the Information to be contained in EIAR (EPA)
0	No change	None	Imperceptible
0.1 – 2.9	Barely perceptible	Minor	Not Significant
3.0 – 4.9	Noticeable	Moderate	Slight, Moderate
5.0 – 9.9	Up to a doubling or halving of loudness	Substantial	Significant
10.0 or more	More than a doubling or halving of loudness	Major	Very Significant, Profound

The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3 dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10 dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

Plant Noise

In relation to external services plant noise that may be required to service the development, reference is made to BS 4142:2014 *Methods for Rating and Assessing Industrial and Commercial Sound*. This document describes methods for rating and assessing sound of an industrial and/or commercial nature to a residential receptor. The methods described in this standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. The results of baseline surveys of the prevailing background sound level allow for the noise impact associated with proposed new external plant items to be assessed. With reference to BS 4142:2014, it is noted that, depending on context, adverse impacts are likely to occur when rated plant sound level exceeds the prevailing background sound level by +5dB, with a significant adverse impact occurring at +10dB or more. Where the rating level does not exceed the background sound level, BS 4142 comments that this is an indication of the specific sound source having a low impact, again depending on the context.

12.4 Potential Impacts

During the construction phase the main site activities will include site clearance, earthworks, substructure and super structure construction. This phase will involve the use of various mobile plant, excavators, cranes and other standard construction machinery throughout most of the site. Although it is expected that the earthworks and substructure works are likely to give rise to noise and vibration emissions, the impact is considered relatively short-term in nature and is assessed in Section 12.4.1.

12.4.1 Construction Phase

Noise

Construction noise has been predicted at the nearest noise sensitive location. The receptor location is presented in Plate 12.2.

Plate 12.2 Noise Sensitive Receptor Location

A variety of items of plant will be in use for the purposes of site clearance and construction. There will be vehicular movements to and from the site that will make use of existing roads. Due to the nature of these activities, there is potential for the generation of elevated levels of noise.

The main elements of construction for the proposed development can be summarised as follows:

- Site preparation including establishment of boundary security, site clearance, and diversion, removal or protection of existing services as necessary;
- Approach road improvement works;
- Earthworks (cutting and filling);
- Construction of cableway infrastructure – 2 no. stations, 2 no. pylons and installation of cableway machinery, ropes and cable cars;
- Buildings and associated services and civils works:
    - Visitor Centre / gift shop;
    - Café with toilet block;
    - Mainland station building (drive station) with staff facilities, workshop and storage;
    - Energy Centre;
    - Island station building (return station) with welfare facilities;
- Pavement, drainage and wastewater treatment installations;
- Landscaping and finishes

Due to the fact that the construction programme is not progressed to a detail level at this stage of the programme, it is not possible to calculate specific noise emissions to the local environment from different phases of works. However, the following tables present calculations of indicative noise levels for typical noise sources associated with construction.

BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1 Noise sets out typical noise levels for items of construction plant. Table 12.8 sets out assumed plant items during the key phases of construction with the associated source reference from BS5228 *Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1 Noise*. The closest property to the proposed visitor centre is over 200m away, however, in addition to the main visitor centre works there are also 10 no. passing bays and 1 no. visibility splay being constructed along the R572 which will result in road works being carried out at various distances from 10m to 50m from dwellings.

Table 12.8 Indicative construction noise calculations at closest properties to works

Construction Activities	**Calculated Construction Noise Levels, dB $L_{Aeq,1hr}$**		
	10m	**50m**	**200m**
Site Clearance & Preparation			
Wheeled loader C2-26	n/a		45
Tracked excavator (loading dump truck) C1-10			51
Dozer C.2.10			46
Dump Truck C2.30			45
Rock Breaking C9.12			56
General Construction (Building & Cableway)			
Wheeled loader C2-26	n/a		47
Tracked excavator (loading dump truck) C1-10			53
Crane C4.38			46
Dump Truck C2.30			47
Circular Saw C4.71			58
Diesel Generator C4.84			47
Angle Grinder C4.93			53
Road Works			
Tracked excavator (C2.21)	71	50	n/a
Dump Truck (C2.30)	79	58	
vibration rollers (C5.20)	75	54	
Asphalt Paver & Tipping Lorry (C.5.31)	77	56	
Diesel Generator (C4.76)	61	40	
Road Rollers (C5.19)	80	59	

The results of the assessment have indicated that at distances of 10m from the works, the construction daytime noise limit of 65dB L_{Aeq} is likely to be exceeded. This scenario applies only to locations which are in immediate proximity to road works along the R572 which are expected to last for a short duration. At distances of 50m and beyond noise levels associated with construction plant items are further reduced and are typically within the daytime noise construction criterion.

Whist the calculations have demonstrated that works can be conducted within the adopted criteria at certain distances, it is recommended that the various best practice working methods used to control noise and vibration are adopted by the contractor during all works.

Vibration

The potential for vibration at neighbouring sensitive locations during construction is typically limited to excavation works, road rolling and lorry movements on uneven road surfaces. The more significant of these is the vibration from road rolling; the method of which will be selected and controlled to ensure there is no likelihood of structural or even cosmetic damage to existing neighbouring dwellings.

12.4.2 Operational Phase

Noise

There are two primary sources of operational noise that may be associated with the development:

- Plant servicing the Visitor Centre, and;
- Additional vehicular traffic.

Plant Servicing the Visitor Centre

Once a development of this nature becomes fully operational, a variety of electrical and mechanical plant will be required to service the Visitor Centre. Most of this plant will be capable of generating noise to some degree. Some of this plant may operate 24 hours a day, and hence would be most noticeable during quiet periods (i.e. overnight). Noisy plant with a direct line-of-sight to noise sensitive properties would potentially have the greatest impact.

In this instance, based on the baseline noise environment, mechanical plant serving the Visitor Centre, will be controlled in accordance with BS 4142 such that the existing noise environment is not increased. Note that this applies to the plant required for normal operations, emergency or back-up plant such as the generator and related equipment will not be subject to the same noise limits.

Given the distance from the Visitor Centre buildings to the nearest sensitive locations is in excess of 200m, it is expected that once new plant is controlled such that noise emissions do not exceed 85dB at 1m, the requirements of BS4142 will be met and the existing noise climate is not expected to change.

Additional Vehicular Traffic

A traffic impact assessment relating to the proposed development has been prepared by Roughan & O'Donovan as part of this application. Information from this report has been used to determine the predicted change in noise levels along the R572, for the opening (2023) and design (2038) years of the development.

For the purposes of assessing potential noise impact, it is appropriate to consider the relative increase in noise level associated with traffic movements on the existing road network. Traffic flow data for the peak hour period during the peak season have been assessed and the calculated change in noise levels during this period is summarised in Table 12.9. The predicted increase in noise level has been calculated in accordance with the approach outlined in the Calculation of Road Traffic Noise (CRTN) which is the preferred calculation methodology for assessing road traffic noise in Ireland.

Table 12.9 Change in Traffic Noise Levels During Peak Months (July & August) with Proposed Development

Road	Base Year Daily Vehicle Movements	Opening Year with Development Daily Vehicle Movements	Change in Noise Level dB (A)	Base Year Daily Vehicle Movements	Design Year With Development Daily Vehicle Movements	Change in Noise Level dB (A)
R572	470	476	+0.1	470	501	+0.3

Making reference to the predicted change in traffic noise level in Table 12.9 and comparing it to the table of significance effects from Table 12.7, it can be seen that the proposed development is expected to have a negligible impact on the noise environment.

In summary, the future traffic volumes associated with the development are not expected to increase the existing noise levels by any noticeable amount. Note that it is proposed to limit the visitor numbers to the mainland Visitor Centre to 100,000 per annum which will ensure that traffic volumes do not increase significantly.

Vibration

No vibration emissions are expected from the operation of the proposed Visitor Centre.

12.4.3 Human Health Impacts

Construction Impacts

The assessment found that there is potential for some short term and temporary noise and vibration impacts during construction. However, with the application of standard construction methods, binding hours of operation and mitigation measures detailed in this chapter, any impacts due to noise and vibration will be temporary in nature and will not impact on human health.

Operational Impacts

There are no likely significant impacts due to noise or vibration during the operational phase that will impact on human health.

12.5 Mitigation Measures

12.5.1 Construction Phase

Noise

With regard to construction activities, best practice control measures for noise and vibration from construction sites are found within *BS 5228 (2009 +A1 2014) Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2*. It is expected that the contractor will ensure that all best practice noise and vibration control methods will be used as necessary in order to ensure impacts to nearby residential noise sensitive locations are not significant.

Noise-related mitigation methods are described below and will be implemented for the project in accordance with best practice. These methods include:

- No plant used on site will be permitted to cause an ongoing public nuisance due to noise;
- The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations;
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract;
- Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers;
- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use;
- During construction, the contractor will manage the works to comply with noise limits outlined in *BS 5228-1:2009+A1 2014. Part 1 – Noise*;
- All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures;
- Limiting the hours during which site activities which are likely to create high levels of noise or vibration are permitted;
- Monitoring levels of noise and vibration during critical periods and at sensitive locations;
- Establishing channels of communication between the contractor/developer, Cork County Council and residents so that receptors are aware of the likely duration of activities likely to generate higher noise or vibration;
- The Contractor shall appoint a Site Environmental Manager (SEM) who is responsible for matters relating to noise and vibration.;

Furthermore, it is envisaged that a variety of practicable noise control measures will be employed. These may include:

- Selection of plant with low inherent potential for generation of noise and/or vibration;
- Erection of good quality, printed site hoarding which will act as a noise barrier to general construction activity at ground level;
- Erection of barriers as necessary around items such as generators or high duty compressors; and
- Situate any noisy plant as far away from sensitive properties as permitted by site constraints.

Working Hours

Normal working times will be 07:00 to 19:00hrs Monday to Friday and 08:00 to 16:30hrs Saturday and Sunday. Works will not be undertaken outside these working hours without the written permission of Cork County Council.

12.5.2 Operational Phase

During the operational phase of the development, noise from building services equipment serving the Visitor Centre will be selected such that the noise emission does not exceed 85dB(A) at 1m from the plant item.

No mitigation measures are necessary with respect to the control of noise or vibration impacts from additional vehicular traffic.

12.6 Residual Impacts

12.6.1 Construction Phase

During the construction phase of the project there is the potential for impacts on nearby noise sensitive properties due to noise emissions from site activities. The application of binding noise limits, hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impacts will be reduced as far as is reasonably practicable. The resultant residual noise impact from this source will be of negative, significant, short-term impact.

Table 12.10 Description of Construction Phase Effects

Quality	Significance	Duration
Negative	Significant	Short-term

12.6.2 Operational Phase

During the operational phase it is expected that noise emissions from the development will not be perceptible above the existing noise environment resulting in a neutral, imperceptible, long-term impact.

Table 12.11 Description of Construction Phase Effects

Quality	Significance	Duration
Neutral	Imperceptible	Long-term

12.7 Difficulties Encountered

No difficulties were encountered during the preparation of this chapter.

12.8 Conclusion

The proposed Dursey Island Visitor Centre has been assessed to determine the potential of the development to generate a noise or vibration impact.

During the construction phase of the project there is the potential for impacts on nearby noise sensitive properties due to noise emissions from site activities. The application of binding noise limits, hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impacts will be reduced as far as is reasonably practicable.

At operational stage it has been found that the change in road traffic volumes on the main access route to the site, via R572, will not change significantly as a result of the development. The predicted change in the noise environment during the peak season is less than 1dB which is considered to be negligible. Building services plant will be selected at design stage such that any noise emissions from this plant do not result in a noticeable increase in the existing noise environment at the nearest residential dwellings.

Chapter 13 Air Quality & Climate

13.1 Introduction

This chapter assesses the likely air quality and climate impacts, if any, associated with the proposed Dursey Island Cable Car and Visitor Centre. The proposed development also includes upgrades to the approach road, the R572, from the junction with the R575 to the cable car. These upgrades will include the construction of 10 no. new passing bays and 1 no. visibility splay, and completion of a number of other localised improvements to improve forward visibility. A full description of the proposed development can be found in Chapter 4 of Volume 2 of this EIAR – Description of the Proposed Development.

13.2 Methodology

13.2.1 Background Information

Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (see Table 13.1 and Appendix 13.1).

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2011, which incorporate European Union (EU) Directive 2008/50/EC, which has set limit values for NO_2, PM_{10}, $PM_{2.5}$, benzene and CO (see Table 13.1). Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used which are triggers for particular actions (see Appendix 13.1).

Table 13.1 Ambient Air Quality Standards

Pollutant	Regulation Note 1	Limit Type	Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 μg/m^3
		Annual limit for protection of human health	40 μg/m^3
		Critical level for protection of vegetation	30 μg/m^3 NO + NO_2
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 μg/m^3
		Annual limit for protection of human health	40 μg/m^3
Particulate Matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 μg/m^3
Benzene	2008/50/EC	Annual limit for protection of human health	5 μg/m^3
Carbon Monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	10 mg/m^3 (8.6 ppm)

[Note 1] EU 2008/50/EC – Clean Air For Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

Dust Deposition Guidelines

The concern from a health perspective is focussed on particles of dust which are less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$) and the EU ambient air quality standards outlined in Table 13.1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regards to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland. Furthermore, no specific criteria have been stipulated for nuisance dust in respect of this development.

With regard to dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/(m^2*day) averaged over a one year period at any receptors outside the site boundary. Recommendations from the Department of the Environment, Health & Local Government (DOEHLG, 2004) apply the Bergerhoff limit of 350 mg/(m^2*day) to the site boundary of quarries. This limit value can also be implemented with regard to dust impacts from construction of the proposed development.

Climate Agreements

Ireland ratified the United Nations Framework Convention on Climate Change (UNFCCC) in April 1994 and the Kyoto Protocol in principle in 1997 and formally in May 2002 (UNFCCC, 1997; UNFCCC, 1999). For the purposes of the EU burden sharing agreement under Article 4 of the Doha Amendment to the Kyoto Protocol, in December 2012, Ireland agreed to limit the net growth of the six Greenhouse Gases (GHGs) under the Kyoto Protocol to 20% below the 2005 level over the period 2013 to 2020 (UNFCCC, 2012).

The UNFCCC is continuing detailed negotiations in relation to GHGs reductions and in relation to technical issues such as Emission Trading and burden sharing. The most recent Conference of the Parties to the Convention (COP24) took place in Katowice, Poland from the 4th to the 14th December 2018 and focussed on advancing the implementation of the Paris Agreement. The Paris Agreement was established at COP21 in Paris in 2015 and is an important milestone in terms of international climate change agreements. The Paris Agreement was agreed by over 200 nations and has a stated aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit global GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to greenhouse gas emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress was also made on elevating adaption onto the same level as action to cut and curb emissions.

The EU, in October 2014, agreed the "2030 Climate and Energy Policy Framework" (EU 2014). The European Council endorsed a binding EU target of at least a 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990. The target will be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the ETS and non-ETS sectors amounting to 43% and 30% by 2030 compared to 2005, respectively. Secondly, it was agreed that all Member

States will participate in this effort, balancing considerations of fairness and solidarity. The policy also outlines, under "Renewables and Energy Efficiency", an EU binding target of at least 27% for the share of renewable energy consumed in the EU in 2030.

Gothenburg Protocol

In 1999, Ireland signed the Gothenburg Protocol to the 1979 UN Convention on Long Range Transboundary Air Pollution. The initial objective of the Protocol was to control and reduce emissions of Sulphur Dioxide (SO_2), Nitrogen Oxides (NO_X), Volatile Organic Compounds (VOCs) and Ammonia (NH_3). To achieve the initial targets Ireland was obliged, by 2010, to meet national emission ceilings of 42 kt for SO_2 (67% below 2001 levels), 65 kt for NO_X (52% reduction), 55 kt for VOCs (37% reduction) and 116 kt for NH_3 (6% reduction). In 2012, the Gothenburg Protocol was revised to include national emission reduction commitments for the main air pollutants to be achieved in 2020 and beyond and to include emission reduction commitments for $PM_{2.5}$.

European Commission Directive 2001/81/EC, the National Emissions Ceiling Directive (NECD), prescribes the same emission limits as the 1999 Gothenburg Protocol. A National Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005 (DEHLG, 2004; 2007). Data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO_2, VOCs and NH_3 but failed to comply with the ceiling for NO_X (EEA, 2012). Directive (EU) 2016/2284 "*On the Reduction of National Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC*" was published in December 2016. The Directive will apply the 2010 NECD limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_X, NMVOC, NH_3, $PM_{2.5}$ and CH_4. In relation to Ireland, 2020 emission targets are 25 kt for SO_2 (65% on 2005 levels), 65 kt for NO_X (49% reduction on 2005 levels), 43 kt for VOCs (25% reduction on 2005 levels), 108 kt for NH_3 (1% reduction on 2005 levels) and 10 kt for $PM_{2.5}$ (18% reduction on 2005 levels). In relation to 2030, Ireland's emission targets are 85% below 2005 levels for SO_2, 69% reduction for NO_x, 32% reduction for VOCs, 5% reduction for NH_3 and 41% reduction for $PM_{2.5}$.

13.2.2 Construction Phase

The Institute of Air Quality Management in the UK (IAQM) guidelines (2014) outline an assessment method for predicting the impact of dust emissions from demolition, earthworks, construction and haulage activities based on the scale & nature of the works and the sensitivity of the area to dust impacts. The IAQM methodology has been applied to the construction phase of this development in order to predict the likely magnitude of the dust impacts in the absence of mitigation measures.

13.2.3 Operational Phase

The air quality assessment is carried out following procedures described in publications by the EPA (2015, 2017) and using the methodology outlined in the guidance documents published by the UK DEFRA (2018; 2016). The assessment of air quality was carried out using a phased approach as recommended by the UK DEFRA (2018). The phased approach recommends that the complexity of an air quality assessment be consistent with the risk of failing to achieve the air quality standards. In the current assessment, an initial scoping of possible key pollutants was carried out and the likely location of air pollution "*hot-spots*" identified. An examination of recent EPA and Local Authority data in Ireland (EPA, 2019) has indicated that SO_2, smoke and CO are unlikely to be exceeded in the majority of locations within Ireland and thus these pollutants do not require detailed monitoring or assessment to be carried out. However, the analysis did indicate potential issues in regards to nitrogen dioxide (NO_2), PM_{10} and $PM_{2.5}$ at busy junctions in urban centres (EPA, 2019). Benzene, although previously reported at quite high levels in urban centres, has recently been measured at several city centre locations to be well below the EU limit value (EPA, 2018). Historically, CO levels in urban areas were a cause for concern. However, CO concentrations have decreased significantly over the past number of years and are now measured to be well below the limits even in urban centres (EPA 2018; 2019). The key pollutants reviewed in the assessments are NO_2, PM_{10}, $PM_{2.5}$, benzene and CO, with particular focus on NO_2 and PM_{10}.

The assessment methodology involves air dispersion modelling using the UK DMRB Screening Model (Version 1.03c, July 2007), the NO_x to NO_2 Conversion Spreadsheet (Version 6.1, October 2017) (UK DEFRA, 2017), and following guidance issued by the TII (2011), UK Highways Agency (2007), UK DEFRA (2018; 2016; UK DETR 1998) and the EPA (2017, 2015).

The TII guidance (2011) states that the assessment must progress to detailed modelling if:

- Concentrations exceed 90% of the air quality limit values when assessed by the screening method; or
- Sensitive receptors exist within 50m of a complex road layout (e.g. grade separated junctions, hills etc).

The UK DMRB guidance (UK Highways Agency, 2007), on which the TII guidance was based, states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment:

- Road alignment change of 5 metres or more;
- Daily traffic flow changes by 1,000 AADT or more;
- HGV flows change by 200 vehicles per day or more;
- Daily average speed changes by 10 km/h or more; or
- Peak hour speed changes by 20 km/h or more.

The proposed development will not increase traffic volume (AADT or HGVs), speeds or change the road alignment by an amount greater than the criteria discussed above. Therefore, no road links impacted by the proposed development satisfy the above criteria and a quantitative assessment of the impact of traffic emissions on ambient air quality and climate is not necessary.

Ecological Sites

For routes that pass within 2km of a designated area of conservation (either Irish or European designation) the TII guidelines (2011) require consultation with an Ecologist. However, in practice, the potential for impact to an ecological site is highest within 200m of the proposed development and when significant changes in AADT (>5%) occur.

Transport Infrastructure Ireland's *Guidelines for Assessment of Ecological Impacts of* National *Road Scheme*s (2009) and *Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities* (DEHLG, 2010) provide details regarding the legal protection of designated conservation areas.

If both of the following assessment criteria are met, an assessment of the potential for impact due to nitrogen deposition should be conducted:

- A designated area of conservation is located within 200 m of the proposed development; and
- A significant change in AADT flows (>5%) will occur.

Beara Peninsula SPA, Garinish Point pNHA and Kenmare River SAC are all located within 200m of the R572 which will be directly impacted by the proposed development. As such an assessment of the impact with regard to nitrogen oxide (NO_x) concentrations and nitrogen deposition was conducted. Dispersion modelling and prediction was carried out at typical traffic speeds for the affected parts of the road which will be nearest the designated sites. Ambient NO_x concentrations were predicted for the worst-case year (design year 2038) along a transect of up to 200m within the SPA, pNHA and SAC. The road contribution to dry deposition of nitrogen along the transect was also calculated using the methodology outlined in Appendix 9 of the *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011).

13.3 Baseline Environment

13.3.1 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality is the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e. traffic levels). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM_{10}, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than $PM_{2.5}$) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles ($PM_{2.5}$ - PM_{10}) will actually increase at higher wind speeds. Thus, measured levels of PM_{10} will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Valentia observatory, which is located approximately 37km north of the site. Valentia Observatory met data has been examined to identify the prevailing wind direction and average wind speeds (Met Éireann, 2019). For data collated over the period 1981 – 2010, the predominant wind direction is southwesterly with an average wind speed over the period of 5 m/s.

13.3.2 Baseline Air Quality – Review of Available Background Data

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality in Ireland is "*Air Quality In Ireland 2017 – Indicators of Air Quality*" (EPA, 2018). The EPA website details the range and scope of monitoring undertaken throughout Ireland and provides both monitoring data and the results of previous air quality assessments (EPA, 2019).

As part of the implementation of the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA, 2018). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D.

In terms of air monitoring and assessment, the proposed development is within Zone D (EPA, 2018). The long-term monitoring data has been used to determine background concentrations for the key pollutants in the region of the proposed development. The background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating etc.).

NO_2 monitoring was carried out at two rural Zone D locations in Emo and Kilkitt in recent years, and in two urban areas in Enniscorthy and Castlebar (EPA,2018). The NO_2 annual averages in 2017 for both rural sites, Emo and Killkitt, were 3 μg/m^3 and 2 μg/m^3, respectively; with the results for Castlebar averaging 7 μg/m^3. Hence long-term average concentrations measured at all locations were significantly lower than the annual average limit value of 40 μg/m^3. The maximum 1-hour limit value of 200 μg/m^3 (measured as a 99.8th percentile i.e. 18 exceedances are allowed per year) was not exceeded in any year. The average results at rural Zone D locations over the last five years suggests an upper average of no more than 4 μg/m^3 as a background concentration (Table 13.2). Based on the above information, a conservative estimate of the current background NO_2 concentration for the region of the development is 6 μg/m^3.

Long term NO_X monitoring has been carried out at a four Zone D locations in recent years: Castlebar, Enniscorthy, Kilkitt and Emo. Annual mean concentrations of NO_X at the monitoring sites over the period 2013 – 2017 ranged from 2 μg/m^3 for a purely rural area to 25 μg/m^3 for an urbanised area (see Table 13.3). The area of the proposed development is predominantly rural in nature, therefore, an appropriate conservative estimate for the current background NO_X concentration in the region of the proposed development is 8 μg/m^3.

Table 13.2 Trends In Zone D Air Quality - Nitrogen Dioxide (NO_2)

Station	Averaging Period Notes 1, 2	Year				
		2013	2014	2015	2016	2017
Castlebar	Annual Mean NO_2 (μg/m^3)	11	8	8	9	7
	99.8th %ile 1-hr NO_2 (μg/m^3)	65.7	71.2	-	65.6	59.8
Kilkitt	Annual Mean NO_2 (μg/m^3)	4	3	2	3	2
	99.8th %ile 1-hr NO_2 (μg/m^3)	46.3	26.9	-	26.1	17.0
Emo	Annual Mean NO_2 (μg/m^3)	4	3	3	4	3
	99.8th %ile 1-hr NO_2 (μg/m^3)	26.8	25.5	-	35.5	27.5
Enniscorthy	Annual Mean NO_2 (μg/m^3)	-	13	9	10	-
	99.8th %ile 1-hr NO_2 (μg/m^3)	-	-	-	72.5	-

Note 1 Annual average limit value - 40 μg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Note 2 1-hour limit value - 200 μg/m^3 as a 99.8th%ile, i.e. not to be exceeded >18 times per year (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Table 13.3 Trends In Zone D Air Quality - Nitrogen Oxide (NO_X)

Station	Averaging Period Note 1	Year				
		2013	2014	2015	2016	2017
Castlebar	Annual Mean (μg/m^3)	16	12	11	13	11
Kilkitt	Annual Mean (μg/m^3)	5	3	2	4	3

Station	Averaging Period [Note 1]	Year				
		2013	2014	2015	2016	2017
Emo	Annual Mean (µg/m^3)	5	5	3	6	4
Enniscorthy	Annual Mean (µg/m^3)	-	25	9	17	-

[Note 1] Annual average limit value - 30 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Long-term PM_{10} measurements carried out at the rural Zone D location in Kilkitt in 2017 gave an average level of 8 µg/m^3 (EPA, 2018). Long-term PM_{10} monitoring was carried out at the urban Zone D locations of Castlebar, Enniscorthy and Claremorris in recent years. The average annual mean concentration measured at Castlebar and Claremorris in 2017 was 11 µg/m^3 (see Table 13.4). The average results over the last five years at the rural Zone D location of Kilkitt suggests an upper average of no more than 11 µg/m^3 as a background concentration. Based on the above information a conservative estimate of the current background PM_{10} concentration for the region of the development is 11 µg/m^3.

Table 13.4 Trends In Zone D Air Quality - PM_{10}

Station	Averaging Period [Notes 1, 2]	Year				
		2013	2014	2015	2016	2017
Castlebar	Annual Mean PM_{10} (µg/m^3)	15	12	13	12	11
	24-hr Mean > 50 µg/m^3 (days)	7	2	2	1	1
Kilkitt	Annual Mean PM_{10} (µg/m^3)	11	9	9	8	8
	24-hr Mean > 50 µg/m^3 (days)	3	2	1	0	0
Claremorris	Annual Mean PM_{10} (µg/m^3)	13	10	10	10	11
	24-hr Mean > 50 µg/m^3 (days)	3	0	0	0	1
Enniscorthy	Annual Mean PM_{10} (µg/m^3)	-	22	18	17	-
	24-hr Mean > 50 µg/m^3 (days)	-	6	9	7	-

[Note 1] Annual average limit value - 40 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

[Note 2] 24-hour limit value - 50 µg/m^3 as a 90.4th%ile, i.e. not to be exceeded >35 times per year (EU Council Directive 1999/30/EC & S.I. No. 180 of 2011).

The results of $PM_{2.5}$ monitoring at Claremorris for the period 2013 - 2017 indicated an average $PM_{2.5}/PM_{10}$ ratio ranging from 0.50 – 0.62. Based on this information, a conservative ratio of 0.65 was used to generate a background $PM_{2.5}$ concentration for the region of the development of 7 µg/m^3.

In terms of benzene, monitoring data for the Zone D location of Shannon Town is not available since 2012. As an alternative, data from the Zone C location of Kilkenny for the period 2014 – 2017 showed an upper average concentration of no more than 0.2 µg/m^3, which is significantly below the 5 µg/m^3 limit value. Based on this monitoring data a conservative estimate of the current background concentration in the region of the development is 0.2 µg/m^3.

With regard to CO, annual averages at the Zone D location of Enniscorthy for the 2014 - 2016 period are low, peaking at 0.6 mg/m^3 or 6% of the limit value of 10 mg/m^3 (EPA, 2018). More recent data for Zone D locations is not available. Data for the Zone C monitoring station in Portlaoise gave an annual mean concentration of

0.2 mg/m^3 in 2017. Based on this EPA data, a conservative estimate of the current background CO concentration in the region of the development is 0.6 mg/m^3.

Background concentrations for the Design Year of 2038 have been calculated for the ecological assessment. These have used current estimated background concentrations and the year on year reduction factors provided by Transport Infrastructure Ireland in the *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011) and the UK Department for Environment, Food and Rural Affairs LAQM.TG(16) (2018).

13.3.3 Sensitivity of the Receiving Environment

In line with the IAQM guidance document (2014) prior to assessing the impact of dust from a proposed development the sensitivity of the area must first be assessed as outlined below. Both receptor sensitivity and proximity to proposed works areas are taken into consideration. For the purposes of this assessment, high sensitivity receptors are regarded as residential properties where people are likely to spend the majority of their time. Commercial properties and places of work are regarded as medium sensitivity while low sensitivity receptors are places where people are present for short periods or do not expect a high level of amenity.

In terms of receptor sensitivity to dust soiling, there are no sensitive receptors within 20m of the proposed works and less than 10 sensitive receptors within 50m of the proposed works. Based on the IAQM criteria outlined in Table 13.5, the worst case sensitivity of the area to dust soiling is considered to be **low**.

Table 13.5 Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number Of Receptors	Distance from source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	**Low**	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

In addition to sensitivity to dust soiling, the IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to human health impacts. The criteria take into consideration the current annual mean PM_{10} concentration, receptor sensitivity based on type and the number of receptors affected within various distance bands from the construction works. A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the proposed development is estimated to be 11 µg/m^3 and there are no sensitivite receptors located less than 20m from the proposed works and less than 10 sensitive receptors located less than 50m from the proposed works. Based on the IAQM criteria outlined in Table 13.6, the worst case sensitivity of the area to human health is considered to be **low**.

Table 13.6 Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number Of Receptors	Distance from source (m)			
			<20	<50	<100	<200
High	< 24 µg/m^3	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	**Low**	Low	Low
Medium	< 24 µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	< 24 µg/m^3	>1	Low	Low	Low	Low

The IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to ecological impacts from dust. The criteria take into consideration whether the receiving environment is classified as a Special Area of Conservation (SAC), a Special Protected Area (SPA), a Natural Heritage Area (NHA) or a proposed Natural Heritage Area (pNHA) as dictated by the EU Habitats Directive or whether the site is a local nature reserve or home to a sensitive plant or animal species. As the construction will occur directly adjacent to or in close proximity to the Garinish Point pNHA, Bearish Peninsula SPA, Kenmare River SAC and Dursey Island pNHA., the worst-case sensitivity of the area to ecological impacts is considered to be high.

13.4 Predicted Impacts

13.4.1 Do Nothing Scenario

The 'do nothing scenario' includes retention of the existing cableway and associated infrastructure, without the proposed development works. In this scenario, ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from potential new developments in the surrounding area, changes in road traffic, etc).

13.4.2 Construction Phase

Air Quality

The greatest potential impact on air quality during the construction phase of the proposed development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 200m of a construction site, the majority of the deposition occurs within the first 50m. The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction.

It is important to note that the potential impacts associated with the construction phase of the proposed development are short-term in nature. In addition, works on site will be carried out in a phased manner which will further reduce the potential for significant dust emissions. When the dust minimisation measures detailed in Appendix 13.2 of this report are implemented, fugitive emissions of dust from the site will not be significant and will pose no nuisance at nearby receptors.

In order to determine the level of dust mitigation required during the proposed works, the potential dust emission magnitude for each dust generating activity needs to be taken into account, in conjunction with the previously established sensitivity of the area (see Section 13.3.4). The major dust generating activities are divided into four types within the IAQM guidance to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout (movement of heavy vehicles).

In order to determine the level of dust mitigation required during the proposed demolition, earthworks, construction and trackout activities, the potential dust emission magnitude for each category in turn needs to be taken into account, along with the already established sensitivity of the area.

Demolition

Demolition will primarily involve the removal of buildings or structures currently on the site in a potentially dusty manner. This may also involve dust generation at heights. Dust emission magnitude from demolition can be classified as small, medium and large and are described below.

- **Large**: Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level;
- **Medium**: Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level; and
- **Small**: Total building volume less than 20,000 m^3.

Lead was detected in paint samples from the existing pylons and anchors. Appropriate mitigation measures will be implemented during the demolition phase of the development to ensure that potential adverse air quality impacts from this source are minimised. There are minimal demolition works required for the proposed development. Therefore, the demolition works can be classified as small. As the overall sensitivity of the area to dust soiling and human health impacts is low, there is a **negligible risk** associated with the proposed demolition activities according to IAQM guidance (2014) (see Table 13.7). As the overall sensitivity of the area to ecological impacts is high, there is an overall **medium risk** of ecological impacts as a result of the proposed demolition activities (see Table 13.7).

Table 13.7 Risk of Dust Impacts - Demolition

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	**Medium Risk**
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	**Negligible**

Earthworks

Earthworks typically involve excavating material, loading and unloading of materials, tipping and stockpiling activities. Activities such as levelling the site and landscaping works are also considered under this category. Dust emission magnitude from earthworks can be classified as small, medium and large and are described below.

- **Large:** Total site area > 10,000 m^2, potentially dusty soil type (e.g. clay which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds > 8 m in height, total material moved >100,000 tonnes;
- **Medium:** Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 – 8 m in height, total material moved 20,000 – 100,000 tonnes; and
- **Small:** Total site area < 2,500 m^2, soil type with large grain size (e.g. sand), < 5 heavy earth moving vehicles active at any one time, formation of bunds < 4 m in height, total material moved < 20,000 tonnes, earthworks during wetter months.

Under the IAQM guidance (2014) the proposed earthworks can be classified as small. This results in an overall **negligible risk** of temporary dust soiling and temporary human health impacts as a result of earthworks activities (see Table 13.8). As the overall sensitivity of the area to ecological impacts is high there is an overall **low risk** of ecological impacts as a result of the proposed earthworks activities (see Table 13.8).

Table 13.8 Risk of Dust Impacts - Earthworks

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	**Low Risk**
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	**Negligible**

Construction

Dust emission magnitude from construction can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large:** Total building volume > 100,000 m^3, on-site concrete batching, sandblasting;
- **Medium:** Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), on-site concrete batching;
- **Small:** Total building volume < 25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

The dust emission magnitude from construction associated with the proposed development works can be classified as medium as a worst-case according to the IAQM guidance (2014) as the construction will involve pouring of concrete. Therefore, there is an overall **low risk** of temporary dust soiling and human health impacts as a result of the proposed construction activities (Table 13.9). As the overall sensitivity of the area to ecological impacts is high there is an overall **medium risk** of ecological impacts as a result of the proposed construction activities (see Table 13.9).

Table 13.9 Risk of Dust Impacts – Construction

Sensitivity of Area	**Dust Emission Magnitude**		
	Large	**Medium**	**Small**
High	High Risk	**Medium Risk**	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	**Low Risk**	Negligible

Trackout

Factors which determine the dust emission magnitude associated with trackout are vehicle size, vehicle speed, number of vehicles, road surface material and duration of movement. Dust emission magnitude from trackout can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large:** > 50 HGV (> 3.5 t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length > 100 m;
- **Medium:** 10 - 50 HGV (> 3.5 t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 - 100 m;
- **Small:** < 10 HGV (> 3.5 t) outward movements in any one day, surface material with low potential for dust release, unpaved road length < 50 m.

Dust emission magnitude from trackout can be classified as small under IAQM guidance as there are likely to be less than 10 outward HGV movements per day. This results in an overall **negligible risk** of temporary dust soiling impacts and temporary human health impacts as a result of the proposed trackout activities. As the overall sensitivity of the area to ecological impacts is high there is an overall **low risk** of ecological impacts as a result of the proposed trackout (see Table 13.10).

Table 13.10 Risk of Dust Impacts – Trackout

Sensitivity of Area	**Dust Emission Magnitude**		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	**Low Risk**
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	**Negligible**

Summary of Dust Emission Risk

The risk of dust impacts as a result of the proposed development are summarised in Table 13.11 for each activity. The magnitude of risk determined is used to prescribe the level of site specific mitigation required for each activity in order to prevent significant impacts occurring.

Overall, in order to ensure that no dust nuisance occurs during the demolition, earthworks, construction and trackout activities, a range of dust mitigation measures associated with a **medium risk** of dust impacts must be implemented. When the dust mitigation measures detailed in Appendix 13.2 are implemented, fugitive emissions of dust from the site will be insignificant and pose no nuisance at nearby receptors. In addition all works will be phased which will further reduce the potential for significant dust emissions and dust related impacts.

Table 13.11 Summary of Dust Impact Risk used to Define Site-Specific Mitigation

Potential Impact	Dust Emission Magnitude			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Dust Soiling	Negligible	Negligible	Low Risk	Negligible
Human Health	Negligible	Negligible	Low Risk	Negligible
Ecological Impacts	Medium Risk	Low Risk	Medium Risk	Low Risk

Climate

There is the potential for a number of greenhouse gas emissions to atmosphere during the construction of the development. Construction vehicles, generators etc., may give rise to CO_2 and N_2O emissions. However, based on the scale and nature of construction for the proposed development and the short-term nature of the construction phase, the impact on the climate is considered to be short-term and imperceptible.

Human Health

Best practice mitigation measures associated with a low risk of temporary human health impacts are proposed for the construction phase of the proposed development. These will focus on the pro-active control of dust and other air pollutants to minimise generation of fugitive emissions at source. The mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the proposed development is likely to be short-term and imperceptible with respect to human health.

13.4.3 Operational Phase

Air Quality

There is the potential for a number of emissions to the atmosphere during the operational phase of the development. In particular, the traffic-related air emissions may generate quantities of air pollutants such as NO_2, CO, benzene and PM_{10}. However, impacts from these emissions have been screened out using the UK DMRB guidance (2016), on which the TII guidance was based (see Section 13.2.3).

The proposed development will not increase traffic volume (AADT or HGVs), speeds or change the road alignment by an amount greater than the criteria outlined in Section 13.2.3. Therefore, no road links impacted by the proposed development satisfy the criteria for quantitative assessment and an assessment of the impact of traffic emissions on ambient air quality and climate is not necessary. It can therefore be determined that the impact to air quality from traffic emissions during the operational stage of the development will be long-term and imperceptible.

Air Quality Impact on Designated Sites

The impact of NO_X (i.e. NO and NO_2) emissions resulting from the traffic along the R572 associated with the proposed development at the Beara Peninsula SPA, Garinish Island pNHA and Kenmare River SAC was assessed. Ambient NO_X concentrations were predicted for the worst-case year (design year 2038) along a transect of up to 200m from the R572 and are given in Table 13.12. The road contribution to dry deposition along the transect is also given and was calculated using the methodology of TII (TII, 2011).

The predicted annual average NO_X level (including background) at the worst-case location in the designated sites, adjacent to the proposed development is well below the limit value of 30 μg/m^3 for both the "Do Nothing" and "Do Something" scenarios. Do Nothing NO_X concentrations are 26% of this limit (including background concentrations); with the proposed development in place NO_X concentrations only increase by 0.02 μg/m^3, reaching 26% of the limit (including background levels).

The road contribution to the NO_2 dry deposition rate along the 200m transect within the designated sites is also detailed in Table 13.12. The maximum increase in the NO_2 dry deposition rate is 0.001 Kg(N)/ha/yr. This reaches only 0.01% of the critical load for coastal habitats of 10 - 20 Kg(N)/ha/yr.

Therefore, the impact of the proposed development in terms NO_x impacts on sensitive ecosystems is long-term, neutral and imperceptible.

Table 13.12 Assessment of NO_X Concentrations and NO_2 Dry Deposition Impact in nearby Designated Sites in 2038

Distance to Roads (m) Note 1	**NO_X Conc. (µg/m^3)**			**NO_2 Dry Deposition Rate Impact**
	Do Nothing	**Do Something**	**Increase**	**Kg N ha^{-1} yr-^{1}**
3m	7.82	7.84	0.01	0.001
13m	7.78	7.80	0.01	0.001
23m	7.74	7.75	0.01	0.000
33m	7.71	7.71	0.01	0.000
43m	7.68	7.69	0.01	0.000
53m	7.67	7.67	0.00	0.000
63m	7.65	7.66	0.00	0.000
73m	7.64	7.64	0.00	0.000
83m	7.63	7.63	0.00	0.000
93m	7.63	7.63	0.00	0.000
103m	7.62	7.62	0.00	0.000
113m	7.62	7.62	0.00	0.000
123m	7.61	7.61	0.00	0.000
133m	7.61	7.61	0.00	0.000
143m	7.61	7.61	0.00	0.000
153m	7.61	7.61	0.00	0.000
163m	7.61	7.61	0.00	0.000
173m	7.61	7.61	0.00	0.000
183m	7.60	7.61	0.00	0.000
193m	7.60	7.60	0.00	0.000
200m	7.60	7.60	0.00	0.000

Note 1 Distances given are to centreline of R572

Climate

There is the potential for a number of greenhouse gas emissions to atmosphere during the operational phase of the development. Road traffic and space heating of buildings may give rise to CO_2 and N_2O emissions. However, as the projected changes in traffic volumes on the road links impacted by the development are below the criteria requiring a quantitative air and climate modelling assessment, it can therefore be determined that the impact to climate from traffic emissions during the operational stage will be long term and imperceptible.

Human Health

Traffic related air emissions have the potential to impact air quality which can affect human health. However, as the traffic generated by the proposed development is below the thresholds requiring a quantitative assessment, it can be determined that the impact to human health during the operational stage is long-term and imperceptible.

13.5 Mitigation Measures

13.5.1 Construction Phase

Air Quality

The pro-active control of fugitive dust will ensure the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released. The main contractor will be responsible for the coordination, implementation and ongoing monitoring of the dust management plan. The key aspects of controlling dust are listed below. Full details of the dust management plan can be found in Appendix 13.2.

In summary the measures which will be implemented will include:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
- Furthermore, any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.
- Vehicles exiting the site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads.
- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates.
- Vehicles delivering material with dust potential (soil, aggregates) will be enclosed or covered with tarpaulin at all times to restrict the escape of dust.
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.
- A High Efficiency Particulate Air (HEPA)-filter vacuum shall be employed to clean up debris resulting from the removal (accidental or otherwise) of paints on the structures in question;

- Where paint removal is required, a wet-based method shall be applied;
- Any paint debris shall be disposed of in accordance with the Waste Management Act; and
- All personnel engaged in the removal of (or otherwise working on or near) structures which have been determined to be coated with lead-containing paint shall wear appropriate protective clothing.

At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

Climate

Construction traffic and embodied energy of construction materials are expected to be the dominant source of greenhouse gas emissions as a result of the construction phase of the development. Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, due to short-term nature of these works, the impact on climate will be imperceptible.

Nevertheless, some site-specific mitigation measures can be implemented during the construction phase of the proposed development to ensure emissions are minimised. In particular the prevention of on-site or delivery vehicles from leaving engines idling, even over short periods. Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.

13.5.2 Operational Phase

Air Quality & Climate

No additional mitigation measures are required during the operational phase of the proposed development, which is expected to have an imperceptible impact on ambient air quality and climate.

13.6 Monitoring

13.6.1 Construction Phase

There is no monitoring recommended for the construction stage of the proposed development, except what is required on the part of the Site Environmental Manager (SEM) to ensure the implementation of the prescribed mitigation measures. It is considered that, provided the mitigation measured outlined in Section 13.5 and Appendix 13.2 are implemented, dust related impacts as a result of the proposed development will be short-term and imperceptible (i.e. insignificant).

13.6.2 Operational Phase

There is no monitoring recommended for the operational phase of the development as impacts to air quality and climate are predicted to be imperceptible.

13.7 Difficulties Encountered

There were no difficulties encountered while carrying out this assessment, which may have impacted the outcome.

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Appendix 13.1 Ambient Air Quality Standards

Cork County Council
Comhairle Contae Chorcaí

Fáilte Ireland
National Tourism Development Authority

ROD
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APPENDIX 13.1
Ambient Air Quality Standards

National standards for ambient air pollutants in Ireland have generally ensued from Council Directives enacted in the EU (& previously the EC & EEC). The initial interest in ambient air pollution legislation in the EU dates from the early 1980s and was in response to the most serious pollutant problems at that time which was the issue of acid rain. As a result of this sulphur dioxide, and later nitrogen dioxide, were both the focus of EU legislation. Linked to the acid rain problem was urban smog associated with fuel burning for space heating purposes. Also apparent at this time were the problems caused by leaded petrol and EU legislation was introduced to deal with this problem in the early 1980s.

In recent decades the EU has focused on defining a basis strategy across the EU in relation to ambient air quality. In 1996, a Framework Directive, Council Directive 96/62/EC, on ambient air quality assessment and management was enacted. The aims of the Directive are fourfold. Firstly, the Directive's aim is to establish objectives for ambient air quality designed to avoid harmful effects to health. Secondly, the Directive aims to assess ambient air quality on the basis of common methods and criteria throughout the EU. Additionally, it is aimed to make information on air quality available to the public via alert thresholds and fourthly, it aims to maintain air quality where it is good and improve it in other cases.

As part of these measures to improve air quality, the European Commission has adopted proposals for daughter legislation under Directive 96/62/EC. The first of these directives to be enacted, Council Directive 1999/30/EC, has been passed into Irish Law as S.I. No 271 of 2002 (Air Quality Standards Regulations 2002), and has set limit values which came into operation on 17th June 2002. The Air Quality Standards Regulations 2002 detail margins of tolerance, which are trigger levels for certain types of action in the period leading to the attainment date. The margin of tolerance varies from 60% for lead, to 30% for 24-hour limit value for PM_{10}, 40% for the hourly and annual limit value for NO_2 and 26% for hourly SO_2 limit values. The margin of tolerance commenced from June 2002, and started to reduce from 1 January 2003 and every 12 months thereafter by equal annual percentages to reach 0% by the attainment date. A second daughter directive, EU Council Directive 2000/69/EC, has published limit values for both carbon monoxide and benzene in ambient air. This has also been passed into Irish Law under the Air Quality Standards Regulations 2002.

The most recent EU Council Directive on ambient air quality was published on the 11/06/08 which has been transposed into Irish Law as S.I. 180 of 2011. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive and its subsequent daughter directives. Provisions were also made for the inclusion of new ambient limit values relating to $PM_{2.5}$. The margins of tolerance specific to each pollutant were also slightly adjusted from previous directives. In regards to existing ambient air quality standards, it is not proposed to modify the standards but to strengthen existing provisions to ensure that non-compliances are removed. In addition, new ambient standards for $PM_{2.5}$ are included in Directive 2008/50/EC. The approach for $PM_{2.5}$ was to establish a target value of 25 $\mu g/m^3$, as an annual average (to be attained everywhere by 2010) and a limit value of 25 $\mu g/m^3$, as an annual average (to be attained everywhere by 2015), coupled with a target to reduce human exposure generally to $PM_{2.5}$ between 2010 and 2020. This exposure reduction target will range from 0% (for $PM_{2.5}$ concentrations of less than 8.5 $\mu g/m^3$ to 20% of the average exposure indicator (AEI) for concentrations of between 18 - 22 $\mu g/m^3$). Where the AEI is currently greater than 22 $\mu g/m^3$ all appropriate measures should be employed to reduce this level to 18 $\mu g/m^3$ by 2020. The AEI is based on measurements taken in urban background locations averaged over a three year period from 2008 - 2010 and again from 2018-2020. Additionally, an exposure concentration obligation of 20 $\mu g/m^3$ was set to be complied with by 2015 again based on the AEI.

Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used which are triggers for particular actions. The Alert Threshold is defined in Council Directive 96/62/EC as "a level beyond which there is a risk to human health from brief exposure and at which immediate steps shall be taken as laid down in Directive 96/62/EC". These steps include undertaking to ensure that the necessary steps are taken to inform the public (e.g. by means of radio, television and the press).

The Margin of Tolerance is defined in Council Directive 96/62/EC as a concentration which is higher than the limit value when legislation comes into force. It decreases to meet the limit value by the attainment date. The Upper Assessment Threshold is defined in Council Directive 96/62/EC as a concentration above which high quality measurement is mandatory. Data from measurement may be supplemented by information from other sources, including air quality modelling.

An annual average limit for both NO_X (NO and NO_2) is applicable for the protection of vegetation in highly rural areas away from major sources of NO_X such as large conurbations, factories and high road vehicle activity such as a dual carriageway or motorway. Annex VI of EU Directive 1999/30/EC identifies that monitoring to demonstrate compliance with the NO_X limit for the protection of vegetation should be carried out distances greater than:

- 5 km from the nearest motorway or dual carriageway;
- 5 km from the nearest major industrial installation;
- 20 km from a major urban conurbation.

As a guideline, a monitoring station should be indicative of approximately 1000 km^2 of surrounding area.

Under the terms of EU Framework Directive on Ambient Air Quality (96/62/EC), geographical areas within member states have been classified in terms of zones. The zones have been defined in order to meet the criteria for air quality monitoring, assessment and management as described in the Framework Directive and Daughter Directives. Zone A is defined as Dublin and its environs, Zone B is defined as Cork City, Zone C is defined as 23 urban areas with a population greater than 15,000 and Zone D is defined as the remainder of the country. The Zones were defined based on among other things, population and existing ambient air quality.

EU Council Directive 96/62/EC on ambient air quality and assessment has been adopted into Irish Legislation (S.I. No. 33 of 1999). The act has designated the Environmental Protection Agency (EPA) as the competent authority responsible for the implementation of the Directive and for assessing ambient air quality in the State. Other commonly referenced ambient air quality standards include the World Health Organisation (WHO). The WHO guidelines differ from air quality standards in that they are primarily set to protect public health from the effects of air pollution. Air quality standards, however, are air quality guidelines recommended by governments, for which additional factors, such as socio-economic factors, may be considered.

Appendix 13.2 Dust Minimisation Plan

Cork
County Council
Comhairle Contae Chorcaí

Fáilte Ireland
National Tourism Development Authority

ROD
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APPENDIX 13.2
Dust Minimisation Plan

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK (IAQM 2014, BRE 2003, Scottish Office 1996 and UK ODPM 2002). and the USA (USEPA 1997).

Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance As the prevailing wind in the region of the site is predominantly south-westerly, locating construction compounds and storage piles downwind of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed (BRE 2003, UK ODPM 2002). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials (USEPA 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods were care will be needed to ensure that dust nuisance does not occur. The following measures shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent must engage a Site Environmental Manager (SEM) to monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are minimised;
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details;
- It is recommended that community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;
- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein;
- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below.

Site Roads / Haulage Route

Movement of construction trucks along site roads (particularly unpaved roads) can be a significant source of fugitive dust if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80%(UK ODPM 2002).

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved site roads;
- Access gates to the site shall be located at least 10m from sensitive receptors where possible;
- Bowsers or suitable watering equipment will be available during periods of dry weather throughout the construction period. Research has found that watering can reduce dust emissions by 50% (USEPA, 1997). Watering shall be conducted during sustained dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use;
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.

Land Clearing / Earth Moving

Land clearing/earth-moving works during periods of high winds and dry weather conditions can be a significant source of dust. The following procedures shall be implemented at the site:

- During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust;
- During periods of very high winds (gales), activities likely to generate significant dust emissions should be postponed until the gale has subsided.

Storage Piles

The location and moisture content of storage piles are important factors which determine their potential for dust emissions. The following measures shall be employed to minimise fugitive dust formation from storage piles:

- Overburden material shall be protected from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles should be located downwind of sensitive receptors;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust. The regular watering of stockpiles has been found to have an 80% control efficiency (UK ODPM 2002);
- Where feasible, hoarding will be erected around site boundaries to reduce visual impact. This will also have an added benefit of preventing larger particles from impacting on nearby sensitive receptors.

Site Traffic on Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads should be reduced to a minimum by employing the following measures:

- Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust;
- At the main site traffic exits, a wheel wash facility shall be installed if feasible. All trucks leaving the site must pass through the wheel wash. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.

Summary of Dust Mitigation Measures

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be:

- The specification of a site policy on dust and the identification of the site management responsibilities for dust issues;
- The development of a documented system for managing site practices with regard to dust control;
- The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed; and
- The specification of effective measures to deal with any complaints received.

Chapter 14 Archaeological and Cultural Heritage

14.1 Introduction

This chapter examines the potential effects of the proposed development on the archaeological and cultural heritage resource.

This study determines, as far as reasonably possible from existing records, the nature of the archaeological and cultural heritage resource within the proposed development area, using appropriate methods of study. In order to provide an appropriate archaeological context, the wider vicinity was also examined. 'Desk-based assessment' is defined as a programme of study of the historic environment within a specified area or site that addresses agreed research and/or conservation objectives. It consists of an analysis of existing written, graphic, photographic and electronic information in order to identify the likely heritage assets, their interests and significance and the character of the study area, including appropriate consideration of the settings of heritage assets (CIfA, 2014). The objectives of this desk-based assessment are as follows:

- To determine the presence of known archaeological, architectural and cultural heritage sites that may be affected by the proposed development;
- To assess the likelihood of finding previously unrecorded archaeological remains during the construction programme; and
- To suggest appropriate mitigation measures based upon the results of the above research.

The assessment involved detailed interrogation of the archaeological, historical and architectural background of the development area. This included information from the Record of Monuments and Places of County Cork (Department of Culture, Heritage and the Gaeltacht (DoCHG), 1998), the Cork County Development Plan 2014 - 2020 (Cork County Council, 2014), the topographical files of the National Museum of Ireland and cartographic and documentary records including the Post-medieval Survey of Co. Cork (Cork Archaeological Survey, 2007). Aerial photographs of the assessment area held by Ordnance Survey Ireland were also consulted. A field inspection was carried out on the 11th of March 2019 in an attempt to identify any known cultural heritage sites and previously unrecorded features, structures and portable finds within the study area.

An impact assessment and a mitigation strategy have been prepared. The impact assessment is undertaken to outline potential adverse effects that the proposed development may have on the archaeological and cultural heritage resource, while the mitigation strategy is designed to avoid or reduce such adverse impacts

Definitions

In order to assess, distil and present the findings of this assessment, the following definitions apply. 'Cultural Heritage' where used generically, is an over-arching term applied to describe any combination of archaeological and cultural heritage features, where –

- the term 'archaeological heritage' is applied to objects, monuments, buildings or landscapes of an (assumed) age typically older than AD 1700 (and recorded as archaeological sites within the Record of Monuments and Places (DoCHG, 1998));

- the term 'cultural heritage', where used specifically, is applied to other (often less tangible) aspects of the landscape such as historical events, folklore memories and cultural associations. This designation can also accompany an archaeological or architectural designation.

14.2 Methodology

This study determines, as far as reasonably possible from existing records, the nature of the cultural heritage resource within the area of the proposed development using appropriate methods of study.

Legislation, Standards and Guidelines

The following legislation, standards and guidelines were consulted as part of the assessment.

- National Monuments Acts, 1930-2014;
- The Planning and Development (Strategic Infrastructure) Bill, 2006;
- Planning and Development Act, 2000;
- Heritage Act, 1995;
- Environmental Protection Agency (EPA) (2015). *Draft Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)*. Dublin, Government Publications Office;
- EPA (2017). *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*. Dublin: Government Publications Office;
- EPA (2002). *Guidelines on the Information to be Contained in Environmental Impact Statements*. Dublin: Government Publications Office;
- EPA (2003). *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements*. Dublin: Government Publications Office;
- Department of Arts, Heritage, Gaeltacht and Islands (1999). *Frameworks and Principles for the Protection of the Archaeological Heritage*;
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 2000; and
- Local Government (Planning and Development) Act 2000.

Consultation

- Following the initial research, a number of statutory and voluntary bodies were consulted to gain further insight into the cultural background of the baseline environment, receiving environment and study area, as follows:
- DoCHG – the Heritage Service, National Monuments and Historic Properties Section: Record of Monuments and Places; Sites and Monuments Record; Monuments in State Care Database; Preservation Orders and Register of Historic Monuments;
- National Museum of Ireland, Irish Antiquities Division: topographical files of Ireland;
- Cork County Council: Planning Department; and
- Historical and Ordnance Survey Maps.

Desktop Study

The following sources were examined and a list of areas of archaeological and cultural heritage potential was compiled:

- Record of Monuments and Places for County Cork;
- Sites and Monuments Record for County Cork;
- National Monuments in State Care Database;
- Preservation Orders;
- Register of Historic Monuments;
- Topographical files of the National Museum of Ireland;
- Cartographic and written sources relating to the proposed development;
- Documentary sources;
- Aerial photographs;
- Cork County Development Plan 2014 – 2020; and
- Excavations Bulletin (1970–2018).

Record of Monuments and Places (RMP) is a list of archaeological sites known to the National Monuments Service, which are afforded legal protection under Section 12 of the 1994 National Monuments Act and are published as a record.

Sites and Monuments Record (SMR) holds documentary evidence and field inspections of all known archaeological sites and monuments. Some information is also held about archaeological sites and monuments whose precise location is not known (e.g. only site type and townland are recorded). These are known to the National Monuments Service as 'un-located sites' and cannot be afforded legal protection due to lack of locational information. As a result, these are omitted from the Record of Monuments and Places. SMR sites are also listed on a website maintained by the DoCHG – www.archaeology.ie.

National Monuments in State Care Database is a list of all the National Monuments in State guardianship or ownership. Each is assigned a National Monument number whether in guardianship or ownership and has a brief description of the remains of each monument. The Minister for the DoCHG may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Preservation Orders List contains information on Preservation Orders and/or Temporary Preservation Orders, which have been assigned to a site or sites. Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent and at the discretion of the Minister.

Register of Historic Monuments was established under Section 5 of the 1987 National Monuments Act which requires the Minister to establish and maintain such a record. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

The topographical files of the National Museum of Ireland are the national archive of all known finds recorded by the National Museum. This archive relates primarily to artefacts but also includes references to monuments and unique records of previous excavations. The 'find spots' of artefacts are important sources of information on the discovery of sites of archaeological significance.

Cartographic and written sources are important in tracing land use development within the development area as well as providing important topographical information on areas of archaeological potential and the development of buildings. Cartographic analysis of all relevant maps has been conducted in order to identify any topographical anomalies or structures that no longer remain within the landscape. The cartographic sources consulted during this assessment include:

- William Petty's Down Survey of Ireland Map, Beara and Bantry, Co. Cork, 1654-56;
- A Map of the County of Cork as in the Year 1750
- Grand Jury Map, 1811
- Ordnance Survey 6-inch and 25-inch maps of County Cork (1841 and 1926)

Documentary sources were consulted to gain background information on the archaeological, architectural and cultural heritage landscape of the proposed development area. This included a review of the Post-medieval Survey of Co. Cork, held at Cork County Library.

Aerial photographic coverage is an important source of information regarding the precise location of sites and their extent. It also provides initial information on the terrain and its likely potential for archaeology. A number of sources were consulted including aerial photographs held by the Ordnance Survey and Google Earth.

Development Plans contain a catalogue of all the Protected Structures, Architectural Conservation Areas (ACAs) and archaeological sites within the county. The Cork County Development Plan 2014 – 2020 was consulted to obtain information on cultural heritage sites within/in the immediate vicinity of the site of the proposed project.

Excavations Bulletin is a summary publication that has been produced every year since 1970. It summarises every archaeological excavation that has taken place in Ireland during each year. Since 1987 this publication has been edited by Isabel Bennett. The information provided in the Bulletin is vital when examining the archaeological content of any area, which may not have been recorded under the SMR and RMP files.

Field Inspection

A field inspection is necessary to determine the extent and nature of archaeological, architectural and cultural heritage remains and can also lead to the identification of previously unrecorded or suspected sites and portable finds through topographical observation and local information. The field inspection was carried out on the 11th of March 2019, and entailed:

- Inspecting the proposed development area and its immediate environs;
- Noting and recording the terrain type and land usage;
- Noting and recording the presence of features of archaeological or cultural heritage significance;
- Verifying the extent and condition of any recorded sites; and
- Visually investigating any suspect landscape anomalies to determine the
- possibility of them being of anthropogenic origin.

Effect Evaluation Methodology

The nature of a potential effect can vary. The terminology used to describe the nature of effects in this assessment is defined as follows:

- Negative effect: A change that will detract from or permanently remove an archaeological/cultural heritage site from the landscape.
- Neutral effect: A change that does not affect the archaeological/cultural heritage.
- Positive effect: A change that improves or enhances the setting of an archaeological/cultural heritage site.
- Direct effect: Refers to an effect on an archaeological/cultural heritage site which is physically located within the footprint of the proposed development and which entails the removal of part of or all of the feature in question.
- Indirect effect: Refers to an effect on an archaeological/cultural heritage site or its setting, which is located in close proximity to the proposed development.
- No predicted effect: Refers to circumstances in which the proposed development does not adversely or positively affect an archaeological/cultural heritage site.

It should be noted that whilst effect levels and definitions are applied consistently to the cultural heritage resource, direct effects on sites that are subject to statutory protection are considered to be more significant than those on sites/structures not subject to statutory protection.

Further effect definitions are listed in Table 14.1 below. These are in line with impact definitions as per the most recent EPA guidelines (2017).

Table 14.1 Effect Definitions: Archaeology

Nature of Effect	Definitions relating to sites of an archaeological nature
Profound	Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. These effects arise when an archaeological site is completely and irreversibly destroyed by a proposed development.
Very Significant	Effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment.
Significant	An effect which, by its magnitude, duration or intensity, alters an important aspect of the environment. An effect like this would be where part of a site would be permanently impacted upon, leading to a loss of character, integrity and data about the archaeological feature/site.
Moderate	A moderate effect arises when a change to the site is proposed, which although noticeable, is not such that the archaeological integrity of the site is compromised and which is reversible. This arises when an archaeological feature can be incorporated into the development in

Nature of Effect	Definitions relating to sites of an archaeological nature
	question without damage and when all procedures used to facilitate this are reversible.
Slight	An effect which causes changes to the character of the environment which are not significant or profound and do not directly affect an archaeological feature or monument.
Not significant	Effects which cause noticeable changes in the character of the environment but without causing noticeable consequences
Imperceptible	An effect which can be measures but which does not give rise tot noticeable consequences.

14.3 Description of Receiving Environment

Archaeology

The proposed Dursey Island Cable Car and Visitor Centre Development entails the erection of structures on two landmasses; the proposed visitor centre,car park and a cableway line station are to be located in the townland of Ballaghboy on the western end of the Beara Peninsula, Co. Cork, while a second line station is to be located on the easternmost headland of nearby Dursey Island. Additionally, it is proposed to carry out road improvement works (widening of the carriageway at 11 locations and further road improvements to include pavement and verge works at a number of other locations) on the principle approach road to the mainland side of the site, the R572. This road traverses the townlands of Ballaghboy, Billeragh, Garinish, Scrivoge, Loughane More, Cloghfune, Killough West, and Killough East,all of which are located in the parish and Electoral District of Kilnamanagh, in the barony of Bear, Co. Cork (Plate 14.1).

A 500m study area has been defined around the proposed development areas on Dursey Island and the mainland, while a study area of 250m has been defined along the 8km stretch of the R572 from the Dursey Island Cable Car to the junction at Killough. There are no recorded monuments located within the site of the proposed development, however, there are 19 located within the study areas (Plates 14.1 – 14.6).

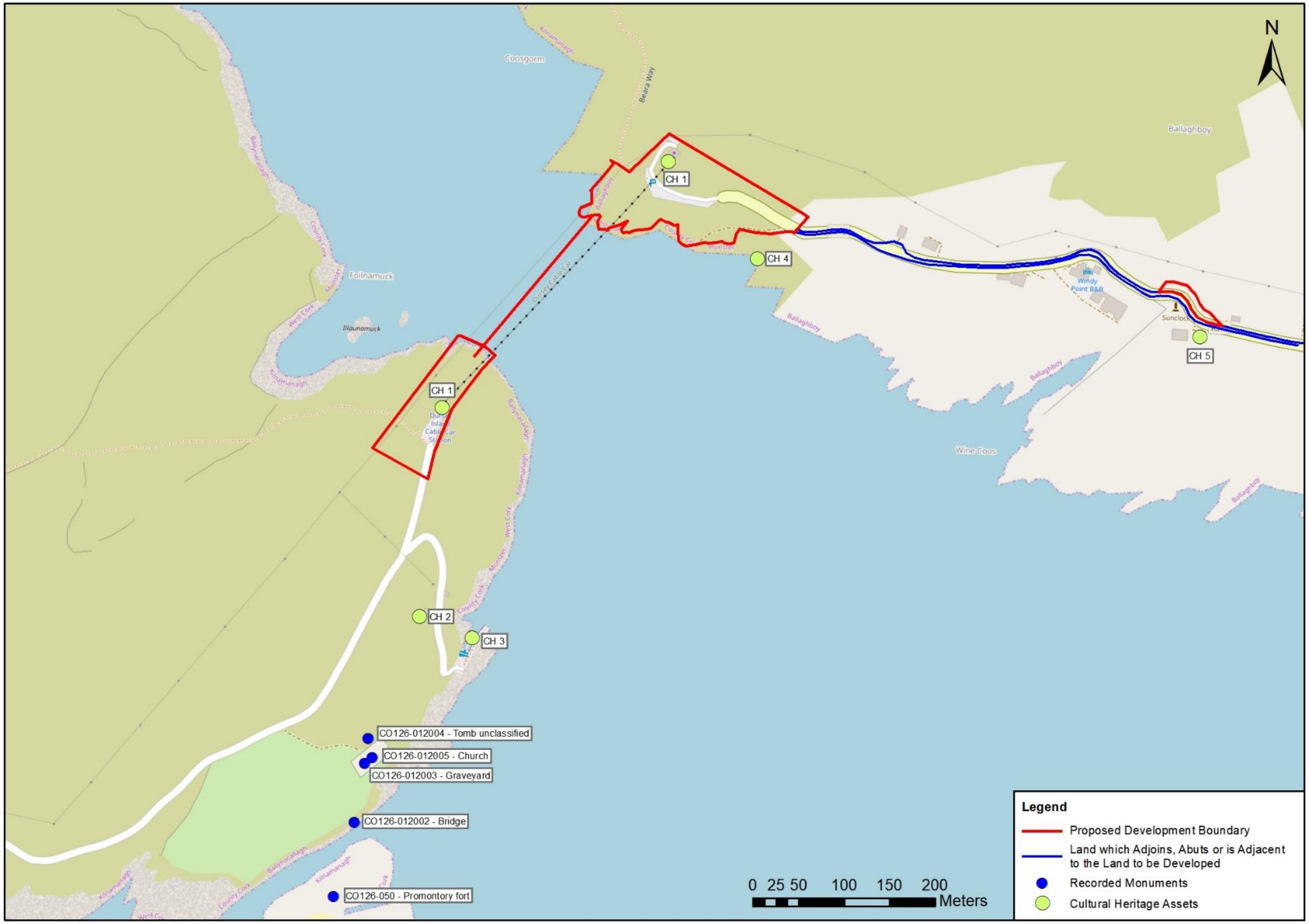

Plate 14.1 Location of proposed development area, recorded monuments and cultural heritage assets

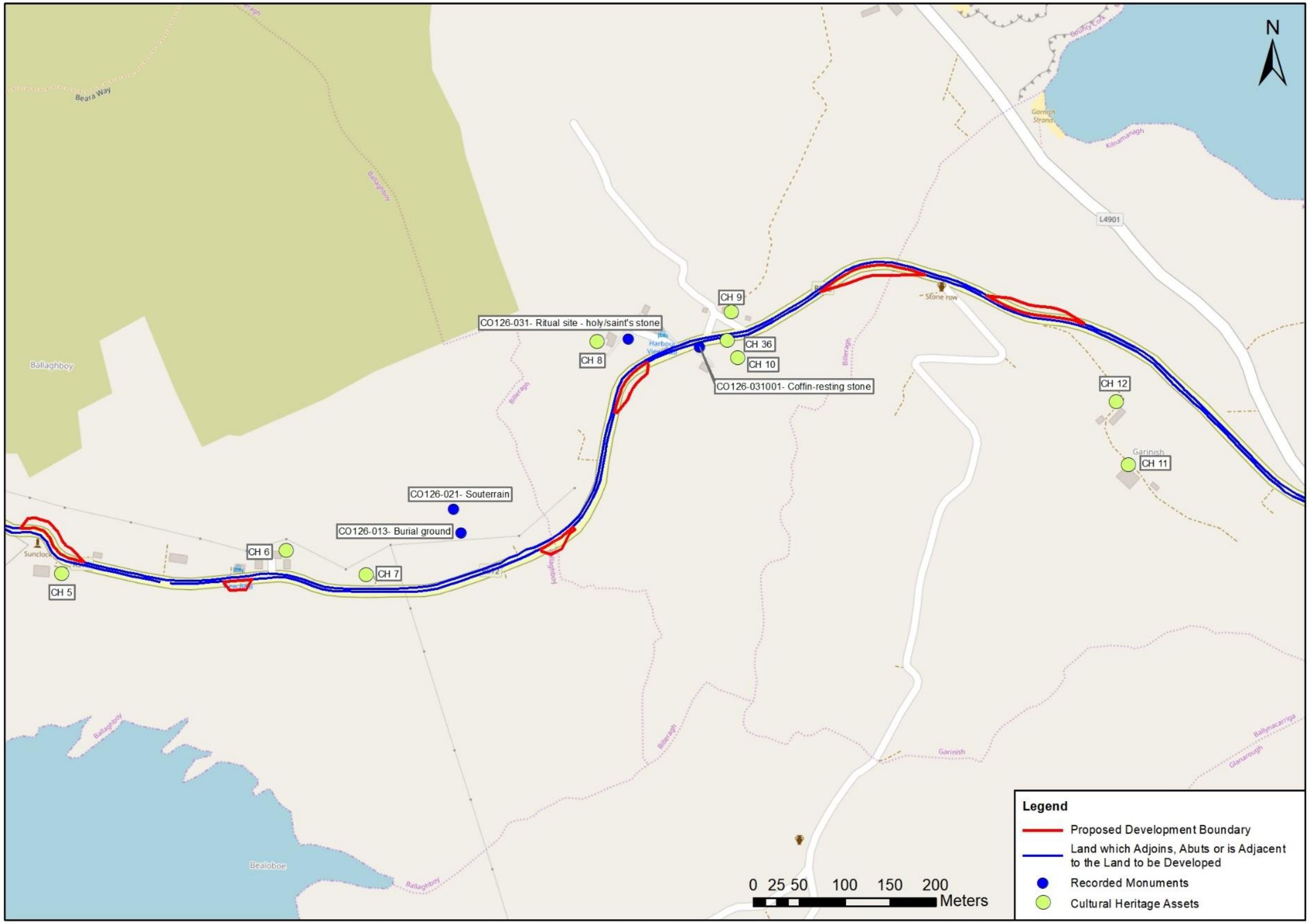

Plate 14.2 Location of proposed development area, recorded monuments and cultural heritage assets

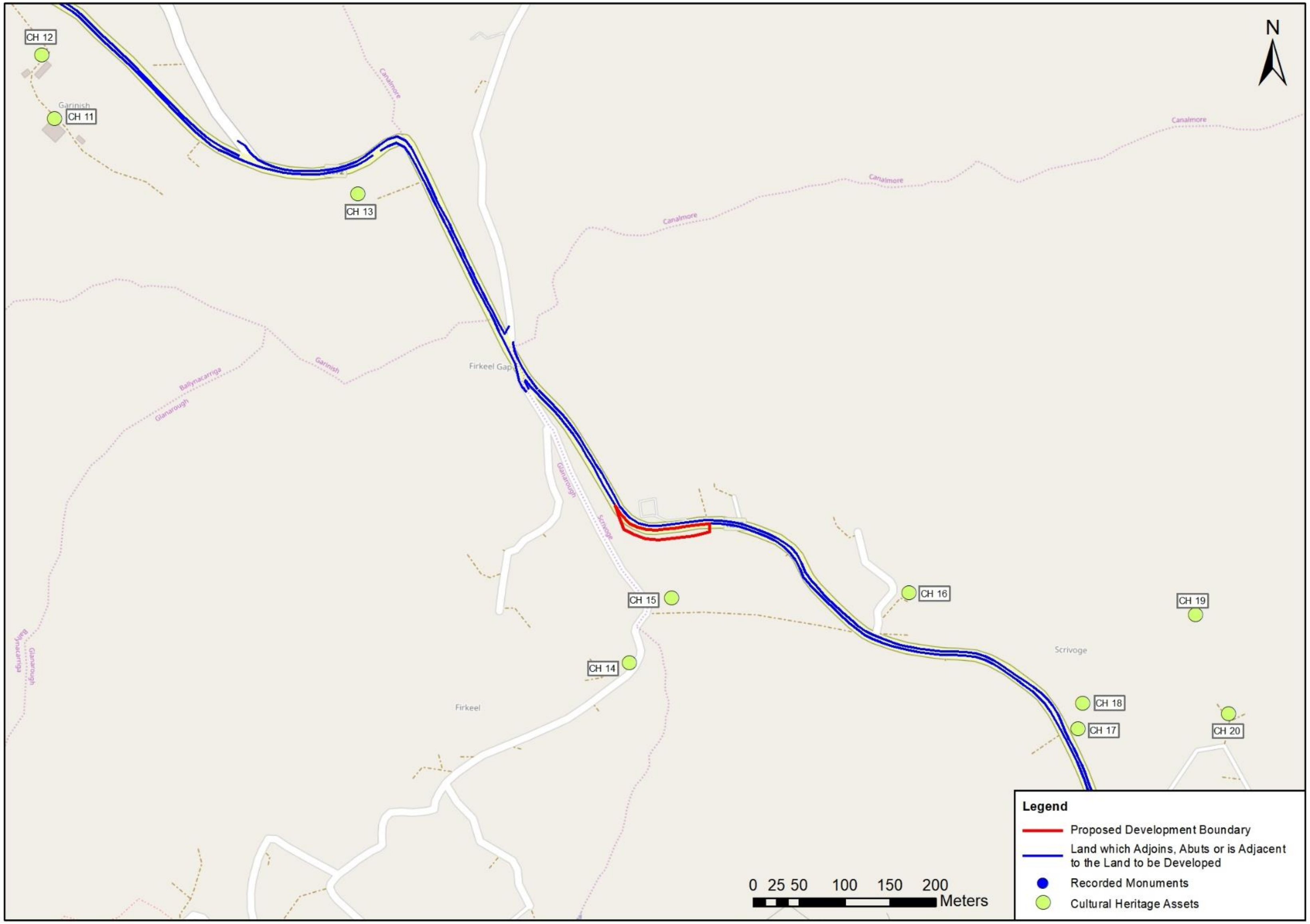

Plate 14.3 Location of proposed development area, recorded monuments and cultural heritage assets

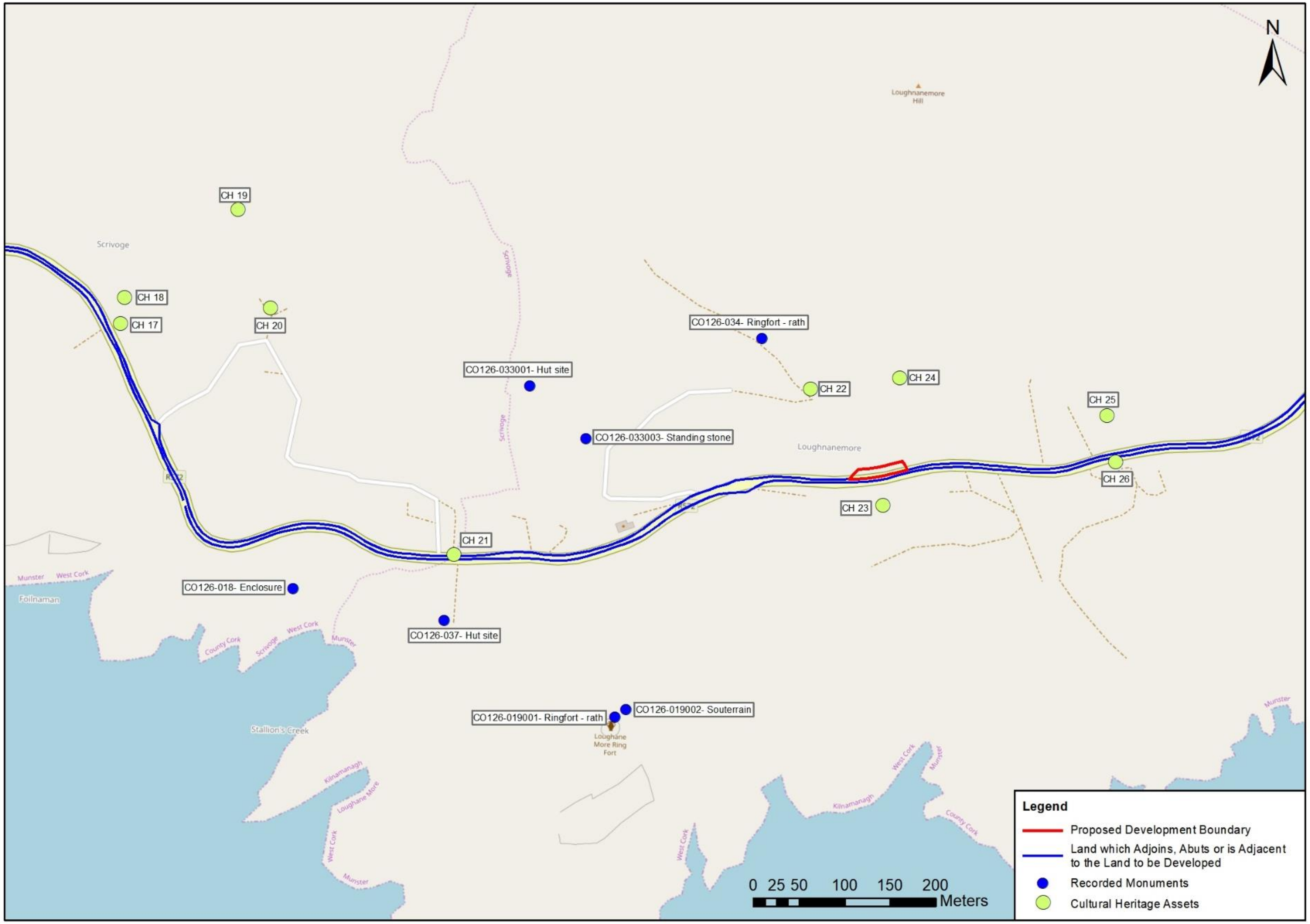

Plate 14.4 Location of proposed development area, recorded monuments and cultural heritage assets

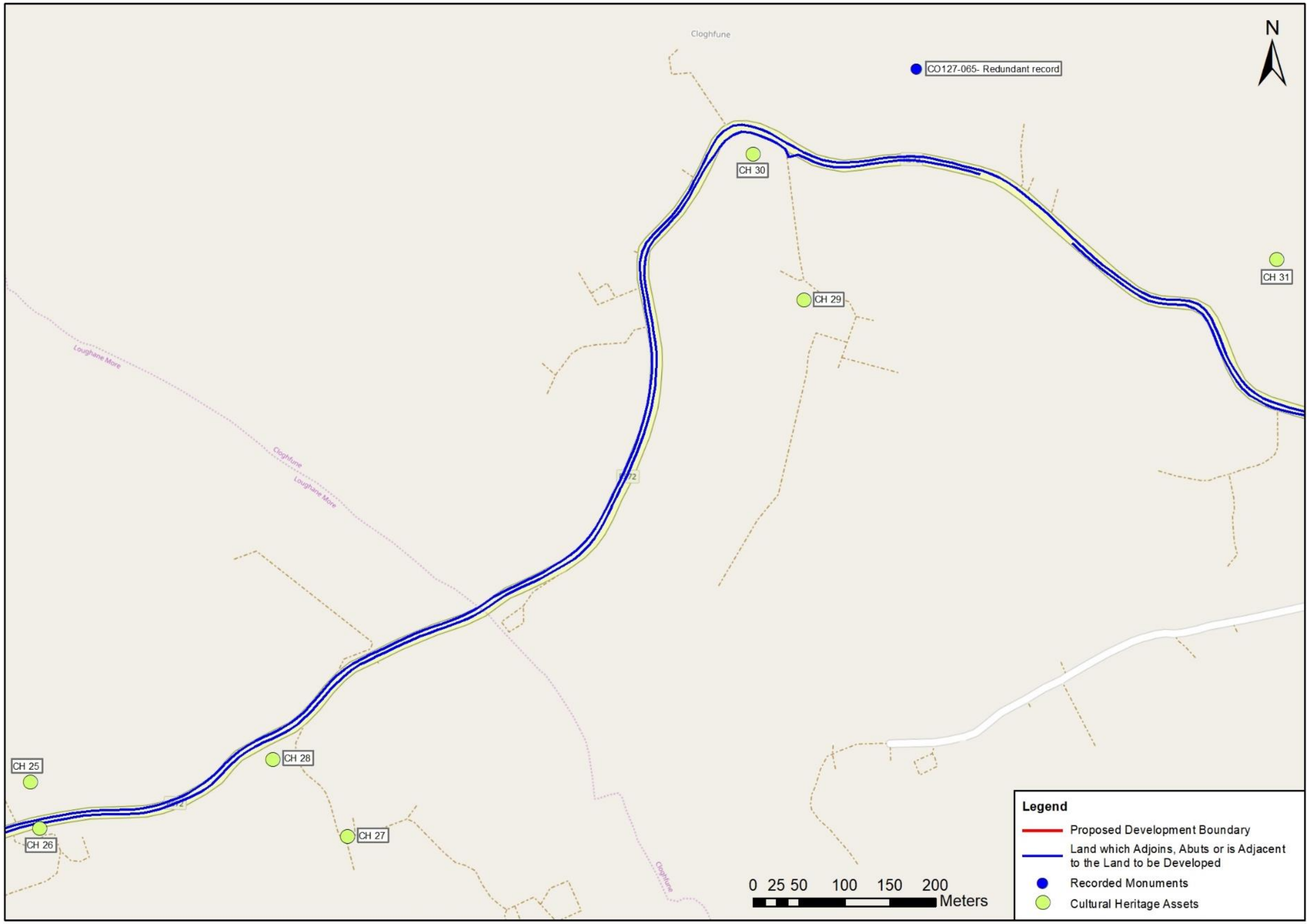

Plate 14.5 **Location of proposed development area, recorded monuments and cultural heritage assets**

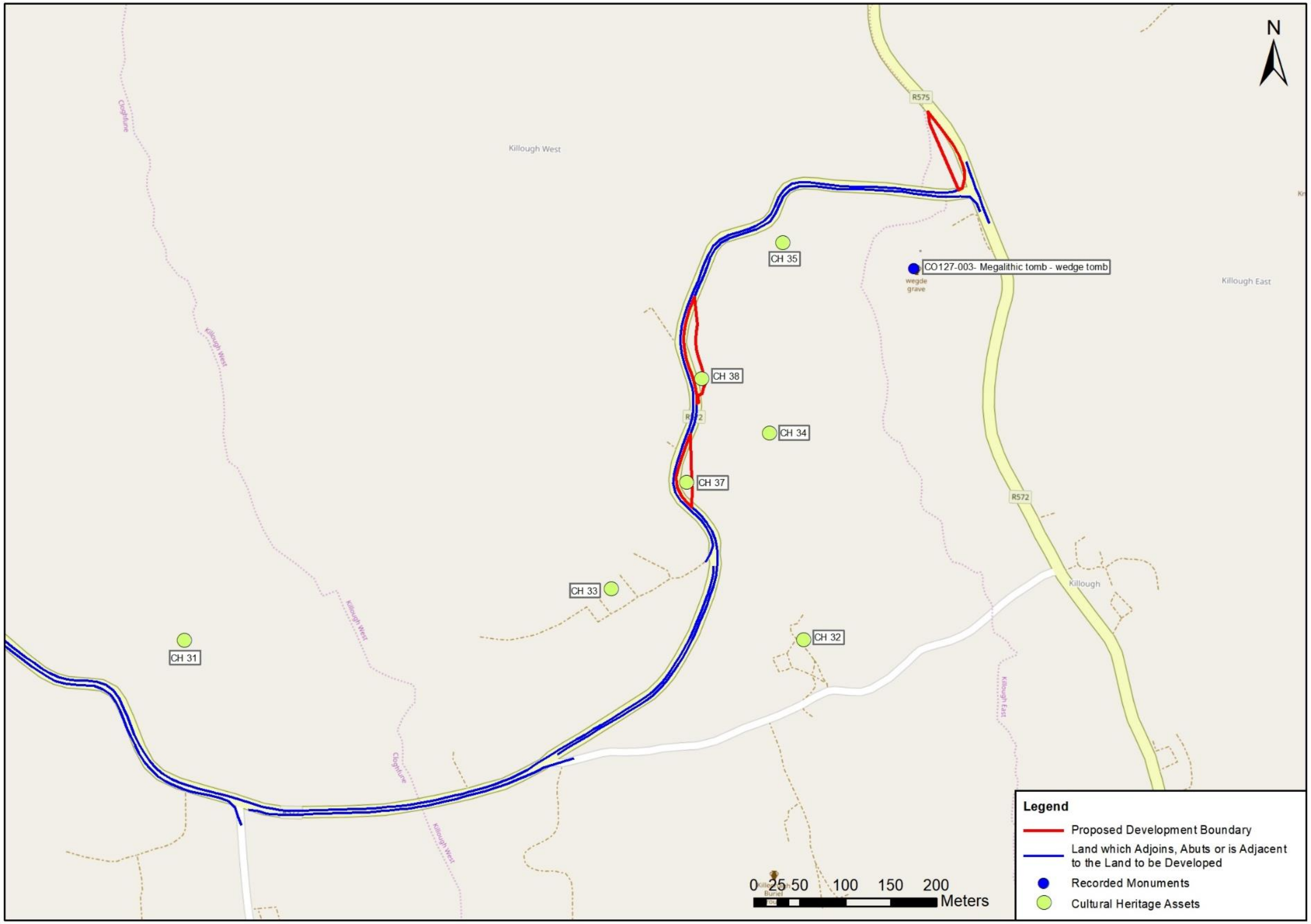

Plate 14.6 Location of proposed development area, recorded monuments and cultural heritage assets

Archaeological and Historical Background

Prehistoric Period

Although very recent discoveries may push back the date of human activity by a number of millennia (Dowd and Carden, 2016), the Mesolithic period is the earliest time for which there is clear evidence of prehistoric activity in Ireland. During this period, people hunted, foraged and gathered food and appear to have had a mobile lifestyle. Evidence of permanent settlement during this period is rare, although Mesolithic deposits are typically found within riparian and coastal areas.

During the Neolithic period, communities became less mobile and their economy became based on the rearing of livestock and cereal cultivation. This transition was accompanied by major social change. Agriculture demanded an altering of the physical landscape, with forests cleared and field boundaries constructed. An excavation carried out c. 900m to the west of the site of the proposed development discovered a pit containing a polished stone axe-head of Neolithic date (Bennett, 2003, p.1039). There was a greater concern for territory, which saw the construction of large communal ritual monuments (referred to as 'megalithic tombs'), which are characteristic of the period. Monuments of this period are represented on the landscape in the vicinity of the proposed development. There is an example megalithic wedge tomb (National Monuments Service Code: CO127-003----) located 75m south of the junction of the R572 and R575 (hereafter referred to as 'Bealbarnish Gap'). De Valera and O Nualláin (1982) recorded vague traces of a mound surrounding the structure in question. The structure itself consists of a slab resting in a sloping position against the western edge of a roofstone, and leaning against this is a second larger slab (ibid. 36).

The Bronze Age in Ireland was marked by the use of metal for the first time. As with the transition from Mesolithic to Neolithic, the transition into the early Bronze Age was accompanied by societal changes. Megaliths were replaced in favour of individual, subterranean cist or pit burials, erected either in isolation or in small cemeteries. These burials contained inhumed or cremated remains and were often (but not always) accompanied by a pottery vessel.

The most common type of Bronze Age site within the archaeological record is the burnt mound or *fulacht fiadh*. The term *fulacht* or *fulacht fiadh* is found in early Irish literature from at least as early as the 9th century AD, and refers to open air cooking places -ver 4,500 of these types of site have been recorded in Ireland (Waddell, 1998). The nearest *fulacht fiadh*to the site of the proposed development is situated c. 3.2km due west-south-west, in the townland of Kilmichael on Dursey Island (CO126-028002-).

Standing stones, usually single upright orthostats, are a common feature in the landscape. They are known by various names including *gallán, dallán, leacht* and 'long stone' (Power *et al.* 1992, p. 45). Although it is thought that standing stones were erected across a wide time span and had multiple functions, they are most often associated with the Bronze Age. They are generally unworked stones and often have packing stones around their base providing additional support. A large number of standing stones are orientated on a north-east to south-west axis, corresponding with those of other megalithic architecture, such as stone rows or circles (Ronan *et al.*, 2009, p. 22). A wide variety of functions have been attributed to these stones, such as burial markers and route or territorial markers,whereas more recent stones have been erected as scratching posts for cattle (Buckley & Sweetman, 1991). An example of one such standing stone (CO126-033003-) is found 115m north of the R572, in the townland of Loughane More. There are three additional standing stones (CO126-006----; CO126-010002-; CO126-046----) on Dursey Island to the west of the site of the proposed development, outside of the study area. Additional Bronze Age features on the island include several cup-marked stones (CO126-010001; CO126-011001; CO126-011003).

There is increasing evidence of Iron Age settlement and activity in recent years as a result of development-led excavations as well as projects such as Late Iron Age and Roman Ireland (LIARI). Yet, this period is distinguished from the rather rich remains of the preceding Bronze Age and subsequent early Medieval period by a relative paucity of evidence for material culture in Ireland. The Iron Age was traditionally associated with the arrival of the Celts and the Celtic language in Ireland. The Celts were an Indo-European group who are thought to have originated probably in east-central Europe in the 2nd millennium BC. They were among the earliest to develop an Iron Age culture, as has been found at Hallstatt, Austria (c. 700BC).

The available evidence suggests that large defensive structures and earthworks known as promontory or hill forts were characteristic of the period. The former is a banked and ditched structure located above a steep cliff or bluff and often found in coastal areas. The nearest promontory fort (CO126-050----) is situated c. 500m to the south-south-west of the site of the proposed development on Dursey Island. The hill-fort or hill-top enclosures are very interesting in that they are almost always multi-period. As a result, their dating is problematic but there appears to be some consensus that their peak use and greatest extents are dated to the Iron Age (Raftery, 1994).

Early Medieval Period

The early medieval period is portrayed in the surviving literary sources as entirely rural, characterised by the basic territorial unit known as a *túath*. Byrne (1973) estimates that there were probably at least 150 kings in Ireland at any given time during this period, each ruling over his own *túath*. In Munster the *Eóganachta* formed the ruling dynasties until the middle of the 10th century. These kings were distributed strategically throughout the region, and ruled over many tribal units. Members of the ruling *Eóganachta* dynasties granted special rights and privileges to them and in turn their leader would have been an overlord to smaller territorial units, known as *aithechthuatha*, within this kingdom.

The early medieval landscape in Ireland is characterised by dispersed enclosed rural farmsteads, or raths, which likely housed an extended family. This site type is considered to be the most common indicator of settlement during the early medieval period and truncated examples are regularly identified as crop marks in aerial photography or through archaeological investigation. Research undertaken as part of the 'Early Medieval Archaeology Project' puts forward a conservative estimate for the number of ringforts, raths, cashels, cahers and 'enclosures' in the country to be at least 60,000 (O'Sullivan *et al.*, 2014, p.49). The sites are typically enclosed by an earthen bank and exterior ditch, and range from 25m - 50m in diameter. Enclosures belong to a classification of monument whose precise nature is unclear. Often, they may in fact represent ringforts, which have either been damaged to a point where they cannot be positively recognised, or which are smaller or more irregular in plan than the accepted range for a ringfort.

A number of enclosures and ringforts are located within the study areas, the closest of which is enclosure CO126-018---- in the townland of Scrivoge, 50m south of the R572. Two ringforts (CO126-019001- and CO126-034----) are located 170m south and 150m north of the R572 respectively, both in the townland of Loughane More. A souterrain (CO126-019002-) is also located within ringfort CO126-019001-. A second souterrain (CO126-021----) is located 70m north of the R572 in the townland of Ballaghboy, but is not associated with a known ringfort or enclosure.Rather, it is located within a burial ground (CO126-013----). An enclosure (CO126-043----) is located 240m north of the site of the proposed development on the mainland.

This period of history is also characterised by the spread of Christianity and the foundation of monastic sites and churches. The church of Kilmichael (CO126-012005-) and its associated burial ground (CO126-012003-;CO126-012004-)) on Dursey Island, c. 1.8km to the southwest of the site of the proposed development, are situated within a landscape populated with a 'bullaun' stone (CO126-008----) and Tubbrid holy well (CO126-011002-) and may represent the site of an early medieval ecclesiastical enclosure. The veneration of holy well sites is one of the oldest traditions in Irish Christianity and most likely has its origins in pagan rituals. These wells can exhibit a variety of forms ranging from natural springs to rain-collecting rock depressions. Many holy wells can be found associated with early ecclesiastical sites and well veneration and its antecedent well worship are not confined to Ireland or even Europe. The veneration of wells is a very widespread and ancient tradition in Ireland. However, the traditions associated with some wells can be recent in origin. 'Bullaun' stones, whose exact purpose remains unclear, are generally found in association with early medieval religious sites. The Gaelic word from which 'bullaun' is derived translates as a bowl or round hollow in a stone.

Medieval Period

The arrival of the Welsh Norman Knights headed by Robert de Clare, Earl of Pembroke (Strongbow) in 1169 marked the beginning of the Norman invasion of Ireland. Following the alliance of Strongbow with the King of Leinster, Henry II became concerned, arriving in Waterford with a large force in 1171 to reassert his authority.

The Kingdom of Munster had been divided into two parts - north and south - under an agreement reached at Castletown Kinney by O'Connor of the *Ard-Rí*, or High King of Ireland. The Kings of Thomond (the O'Briens), ruled north Munster, while the Kings of Desmond, (the McCarthys) ruled south Munster. Battles and raids of neighbouring clans to obtain more territories and wealth were common practice in Ireland at this time. Diarmuid MacCarthy (King of Desmond) sought to ally himself with Henry II in order to strengthen his forces against the O'Briens. Surrendered Desmond lands were, however, subsequently distributed by Henry to two of his own knights, Robert Fitzstephen and Milo de Cogan. Once the Normans obtained lands by force, the continued lack of organised resistance by the Irish chieftains enabled the Norman lords to consolidate their newly built strongholds, and populate their estates with their own followers, thereby firmly establishing themselves.

The main success of the Anglo-Norman settlement was the welding of scattered territories into a cohesive unit through the introduction of the English form of shire government. The rural landscape became a network of manorial centres; these units would generally contain a castle, a manorial house and a number of dwellings, with extensive surrounding acreage.

This period of expansion involved significant changes in the organisation of secular life including the establishment of formal boroughs and towns and the need to defend such settlements. A series of castles and fortified structures were built across the country to defend the lands taken during the conquest from the Gaelic native population. Seven hut sites (CO126-030001 – 7) of the late medieval period were discovered during an excavation c. 600m to the north-east of the proposed development (Licence: 03E0356). Evidence of the island's connection to the medieval continental fishing industry was recovered in the form of Iberian pottery and tiles. Further hut sites of possible late medieval date are located on the mainland (CO126-037---- and CO126-033001-).

The arrival of the Anglo-Normans in Tipperary in 1192 drove the O'Sullivans from their ancestral seat near Cnoc-Raffon. The O'Sullivans took control of the Baronies of Beare and Bantry, away from the O'Driscolls. By the 14th century the family had split into the O'Sullivan Mór at Dunkerron and the O'Sullivan Beare at Dunboy. Dursey Island under the domain of the O'Sullivan Beare contained a garrisoned castle (CO126-012001-; 520m south-west of the proposed development area). The castle was separated from the south-east corner of Dursey Island by a narrow gorge. Access to the castle was controlled by a drawbridge (CO126-012002-). As seen on the first edition OSi map, 12 rock-cut steps on the mainland of Dursey Island are all that remain of this defensive feature. Both branches of the family were under the feudal sovereignty of the McCarthy Mór and both branches also had a member attend a parliamentary session in Dublin in 1585 (O'Halloran, 1916). The church on Dursey Island (CO126-012005-) c. 340m to the south of the proposed development area was purportedly built as a monastery by Bonaventura, a Spanish Bishop, in the 1500s. According to Philip O'Sullivan, writing in 1621, it was later destroyed by pirates (Byrne, 1903, p.156; O'Halloran, 1916). As with many ecclesiastical sites there is an associated graveyard (CO126-012003-) surrounding the church.

Post-medieval Period

An event known as the Dursey Massacre occurred on the island in 1602 during the Nine Year's War. A Spanish force of 44 ships led by Don Juan d'Aguila was sent by King Philip II of Spain to aid the Gaelic leaders revolting against Elizabeth I of England. D'Aguila's forces occupied Kinsale in 1601 and Sir George Carew was sent by the English Crown to blockade the town (Webb, 1878). Carew routed the Spanish and went to besiege O'Sullivan Beare at Dunboy Castle. He sent 160 men to capture the castle (CO126-012001-) on Dursey garrisoned by O'Sullivan Beare. The castle's defenders surrendered and were hanged at Dunboy. The English soldiers went on to raze the castle and the nearby settlement, comprising medieval hut sites, killing over 300 inhabitants (Sullivan, 1908, p.18-19; bearatourism.com, 2019). These events destroyed the power base of the O'Sullivan Beare and ultimately ended the war.

While English landowners may have been losing their grip on Irish land during the medieval period, during the Elizabethan period, lands were regained and secured. The Elizabethan implementation of the 'surrender and regrant' policy allowed the monarch to continue colonising Ireland at a time when the treasury funds were too low to afford a war. The policy was to induce native leaders to put their lands under the protection and ultimate ownership of the crown. The implication was that if they failed to do so, their lands would be seized anyway. The aim of the policy was to break up the clan system and place lands and their owners under the control of the crown. The crown could seize lands at any time, if they so wished, and over the coming years, frequently exercised this right. Confiscated lands were granted to 'undertakers' - Protestant English persons who would purchase the land at a very low price, on agreement that they would sub-let it only to English Protestants and would otherwise comply with the wishes of the authorities. Recorded monuments dating to the post-medieval period within the study area include two burial grounds (CO126-013---- and CO126-012003-) and a 'coffin resting stone;' (CO126-031001-).

The 18th century, a relatively peaceful period, saw the large-scale development of demesnes and country houses in Ireland. Demesnes were dominant features of the rural landscape throughout the 18th and 19th centuries. No large demesnes or parklands are located within the vicinity of the proposed development.

Vernacular architecture is defined in James Steven Curl's Encyclopaedia of Architectural Terms as 'a term used to describe the local regional traditional building forms and types using indigenous materials, and without grand architectural pretensions', i.e. the homes and workplaces of the ordinary people, built by local people, using local materials. This is in contrast to formal architecture, such as the grand estate houses of the gentry, churches and public buildings, which were often designed by architects or engineers. The majority of vernacular buildings are domestic dwellings. Examples of other structures that may fall into this category include shops, outbuildings, mills, lime kilns, farmsteads, forges, gates and gate piers. The ruins of a number of former homesteads and farm buildings have been identified within the study area, including cultural heritage (CH) assets CH 2, 5, 7, 11, 26, 28 and 35, as listed in Table 14.4.

Lewis (1837) records that the island of Dursey had 198 residents and was owned by the Earl of Bantry. The signal tower (CO126-005----), located 3.8km south-west of the site of the proposed development on Dursey Island, was constructed on the highest point of the island after the French army used it to launch an attack on Castletownbere in 1796. The tower formed part of a chain of signal towers that extended from Dursey to Cork city, built in anticipation of a Napoleonic invasion (Lewis, 1837).

Summary of Previous Archaeological Investigations

No previous archaeological investigations have been carried out within the site of the proposed development or the broader study area. The closest archaeological investigations to the proposed development took place on Dursey Island in 2003, c. 600m north of the site (Bennett, 2003:p.158; Licence No. 03E0356). The work involved test excavations across seven hut sites of probable late medieval date.

Cartographic Analysis

William Petty's Down Survey Map, Beara and Bantry, Co. Cork, 1654-56;

Dursey Island can be seen on the Down Survey map and is annotated as 'Dorfes'. There are no features shown on the island or the mainland within the site of the proposed development.

Map of County Cork as in 1750

Dursey Island can be seen on this map, with no features depicted, save for the church on Dursey, which is shown at the south-east corner of the island. There are no features shown on the mainland within the site of the proposed developments.

Grand Jury Map, 1811

Plate 14.7 Grand Jury Map, 1811

Dursey Island is depicted on this map and annotated as 'Durzey Island'. The island is devoid of features, save for the same abbey/church depicted on the previous map.

First Edition Ordnance Survey Map, 1841, Scale 1:10,560

The site of the proposed visitor centre, car park and cableway line station (on the mainland) is occupied by marshy ground, with a small road depicted leading from a landing place inland, to the east. The location of the cable car on Dursey Island is also occupied by marshy ground and no features of archaeological significance were noted.

The route of the R572 begins in the townland of Garinish and travels eastwards. There is no formal road from Garinish to the west at this time. Vernacular structures are located along the route of this road and are listed in Table 14.3, including a small vernacular structure (CH 21) shown on Figure 14.9.

Plate 14.8 First Edition Ordnance Survey Map, 1841

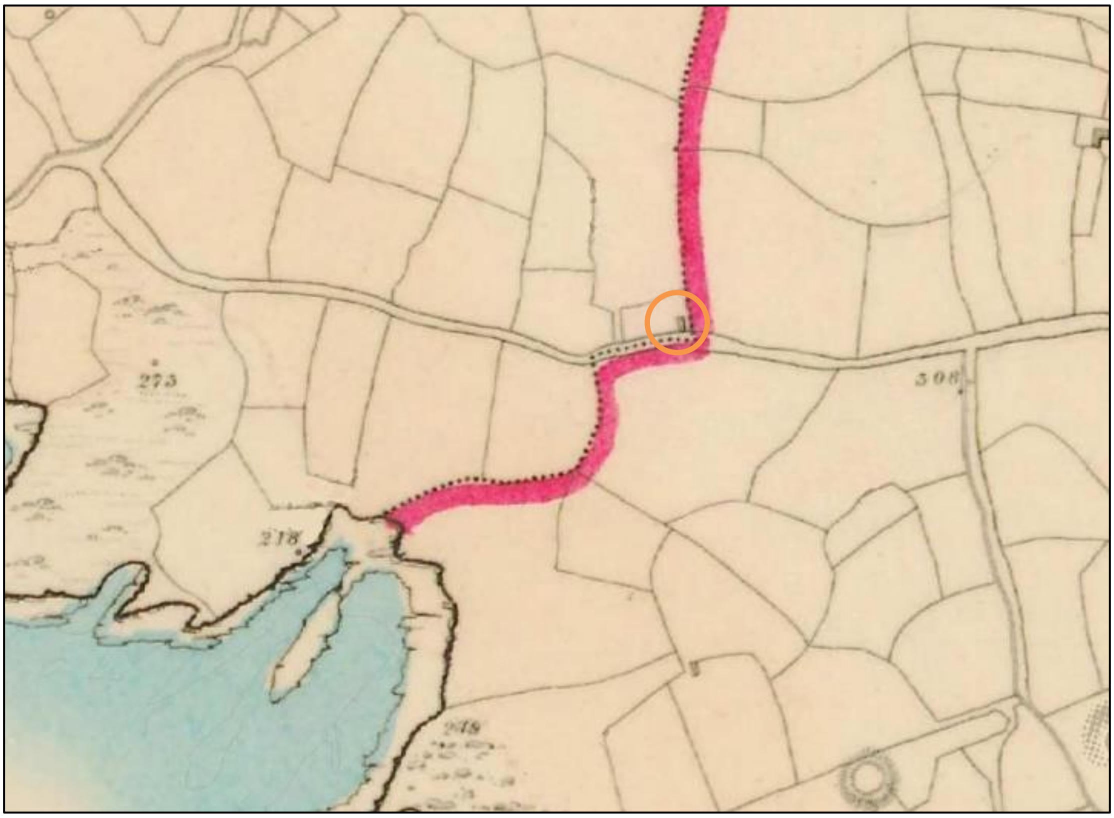

Plate 14.9 **First Edition Ordnance Survey Map, 1841 showing CH 21**

<u>25-inch Ordnance Survey Map, 1926, Scale 1:2,500</u>

The site of the proposed visitor centre, car park and cableway line station (mainland) is still located in marshy ground, however the R572 has now been extended to this area. The landing place is still depicted to the south of the site; however, only the outline of Dursey Island is depicted on this map.

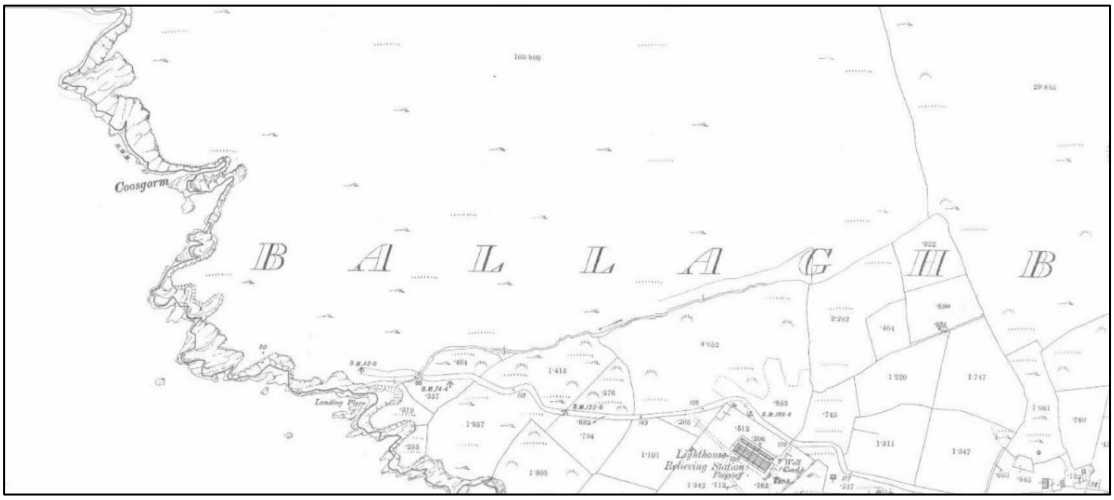

Plate 14.10 **25-inch Ordnance Survey Map, 1926**

<u>Ordnance Survey Map, Cassini, Scale 1: 10,560</u>

There are no changes on this map from the previous edition OSi map.

Aerial Photographic Analysis

A review of the aerial photographic coverage of the site from Google Earth (2003–2016), Bing Maps and OSi (1995, 2000 and 2005) was undertaken. No features of archaeological potential were identified.

Field Inspection

A field inspection was carried out on the 11th of March 2019. The site of the proposed development on Dursey Island is currently occupied by the line station and landing platform for the existing cable car which consists of a concrete platform faced with stones on its eastern elevation (Plate 14.11). The top of the platform contains steel safety bars and is accessed via a ramp. The existing cable car infrastructure is anchored to the island via a large steel structure to the southwest of the platform (Plate 14.12). A small concrete hut (the line station) is also located to the south-west of the platform. The pylon on Dursey Island is located approximately 55m north-east of the platform area and is constructed of wrought iron (Plate 14.13). No features of archaeological potential were noted at the site of the proposed development on Dursey Island.

Plate 14.11: Island-side landing platform

Plate 14.12: Island-side cableway machinery and line station

Plate 14.13: Island-side pylon

Plate 14.14: Mainland-side car park

The site of the proposed development on the mainland is occupied largely by a visitor car park, a line station with toilet facilities, the cable car infrastructure itself (Plate 14.14) and areas of undeveloped greenfield (Plate 14.15). The site slopes from c. 22m above Ordnance Datum (aOD) at the north-east to 0m aOD at the southwest. A slipway is also located to the south east of the proposed development (Plate 14.16). The cable car itself consists of a small wooden carrier cabin which can hold a maximum of 6 people (Plate 14.17). No features of archaeological potential were noted at the site of the proposed development on the mainland.

The R572 is a narrow country road with minimal passing bays. Modern 20th century houses are located along the route, together with a number of ruined 19th century structures (Plate 14.18).

Plate 14.15: Greenfield area on mainland

Plate 14.16: Mainland-side slipway

Plate 14.17: Cableway carrier cabin

Plate 14.18: CH 36 ruined 19th century structure (mainland)

County Development Plan

The Cork County Development Plan (2014-2022) recognises the statutory protection afforded to all RMP sites under the National Monuments Legislation (1930–2014). The development plan also lists a number of aims and objectives in relation to archaeological heritage (see Appendix 14.3 of this chapter).

Table 14.2 Archaeological sites within 500m of the proposed development area and 250m of the R572

RMP/SMR No.	Description	Townland	Distance from the proposed development area
CO126-031001	Coffin-resting stone	Billeragh	5m south
CO126-013	Burial ground	Ballaghboy	37m north
CO126-031	Ritual site - holy/saint's stone	Billeragh	30m northwest
CO126-018	Enclosure	Scrivoge	30m south
CO126-037	Hut site	Loughane More	60m south

RMP/SMR No.	Description	Townland	Distance from the proposed development area
CO126-021	Souterrain	Ballaghboy	72m north
CO127-003	Megalithic tomb - wedge tomb	Killough East	75m south
CO127-065	Redundant record	Cloghfune	95m north
CO126-033003	Standing stone	Loughane More	115m north
CO126-034	Ringfort - rath	Loughane More	150m north
CO126-019001	Ringfort - rath	Loughane More	171m south
CO126-019002	Souterrain	Loughane More	171m south
CO126-033001	Hut site	Loughane More	180m north
CO126-043	Enclosure	Ballaghboy	240m north
CO126-012003	Graveyard	Ballaghboy	315m south
CO126-012005	Church	Ballaghboy	335m south
CO126-012004	Tomb unclassified	Ballaghboy	350m south
CO126-012002	Bridge	Ballaghboy	415m south
CO126-050	Promontory fort	Ballaghboy	500m south

Cultural Heritage

Townland and place name analysis

The term 'cultural heritage' can be used as an overarching term applied to both archaeology and architectural heritage. However, it also refers to more ephemeral aspects of the environment, which are often recorded in folk law or tradition or possibly date to a more recent period.

The townland is an Irish land unit of considerable longevity as many of the units are likely to represent much earlier land divisions. However, the term 'townland' was not used to denote a unit of land until the Civil Survey of 1654. It bears no relation to the modern word 'town' but like the Irish word *baile* refers to a place. It is possible that the word is derived from the Old English *tun land* and meant 'the land forming an estate or manor' (Culleton, 1999, p.174). Gaelic land ownership required a clear definition of the territories held by each sept and a need for strong, permanent fences around their territories. It is possible that boundaries following ridge tops, streams or bog are more likely to be older in date than those composed of straight lines (ibid. 179).

The vast majority of townlands are referred to in the 17th century, when land documentation records began. Many of the townlands are mapped within the Down Survey of the 1650s, so called as all measurements were carefully "*laid downe*" on paper at a scale of forty perches to one inch. Therefore, most are in the context of pre-17th century landscape organisation (McErlean, 1983, p.315). In the 19th century, some demesnes, deer parks or large farms were given townland status during the Ordnance Survey and some imprecise townland boundaries in areas, such as bogs or lakes, were given more precise definition (ibid.). Larger tracks of land were divided into a number of townlands, and named 'Upper', 'Middle' or 'Lower', as well as 'Beg' and 'More' (small and large, respectively) and 'North', 'East', 'South' and 'West' (Culleton, 1999, p.179). By the time the first Ordnance Survey had been completed, a total of 62,000 townlands were recorded in Ireland.

Townland and topographic names are an invaluable source of information on topography, land ownership and land use within the landscape. They also provide information on history; archaeological monuments and folklore of an area. A place name may refer to a long-forgotten site, and may indicate the possibility that the remains of certain sites may still survive below the ground surface. The Ordnance Survey surveyors wrote down townland names in the 1830's and 1840's, when the entire country was mapped for the first time. Some of the townland names in the study area are of Irish origin and through time have been anglicised. The main reference used for the place name analysis is Irish Local Names Explained by P.W Joyce (1870) and the online resource of Logainm.ie. The study area is located within the townlands of Ballynacallagh, Ballaghboy, Billeragh, Garinish, Scrivoge, Loughane More, Cloghfune, Killough West, and Killough East. A description and possible explanation of each townland name in the environs of the study area are provided in Table 14.3.

Table 14.3 Place Name Analysis

Townland name	Derivation	Possible Meaning
Ballynacallagh	*Baile an Chalaidh*	Homestead of Chalaidh
Ballaghboy	*An Bealach Buí*	The yellow way
Billeragh	*An Bhiolrach*	Unknown
Garinish	*Garinis*	Unknown
Scrivoge	*Screamhóg*	Unknown
Loughane More	*An Lochán Mór*	The great lake
Cloghfune	*An Chloch Fhionn*	The white stone
Killough West	*Cill Achaidh Thiar*	The west Church field
Killough East	*Cill Achaidh Thoir*	The east Church field

Cultural Heritage Sites

Dursey Island cable car (CH 1) was constructed in 1969 and, although a modern feature, is considered to be of cultural heritage value. As the only cable car in Ireland, and the only in Europe which crosses a stretch of the Atlantic Ocean, the cable car and its associated infrastructure are important elements of the cultural landscape, to both the local residents of the island and mainland, and as a tourist attraction.

A review of historic maps covering the proposed development area has shown a number of cultural heritage assets located within the proposed development area and its study area. The majority of these represent vernacular architecture such as houses and farm buildings. Some of these survive as ruins today, while others have been removed but may retain some features below ground. These are listed in Table 14.4.

The Post-medieval Survey of County Cork was also reviewed; however, no additional cultural heritage assets were identified.

Table 14.4 Cultural heritage assets within 500m of the proposed development area and 250m of the R572 (between site of proposed development and Bealbarnish Gap)

CH No	Description	Distance from the proposed development area
CH 1	Dursey Island cable car and related infrastructure	Within the proposed development area
CH 2	Vernacular structure on 1st edition OS map 1841	150m south
CH 3	Landing place on 1st edition OS map 1841	185m south
CH 4	Slipway on 1st edition OS map 1841	30m south
CH 5	Vernacular structures on 1st edition OS map 1841	10m south
CH 6	Site of group of vernacular structures on 1st edition OS map 1841	20m north
CH 7	Vernacular structures on 1st edition OS map 1841	12m north
CH 8	Site of group of vernacular structures on 1st edition OS map 1841	40m northwest
CH 9	Site of group of vernacular structures on 1st edition OS map 1841	20m north
CH 10	Site of group of vernacular structures on 1st edition OS map 1841	18m south
CH 11	Coast Guard station on 1st edition OS map 1841	95m southwest
CH 12	Site of vernacular structures on 1st edition OS map 1841	52m southwest
CH 13	Site of vernacular structures on 1st edition OS map 1841	30m south
CH 14	Site of vernacular structures on 1st edition OS map 1841	140m south
CH 15	Site of vernacular structure on 1st edition OS map 1841	65m south
CH 16	Site of group of vernacular structures on 1st edition OS map 1841	50m north
CH 17	Site of vernacular structure on 1st edition OS map 1841	12m east
CH 18	Site of vernacular structure on 1st edition OS map 1841	25m east
CH 19	Site of group of vernacular structures on 1st edition OS map 1841	180m northeast
CH 20	Site of vernacular structure on 1st edition OS map 1841	160m east
CH 21	Site of vernacular structure on 1st edition OS map 1841	5m north
CH 22	Site of vernacular structure on 1st edition OS map 1841	95m north
CH 23	Site of vernacular structures on 1st edition OS map 1841	25m south
CH 24	Site of vernacular structure on 1st edition OS map 1841	90m north
CH 25	Site of vernacular structures, some ruins survive on 1st edition OS map 1841	40m north
CH 26	Vernacular structure on 1st edition OS map 1841	5m south
CH 27	Site of group of vernacular structures, some ruins survive, shown on 1st edition OS map 1841	131m southeast
CH 28	Vernacular structure on 1st edition OS map 1841	20m southeast

CH No	Description	Distance from the proposed development area
CH 29	Site of vernacular structures on 1st edition OS map 1841	150m south
CH 30	Site of vernacular structures on 1st edition OS map 1841	20m south
CH 31	Site of police pound on 1st edition OS map 1841	90m northeast
CH 32	Site of group of vernacular structures on 1st edition OS map 1841	110m east
CH 33	Site of group of vernacular structures on 1st edition OS map 1841	95m east
CH 34	Site of vernacular structure on 1st edition OS map 1841	80m east
CH 35	Vernacular structure on 1st edition OS map 1841	20m southeast
CH 36	Vernacular structure on 1st edition OS map 1841	4m south
CH 37	Vernacular structure shown on 1926 map	Within passing bay
CH 38	Vernacular structure shown on 1926 map	Within passing bay

14.4 Description of Potential Impacts

Archaeology

There are no known archaeological sites or recorded monuments located within the footprint of the proposed development, on the island or mainland.

The potential for previously unrecorded archaeological sites to be present is considered low on Dursey Island considering the disturbance caused by the existing cable car infrastructure. Potential is also considered low for the proposed development area on the mainland due to previous disturbance and the topography of the area. The land-take required for the construction of the 10 no. passing bays and 1 no. visibility splay along the route of the R572 is limited, however a number of previously undisturbed greenfield areas will be impacted. There is, therefore, some potential for the proposed development to have an impact on previously unknown archaeological sites.

Cultural Heritage

There are three cultural heritage assets located within the proposed development area: Dursey Island Cable Car and associated infrastructure (CH 1) and two upstanding vernacular structures (CH 37–38).

Of the existing cableway infrastructure, it is proposed to retain the mainland-side pylon and hauling machinery (currently encased in the mainland-side line station) and remove all other structural elements.

The site of the vernacular structures (CH 37–38) are located within the footprint of two of the proposed passing bays. The widening of the roadway in these area will result in the demolition of these structures. This will result in a direct significant adverse effect on structures.

14.5 Mitigation and Monitoring Measures

Archaeology

There are no known archaeological sites or recorded monuments located within the footprint of the proposed development, however there are a number of recorded monuments in the surrounding area and the construction of the passing bays will impact previously undisturbed areas. Excavation works associated with the construction of the passing bays shall be monitored by a fully qualified archaeologist. Full provision will be made available for the excavation of any archaeological features and/or deposits that may be identified, if that is deemed the most appropriate manner in which to proceed.

Cultural Heritage

Three cultural heritage assets will be directly impacted by the proposed development, namely the Dursey Island Cable Car and associated infrastructure (CH 1) and the site of two vernacular structures (CH 37–38).

In order to mitigate the impact of the proposed development on the cable car and associated infrastructure, a full written and photographic record of the cultural heritage asset should be made prior to removal. Furthermore, the existing mainland pylon will be retained onsite in order to preserve its industrial architecture and cultural heritage value.

In order to mitigate the impact of the proposed development on vernacular structures (CH 37–38), a full written and photographic record of the cultural heritage assets should be made prior to removal.

14.6 Residual Impacts

Once the recommended mitigation measures have been applied, there will be no residual impact on the archaeological or cultural heritage resource as a result of the construction of the proposed development.

14.7 Difficulties Encountered

No difficulties were encountered during the completion of this archaeological and cultural heritage impact assessment.

14.8 References

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www.osiemaps.ie – Ordnance Survey aerial photographs dating to 1995, 2000 and 2005 and 6-inch/25-inch OS maps.

www.heritagemaps.ie – The Heritage Council web-based spatial data viewer which focuses on the built, cultural and natural heritage.

www.googleearth.com – Satellite imagery of the proposed development area.

www.logainm.ie –Placenames Database of Ireland launched by Fiontar agus Scoil na Gaelige and the DoCHG.

Appendix 14.1 SMR/RMP Sites Within the Surrounding Area

Cork
County Council
Comhairle Contae Chorcaí

Fáilte Ireland
National Tourism Development Authority

ROD
ROUGHAN & O'DONOVAN

APPENDIX 14.1
SMR/RMP Sites Within the Surrounding Area

SMR No	CO126-033003
RMP Status	Yes
Townland	Loughnane More
Parish	Kilnamanagh
Barony	Bear
I.T.M	454149, 541081
Classification	Standing stone
Dist. From Development	120m north
Description	In undulating pasture, on a S-facing hillslope overlooking Crow Head and the mouth of Bantry Bay. This standing stone (1.1m x 0.5m; H 1.3m) was recorded in 1993 as upright and orientated NE-SW. The stone is now prostrate and lies 2m to the NW of its well-preserved original location. It is roughly triangular in section, measuring L 1.3m, 1.1m and 0.95m along its three sides. There is a hut site (CO126-033001-) c. 100m to the NW and another hut site (CO126-033002-) is c. 100m to the NNW.
Reference	www.archaeology.ie/ SMR file

SMR No	CO126-034
RMP Status	Yes
Townland	Loughnane More
Parish	Kilnamanagh
Barony	Bear
I.T.M	454342, 541191
Classification	Ringfort - rath
Dist. From Development	150m north
Description	In pasture, on a terrace of a S-facing hillslope with commanding views E-W from Blackball Head to Crow Head and over the mouth of Bantry Bay. According to local information, older people remember part of a circular bank of earth and stone at this location. It was levelled and is not visible at ground level. The location is still known as 'Cathair na Gaoithe' which translates as 'stone fort of the wind'.
Reference	www.archaeology.ie/ SMR file

SMR No	CO127-003
RMP Status	Yes
Townland	Killough East
Parish	Kilnamanagh
Barony	Bear
I.T.M	

Classification	Standing stone
Dist. From Development	75m south
Description	Near head of little valley opening to sea, on S side Beara peninsula. Ruined chamber (L 3.2m; Wth 1.2m) aligned NE-SW, represented by two sidestones covered by single roofstone. Two large slabs rest against W end. Slight traces of mound. (de Valera and O Nualláin 1982, 36, Co. 53)
Reference	www.archaeology.ie/ SMR file

SMR No	CO126-021
RMP Status	Yes
Townland	Ballaghboy
Parish	Kilnamanagh
Barony	Bear
I.T.M	456886, 542087
Classification	Souterrain
Dist. From Development	70m north
Description	In burial ground (CO126-013---). Underground chamber discovered; closed in recent past (O'Shea and Crowley 1972, 101). No visible surface trace.
Reference	www.archaeology.ie/ SMR file

SMR No	CO126-019001
RMP Status	Yes
Townland	Loughnane More
Parish	Kilnamanagh
Barony	Bear
I.T.M	451776, 541828
Classification	Ringfort - rath
Dist. From Development	175m south
Description	In pasture, on S-facing slope. Circular, slightly raised area (22.3m N-S; 22.2m E-W) enclosed by earthen bank (H 3.5m), with internal stone facing; stone walling replaces earthen bank ENE->E. Gap in bank to N. Souterrain (CO126-019002) in centre.
Reference	www.archaeology.ie/ SMR file

SMR No	CO126-013
RMP Status	Yes
Townland	Ballaghboy
Parish	Kilnamanagh
Barony	Bear

I.T.M	454181, 540776
Classification	Burial ground
Dist. From Development	40m north
Description	In pasture on S-facing slope. Irregular area enclosed by stone-faced earthen bank. Modern gate on S side. Many grave-markers noted. Souterrain (CO126-021---) within burial ground.
Reference	www.archaeology.ie/ SMR file

SMR No	CO126-037
RMP Status	Yes
Townland	Loughnane More
Parish	Kilnamanagh
Barony	Bear
I.T.M	451776, 541828
Classification	Hut site
Dist. From Development	65m south
Description	In pasture, on a break on the lower S-facing slopes of Lackacroghan. The remains of a circular hut site (diam. 6.7m) defined by a stone wall (T 0.6m; H 0.4m) which consists mainly of larger stones, some of which are upright or leaning. Some stones may have been removed from the hut site to build the nearby field walls. The level interior is raised (H 0.3m) above the outer ground level.
Reference	www.archaeology.ie/ SMR file

SMR No	CO127-065
RMP Status	Yes
Townland	Cloghfune
Parish	Kilnamanagh
Barony	Bear
I.T.M	453994, 540882
Classification	Redundant record
Dist. From Development	120m north
Description	In undulating pasture, on a S-facing hillslope overlooking Crow Head and the mouth of Bantry Bay. This standing stone (1.1m x 0.5m; H Not listed in the SMR (1988) or the RMP (1998). Located in rough fern-covered pasture with occasional rock outcrops on the lower SW-facing slopes of Knocknahulla and overlooking the mouth of Bantry Bay. Reported as a possible wedge-tomb, this feature is a non-antiquity. It is an animal shelter (2.4m N-S; Wth 1.4m at the SW-facing entrance, which is 0.75m H), cut into an up-sloping bank and roofed over with stone slabs, the tops of which are covered with grass-covered sod.
Reference	www.archaeology.ie/ SMR file

SMR No	CO127-065
RMP Status	Yes
Townland	Cloghfune
Parish	Kilnamanagh
Barony	Bear
I.T.M	453994, 540882
Classification	Redundant record
Dist. From Development	120m north
Description	In undulating pasture, on a S-facing hillslope overlooking Crow Head and the mouth of Bantry Bay. This standing stone (1.1m x 0.5m; H Not listed in the SMR (1988) or the RMP (1998). Located in rough fern-covered pasture with occasional rock outcrops on the lower SW-facing slopes of Knocknahulla and overlooking the mouth of Bantry Bay. Reported as a possible wedge-tomb, this feature is a non-antiquity. It is an animal shelter (2.4m N-S; Wth 1.4m at the SW-facing entrance, which is 0.75m H), cut into an up-sloping bank and roofed over with stone slabs, the tops of which are covered with grass-covered sod.
Reference	www.archaeology.ie/ SMR file

SMR No	CO126-031
RMP Status	Yes
Townland	Billeragh
Parish	Kilnamanagh
Barony	Bear
I.T.M	455692, 541888
Classification	Ritual site - holy/saint's stone
Dist. From Development	22m north
Description	The stone (H 0.4m; 0.25m x 0.15m) is cemented onto a stone wall. It has a lip around its base and a rounded head, underneath which is a hollowed angle. It narrows towards the top but there is a slight ridge around its midpoint. Locally it is considered to represent the human form and it is known as 'the holy stone' or 'the godstone'. A coffin-resting stone (CO126-031001-) lies c. 70m to the E. (O'Shea and Crowley 1972, 91)
Reference	www.archaeology.ie/ SMR file

SMR No	CO126-018
RMP Status	Yes
Townland	Scrivoge
Parish	Kilnamanagh
Barony	Bear
I.T.M	451968, 542015
Classification	Enclosure

Dist. From Development	60m south
Description	In pasture, on SSW-facing slope, overlooking Firkeel Bay. Marked as circular enclosure (diam. c. 15m) on OS 6-inch map (1842). No visible surface trace.
Reference	www.archaeology.ie/ SMR file

SMR No	CO126-031001
RMP Status	Yes
Townland	Billeragh
Parish	Kilnamanagh
Barony	Bear
I.T.M	453828, 540917
Classification	Coffin-resting stone
Dist. From Development	2m south
Description	On the S side of a road which leads to Dursey Sound. A flat-topped boulder (2m N-S; 1.2m E-W; H 0.7m) on which coffins were temporarily rested during funeral processions to the now closed burial ground (CO126-013----) c. 300m to the SW in Ballaghboy. A holy stone (CO126-031----) lies c. 70m to the W.
Reference	www.archaeology.ie/ SMR file

SMR No	CO126-033001
RMP Status	Yes
Townland	Loughnane More
Parish	Kilnamanagh
Barony	Bear
I.T.M	452046, 542006
Classification	Hut site
Dist. From Development	180m north
Description	In pasture, on a S-facing hillslope overlooking Crow Head. The remains of a circular hut site (5.3m E-W; 5.2m N-S) defined by a partially eroded earthen bank (Wth 1.6m; H 0.75m) which varies in height because of several cattle-breaks. The level interior is raised (H 1m) at the S and cut (D 0.6m) into the upslope at the N to compensate for the hillslope. Another hut site (CO126-033002-) is c. 40m to the NE and a standing stone (CO126-033003-) is c. 100m to the SE.
Reference	www.archaeology.ie/ SMR file

SMR No	CO126-019002
RMP Status	Yes
Townland	Loughnane More
Parish	Kilnamanagh

Barony	Bear
I.T.M	454088, 541139
Classification	Souterrain
Dist. From Development	175m south
Description	In ringfort (CO126-019001-). O'Shea and Crowley (1972, 59) record entrance to souterrain 2m E of ringfort. This is now filled in. More recent collapse noted towards centre of interior, with earth-cut creephole visible running in SW direction.
Reference	www.archaeology.ie/ SMR file

SMR No	CO126-043
RMP Status	Yes
Townland	Ballaghboy
Parish	Kilnamanagh
Barony	Bear
I.T.M	454193, 540784
Classification	Enclosure
Dist. From Development	218m north
Description	On a gently sloping terrace, on a W-facing hillslope overlooking Dursey Sound. An irregularly shaped mainly pasture area (c. 140m N-S; c. 120m E-W) is defined by the remains of a collapsed stone wall (T 0.5m; H 0.4m), the base stones of which protrude from a low bank of peat and earth (Wth 0.7-1m). On the W side taller stones, set at right angles to the line of the wall, occur intermittently and lower similarly set stones occur in between.
Reference	www.archaeology.ie/ SMR file

SMR No	CO126-012004
RMP Status	Yes
Townland	Ballynacallagh
Parish	Kilnamanagh
Barony	Bear
I.T.M	450435, 541318
Classification	Tomb unclassified
Dist. From Development	320m south
Description	Partially overlying W wall of church (CO126-012005-) stone-built vault bearing inscription "THIS TOMB WAS ERECTED FOR DAN O'SULLIVAN WHO DEPARTED THIS LIFE JAN ? 1787".
Reference	www.archaeology.ie/ SMR file

SMR No	CO126-012005
RMP Status	Yes
Townland	Ballynacallagh
Parish	Kilnamanagh
Barony	Bear
I.T.M	450440, 541298
Classification	Church
Dist. From Development	340m south
Description	At SE edge of Dursey Island in a graveyard (CO126-012003-) are the poorly preserved remains of a church with chancel (7.47m E-W; 5.58m N-S) and nave (9.55m E-W; 8.8m N-S). Only the lower courses are preserved except at the E end of the chancel which has opposing windows in N and S walls. The chancel extended to the E with a clear masonry break 2.63m from the nave junction. There is a late 18th century stone-built vault built on the line of the W wall. It has been suggested that this church may have replaced the earlier Kilmichael church (CO126-009002-) as a chapel-of-ease when Dursey joined to Killaconenagh (Lunham 1908, 74). According to the soldier-writer and native of Dursey, Philip O'Sullivan-Beare, writing in 1621, it was a 'monastery, built by Bonaventura, a Spanish Bishop, but dismantled by pirates' (Byrne 1903, 156).
Reference	www.archaeology.ie/ SMR file

SMR No	CO126-012003
RMP Status	Yes
Townland	Ballynacallagh
Parish	Kilnamanagh
Barony	Bear
I.T.M	450447, 541308
Classification	Graveyard
Dist. From Development	314m south
Description	Rectangular yard enclosed by modern stone wall at SE edge of Dursey Island. Few modern headstones but lines of low uninscribed stones throughout. Contains ruined church (CO126-012005-).
Reference	www.archaeology.ie/ SMR file

SMR No	CO126-012002
RMP Status	Yes
Townland	Ballynacallagh
Parish	Kilnamanagh
Barony	Bear
I.T.M	450420, 541221
Classification	Bridge

Dist. From Development	411m south
Description	Site of draw bridge which connected small island, containing O'Sullivan Beare Castle (CO126-012001-), to the mainland. Twelve rock-cut steps on mainland side lead down to a rocky ledge.
Reference	www.archaeology.ie/ SMR file

SMR No	CO126-050
RMP Status	Yes
Townland	Ballynacallagh
Parish	Kilnamanagh
Barony	Bear
I.T.M	450396, 541144
Classification	Promontory fort
Dist. From Development	495m south
Description	No information available
Reference	www.archaeology.ie/ SMR file

Appendix 14.2 Stray Finds Within the Surrounding Area

Cork
County Council
Comhairle Contae Chorcaí

Fáilte Ireland
National Tourism Development Authority

ROD
ROUGHAN & O'DONOVAN

APPENDIX 14.2
Stray Finds Within the Surrounding Area

Information on artefact finds from the study area in County Corj has been recorded by the National Museum of Ireland since the late 18th century. Location information relating to these finds is important in establishing prehistoric and historic activity in the study area.

There are no recorded stray finds from within the proposed development area or immediate vicinity.

Appendix 14.3 Legislation Protecting the Archaeological Resource

Cork
County Council
Comhairle Contae Chorcaí

Fáilte Ireland
National Tourism Development Authority

ROD
ROUGHAN & O'DONOVAN

APPENDIX 14.3
Legislation Protecting the Archaeological Resource

Protection of Cultural Heritage

The cultural heritage in Ireland is safeguarded through national and international policy designed to secure the protection of the cultural heritage resource to the fullest possible extent (Department of Arts, Heritage, Gaeltacht and the Islands 1999, 35). This is undertaken in accordance with the provisions of the European Convention on the Protection of the Archaeological Heritage (Valletta Convention), ratified by Ireland in 1997.

The Archaeological Resource

The National Monuments Act 1930 to 2014 and relevant provisions of the National Cultural Institutions Act 1997 are the primary means of ensuring the satisfactory protection of archaeological remains, which includes all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes. A National Monument is described as 'a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto' (National Monuments Act 1930 Section 2). A number of mechanisms under the National Monuments Act are applied to secure the protection of archaeological monuments. These include the Register of Historic Monuments, the Record of Monuments and Places, and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

Ownership and Guardianship of National Monuments

The Minister may acquire national monuments by agreement or by compulsory orde r. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Register of Historic Monuments

Section 5 of the 1987 Act requires the Minister to establish and maintain a Register of Historic Monuments. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. Any interference with sites recorded on the register is illegal without the permission of the Minister. Two months' notice in writing is required prior to any work being undertaken on or in the vicinity of a registered monument. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

Preservation Orders and Temporary Preservation Orders

Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

Record of Monuments and Places

Section 12(1) of the 1994 Act requires the Minister for Arts, Heritage, Gaeltacht and the Islands (now the Minister for the Department of Culture, Heritage and the Gaeltacht) to establish and maintain a record of monuments and places where the Minister believes that such monuments exist. The record comprises a list of monuments and relevant places and a map/s showing each monument and relevant place in respect of each county in the state. All sites recorded on the Record of Monuments and Places receive statutory protection under the National Monuments Act 1994. All recorded monuments on the proposed development site are represented on the accompanying maps.

Section 12(3) of the 1994 Act provides that 'where the owner or occupier (other than the Minister for Arts, Heritage, Gaeltacht and the Islands) of a monument or place included in the Record, or any other person, proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such a monument or place, he or she shall give notice in writing to the Minister of Arts, Heritage, Gaeltacht and the Islands to carry out work and shall not, except in case of urgent necessity and with the consent of the Minister, commence the work until two months after giving of notice'.

Under the National Monuments (Amendment) Act 2004, anyone who demolishes or in any way interferes with a recorded site is liable to a fine not exceeding €3,000 or imprisonment for up to 6 months. On summary conviction and on conviction of indictment, a fine not exceeding €10,000 or imprisonment for up to 5 years is the penalty. In addition, they are liable for costs for the repair of the damage caused.

In addition to this, under the European Communities (Environmental Impact Assessment) Regulations 1989, Environmental Impact Statements (EIS) are required for various classes and sizes of development project to assess the impact the proposed development will have on the existing environment, which includes the cultural, archaeological and built heritage resources. These document's recommendations are typically incorporated into the conditions under which the proposed development must proceed, and thus offer an additional layer of protection for monuments which have not been listed on the RMP.

The Planning and Development Act 2000

Under planning legislation, each local authority is obliged to draw up a Development Plan setting out their aims and policies with regard to the growth of the area over a five-year period. They cover a range of issues including archaeology and built heritage, setting out their policies and objectives with regard to the protection and enhancement of both. These policies can vary from county to county. The Planning and Development Act 2000 recognises that proper planning and sustainable development includes the protection of the archaeological heritage. Conditions relating to archaeology may be attached to individual planning permissions.

Cork County Development Plan 2014

The Cork County Development Plan 2014 contains the following Policies and Objectives with relation to the archaeological resource:

Policies:

HE 3-1: Protection of Archaeological Sites

a) Safeguard sites and settings, features and objects of archaeological interest generally.

b) Secure the preservation (i.e. preservation in situ or in exceptional cases preservation by record) of all archaeological monuments including the Sites and Monuments Record (SMR) (see www.archeology.ie) and the Record or Monuments and Places as established under Section 12 of the National Monuments (Amendment) Act, 1994, as amended and of sites, features and objects of archaeological and historical interest generally.

In securing such preservation, the planning authority will have regard to the advice and recommendations of the Department of Arts, Heritage and Gaeltacht as outlined in the Frameworks and Principles for the Protection of the Archaeological Heritage.

HE 3-3: Zones of Archaeological Potential

Protect the Zones of Archaeological Potential (ZAPs) located within historic towns and other urban areas and around archaeological monuments generally. Any development within the ZAPs will need to take cognisance of the potential for subsurface archaeology and if archaeology is demonstrated to be present appropriate mitigation (such as preservation in situ/buffer zones) will be required.

HE 3-4 Industrial and Post Medieval Archaeology

Protect and preserve the archaeological value of industrial and post medieval archaeology such as mills, limekilns, bridges, piers, harbours, penal chapels and dwellings.

Proposals for refurbishment, works to or redevelopment/conversion of these sites should be subject to careful assessment.

HE 3-6: Archaeology and Infrastructure Schemes

Have regard to archaeological concerns when considering proposed service schemes (including electricity, sewerage, telecommunications, water supply) and proposed roadwork's (both realignments and new roads) located in close proximity to Recorded Monuments and Places and their known archaeological monuments.

HE 5-1: Cultural Heritage

Protect and promote the cultural heritage of County Cork as an important economic asset.

Appendix 14.4 Impact Assessment and the Cultural Heritage Resource

Cork
County Council
Comhairle Contae Chorcaí

Fáilte Ireland
National Tourism Development Authority

ROD
ROUGHAN & O'DONOVAN

APPENDIX 14.4
Impact Assessment and the Cultural Heritage Resource

Potential Impacts On Archaeological And Historical Remains

Impacts are defined as 'the degree of change in an environment resulting from a development' (Environmental Protection Agency 2017). They are described as profound, significant or slight impacts on archaeological remains. They may be negative, positive or neutral, direct, indirect or cumulative, temporary or permanent.

Impacts can be identified from detailed information about a project, the nature of the area affected and the range of archaeological and historical resources potentially affected. Development can affect the archaeological and historical resource of a given landscape in a number of ways.

- Permanent and temporary land-take, associated structures, landscape mounding, and their construction may result in damage to or loss of archaeological remains and deposits, or physical loss to the setting of historic monuments and to the physical coherence of the landscape.
- Archaeological sites can be affected adversely in a number of ways: disturbance by excavation, topsoil stripping and the passage of heavy machinery; disturbance by vehicles working in unsuitable conditions; or burial of sites, limiting accessibility for future archaeological investigation.
- Hydrological changes in groundwater or surface water levels can result from construction activities such as de-watering and spoil disposal, or longer-term changes in drainage patterns. These may desiccate archaeological remains and associated deposits.
- Visual impacts on the historic landscape sometimes arise from construction traffic and facilities, built earthworks and structures, landscape mounding and planting, noise, fences and associated works. These features can impinge directly on historic monuments and historic landscape elements as well as their visual amenity value.
- Landscape measures such as tree planting can damage sub-surface archaeological features, due to topsoil stripping and through the root action of trees and shrubs as they grow.
- Ground consolidation by construction activities or the weight of permanent embankments can cause damage to buried archaeological remains, especially in colluviums or peat deposits.
- Disruption due to construction also offers in general the potential for adversely affecting archaeological remains. This can include machinery, site offices, and service trenches.

Although not widely appreciated, positive impacts can accrue from developments. These can include positive resource management policies, improved maintenance and access to archaeological monuments, and the increased level of knowledge of a site or historic landscape as a result of archaeological assessment and fieldwork.

Predicted Impacts

The severity of a given level of land-take or visual intrusion varies with the type of monument, site or landscape features and its existing environment. Severity of impact can be judged taking the following into account:

- The proportion of the feature affected and how far physical characteristics fundamental to the understanding of the feature would be lost;

- Consideration of the type, date, survival/condition, fragility/vulnerability, rarity, potential and amenity value of the feature affected;
- Assessment of the levels of noise, visual and hydrological impacts, either in general or site-specific terms, as may be provided by other specialists.

Appendix 14.5 Mitigation Measures and the Cultural Heritage Resource

Cork
County Council
Comhairle Contae Chorcaí

Fáilte Ireland
National Tourism Development Authority

ROD
ROUGHAN & O'DONOVAN

APPENDIX 14.5
Mitigation Measures and the Cultural Heritage Resource

Potential Mitigation Strategies For Cultural Heritage Remains

Mitigation is defined as features of the design or other measures of the proposed development that can be adopted to avoid, prevent, reduce or offset negative effects.

The best opportunities for avoiding damage to archaeological remains or intrusion on their setting and amenity arise when the site options for the development are being considered. Damage to the archaeological resource immediately adjacent to developments may be prevented by the selection of appropriate construction methods. Reducing adverse effects can be achieved by good design, for example by screening historic buildings or upstanding archaeological monuments or by burying archaeological sites undisturbed rather than destroying them. Offsetting adverse effects is probably best illustrated by the full investigation and recording of archaeological sites that cannot be preserved in situ.

Definition Of Mitigation Strategies

Archaeological Resource

The ideal mitigation for all archaeological sites is preservation in situ. This is not always a practical solution, however. Therefore, a series of recommendations are offered to provide ameliorative measures where avoidance and preservation in situ are not possible.

Archaeological Test Trenching can be defined as 'a limited programme of intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site on land, inter-tidal zone or underwater. If such archaeological remains are present field evaluation defines their character, extent, quality and preservation, and enables an assessment of their worth in a local, regional, national or international context as appropriate' (CIfA 2014a).

Full Archaeological Excavation can be defined as 'a programme of controlled, intrusive fieldwork with defined research objectives which examines, records and interprets archaeological deposits, features and structures and, as appropriate, retrieves artefacts, ecofacts and other remains within a specified area or site on land, inter-tidal zone or underwater. The records made and objects gathered during fieldwork are studied and the results of that study published in detail appropriate to the project design' (CIfA 2014b).

Archaeological Monitoring can be defined as 'a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive (CIfA 2014c).

Underwater Archaeological Assessment consists of a programme of works carried out by a specialist underwater archaeologist, which can involve wade surveys, metal detection surveys and the excavation of test pits within the sea or riverbed. These assessments are able to access and assess the potential of an underwater environment to a much higher degree than terrestrial based assessments.

Chapter 15 Architectural Heritage

15.1 Introduction

This chapter assesses the potential impact on architectural heritage of the proposed Dursey Island Cable Car and Visitor Centre. The history of the proposed development location is summarised and the historic buildings and other structures in the vicinity are identified and described. Where it is assessed that there could be a significant impact, mitigation measures are proposed.

The location of the proposed development is directly adjacent to the existing cableway, which straddles the Dursey Sound, connecting the easternmost tip of Dursey Island with the townland of Ballaghboy, on the western end of the Beara Peninsula in west County Cork. The proposed cableway will run parallel to the existing alignment offset by approximately 14m to the north. The end-to-end length of the proposed cableway will be approximately 375m which is slightly shorter than the length of the existing cableway. A comprehensive description of the proposed development is detailed in Chapter 4 of this EIAR.

15.2 Methodology

The architectural heritage impact assessment involves the following:

- Identification of buildings and other structures in the vicinity of the proposed development;
- Assessment of the architectural significance of those buildings and structures; and
- Assessment of the anticipated effects of the proposals on their character.

The emphasis of this assessment is on buildings and structures that are still standing. Where a building or other structure has been destroyed, it no longer has architectural significance on the landscape, though it may leave traces that fall within the ambit of the archaeological and cultural heritage impact assessment (presented in Chapter 14 of this EIAR). It may also have had an importance that remains through the historical record, though this is not of concern to the present task. For a structure to have architectural significance, it need not necessarily be intact; ruins, or even fragments of buildings, may be of importance.

The identification of buildings and structures to be considered in this assessment was based, in the first instance, on an analysis of current Ordnance Survey (OSi) maps. The potential for any building or other structure in the vicinity of the proposed works to have special architectural significance was also gauged through examination of the following sources:

- Cork County Council (2014). *The Cork County Development Plan 2014 - 2020*
- Smith (1750). *Pre-Ordnance Survey Map of County Cork*
- Bath (1811). *Pre-Ordnance Survey Map of County Cork*
- Ordnance Survey six-inch maps of 1842 and 1930s
- Ordnance Survey 1:2500 map of 1903
- Records of Protected Structures for County Cork

Any buildings on or close to the proposed development that were identified on the earlier Ordnance Survey maps were then checked against the current Ordnance Survey maps to ascertain which were still extant.

A walkover survey of the site of the proposed development was then carried out in order to identify those structures noted in the desktop survey, and to assess their architectural quality. Any structures of potential architectural significance not identified during the desktop study were also recorded during the walkover survey.

Any buildings/structures of architectural significance identified in the vicinity of the proposed development were examined to assess the potential effects of the works, and to consider potential for mitigation measures, where necessary. In each case, the structures identified were rated in accordance with the National Inventory of Architectural Heritage (NIAH) classification system, wherein a structure is rated as being of International, National, Regional or Local interest, or, if a structure is of no special interest, the NIAH includes a category of "Record only"[1].

The legislation related to the protection of architectural heritage assets is set down in the Planning and Development Act 2000. This legislation defines 'architectural heritage' as structures which are of special interest under the headings of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. Wherever the phrase 'special architectural interest' is used in this report, it should be understood to refer to special interest in one or more of these eight respects.

15.3 Description of Receiving Environment

The site of the proposed development takes in areas on the mainland (Beara Peninsula, west Co. Cork) and on Dursey Island (townland of Ballynacallagh). The mainland and the island sides of the site are separated by Dursey Sound, a narrow tidal channel with strong currents. The land on either side of the Sound slopes towards the sea, with thin soils and jagged exposed rock with bedding planes rising almost vertically in numerous places. At the coast, there are low rocky cliffs. At its narrowest, the Dursey Sound is approx. 200m wide, while the cable car runs for a distance of just over 370m.

Historically (over at least the past two centuries or so), the land in the vicinity of the proposed development has not been cultivated. No field boundaries are present in the vicinity of either end of the proposed cable car route, nor are they depicted on the first edition OSi map, dating from the early 1840s. A field system does exist on the southern coast of the Beara Peninsula, approaching within approx. 140m of the base of the existing cable car. On the island, the nearest fields are more than 700m away from the existing cable car infrastructure. This was also the case in the 1840s, as shown on the Ordnance Survey map.

At present, there are no buildings in the immediate vicinity of the site of the proposed development. Nor were there on the historical Ordnance Survey maps. The nearest structure on the mainland - other than those associated with the cable car - is the slipway to the south-east, which is at a distance of about 90m in a direct line from the base of the existing cable car. On the island, the nearest structure is a small building associated with the island-side slipway, which is at a distance of about 160m. The first edition Ordnance Survey map shows no buildings closer than these – though a building is shown near the slipway on the island, at a distance of about 220m.

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[1] National Inventory of Architectural Heritage *NIAH Handbook* edition September 2017 p. 20

Neither Charles Smith's Map of County Cork(1750), nor Neville Bath's (1811) is large enough to show any meaningful detail of buildings in the vicinity, though both show a structure that is probably the ancient church on the island, about 370m south of the cable car landing point. Smith's map shows a structure further to the north, on the mainland, where a signal tower was to be built more than fifty years after his map was published, but it is not known what the building shown on the 1750 map may have been. The road leading to the cable car was laid out during the nineteenth century and for the majority of its length no road was shown on the first-edition Ordnance Survey map of 1842.

There are no protected structures in the vicinity of the cable car site, either on the island or on the mainland, and no structures at either location that are close to the site are included in the National Inventory of Architectural Heritage.

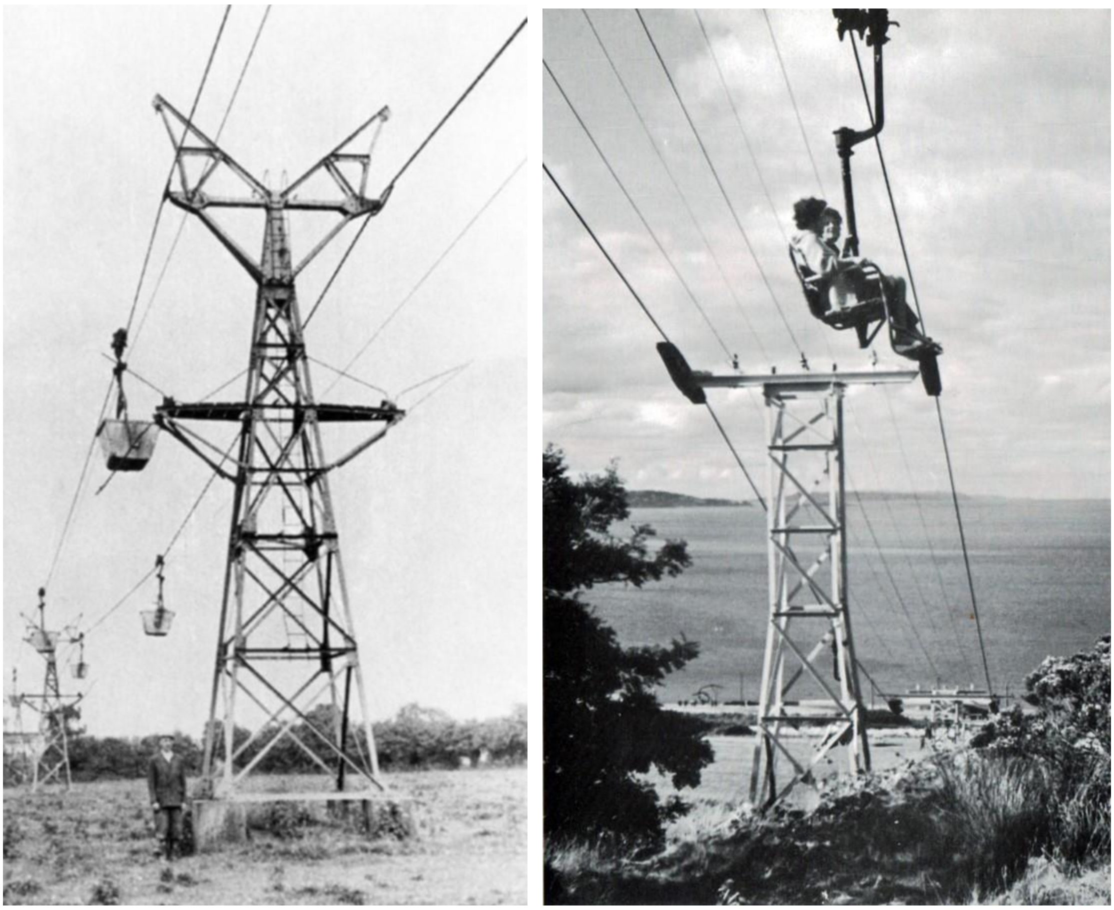

Plate 15. 1 The Drogheda Aerial Ropeway (left) and Bray Head Chair Lift (right).

The Dursey Island Cable Car

The cable car that connects Dursey Island with the mainland was constructed in 1969. It appears to have been the first of its kind in Ireland, though not in Europe.

There have been other facilities of similar nature in this country, including the cement aerial ropeway outside Drogheda, which operated between 1938 and 1958, transporting limestone from quarries to a cement factory. Additionally, a chair lift operated in Bray between 1950 and 1970, bringing visitors from the seafront to the Eagle's Nest Hotel, high on the slopes of Bray Head. The Dursey Island Cable Car was the first true cable car in the country and was opened by the Taoiseach, Jack Lynch, in December 1969. It was constructed by British Chairlifts Ltd.

15.4 Inventory of Architectural Heritage

There are no significant structures of pre-twentieth century origin in the vicinity of the proposed development. The following sections represent an inventory of structures associated with the cable car site and the nearby slipways. There are no other structures of significance in the vicinity of the site.

Cable Car Site - Mainland

The existing cable car infrastructure consists of two steel pylons (one each on island and mainland), the ropeway (including supporting and hauling cables), operating machinery on island and mainland, and the carrier cabin itself.

The supporting line structures (pylons) consist of lattice steelwork. Each has a frame ('eye') at the top through which the cabin passes.

On the mainland, there is a concrete landing platform, bounded by concrete walls and approached via concrete ramps bounded by steel railings. The concrete walls are painted. The platform serves as a waiting area and boarding/embarking area for those using the cable car.

Plate 15.2 **Mainland-side pylon (left) and landing platform (right).**

The line station building on the mainland (Plate 15.3) provides office space for staff, along with a ticket office, and it also houses the machinery that operates the cableway. This building is constructed with concrete, is painted and has a roof of profiled steel.

Plate 15.3 Mainland-side line station building

The existing cable car site is approached via an access road that branches off the R572 regional road. At the mainland side of the site, the roadway broadens to become an informal car park. On the seaward side of the mainland site, there is a group of stone-faced walls and benches (Plate 15.4) that allow visitors to sit and watch the cable car and take in the view.

Plate 15.4 Stone walls and benches on the mainland side of the site

South-east of the cable car is a slipway (Plate 15.5). This consists of a concrete ramp that descends into the sea, alongside which a roadway runs down to a concrete quay to allow boats to tie up.

Plate 15.5 **Mainland-side slipway**

Cable Car Site – Dursey Island

The supporting line structure (pylon) on Dursey Island (Plate 15.6) is similar to that on the mainland, also being constructed of lattice steel. Both pylons have their seaward legs encased in concrete to provide a platform of similar height to the ground on which the rear legs stand.

The ropeway cables are attached to an anchor point fabricated with steel I-beams in a triangular arrangement, for strength. This is fixed to a concrete platform. As noted above, the cables run around pulley wheels on this anchor point.

Plate 15.6 **Island-side pylon (left) and anchor point (right).**

The landing platform on Dursey Island is in the form of a ramp rising from the ground level at the rear. On either side and on the downhill end the ramp is partly faced with dry-stone walling, with the stones generally set vertically, while parts of the ramp have been repaired with concrete blockwork, chiefly at the corners. The upper surface of the ramp is grassed. Passengers disembark onto a concrete platform adjacent to the ramp and this is guarded with tubular-steel railings.

At the landward end of the ramp there is a small line station building constructed of concrete and with a corrugated-steel roof.

Plate 15.7 Island-side landing platform (left) and line station building (right).

A slipway is located to the south-west of the cable car on Dursey Island. The slipways on the mainland and the island allow for the movement of goods by boat, including goods that cannot be transported in the cable car, such as cars, groceries and building materials. In the past, cattle were transported one-by-one in the cable car but now they are moved by sea between the two slipways.

Plate 15.8 Island-side slipway

Cable Car

The cable car is a modest-sized structure with sliding doors on one side and with paired horizontal windows facing the two landing platforms. A disused car is situated in a hen run associated with a private residence alongside the road that approaches the site.

Plate 15.9 **Existing cable car (left) and disused cable car (right).**

R572 Regional Road

As noted above, the access to the cable car along the R572 uses a road that was laid out during the nineteenth century. As a result, there are few buildings along the road that date from the nineteenth century and those that can be traced back that far date from later in the century, not being shown on the first-edition Ordnance Survey map of 1842. Only one building in the vicinity of the road is included in the National Inventory of Architectural Heritage (reference 20912605), a small house at Scrivoge which is not in the vicinity of any of the proposed passing bays along the route.

A number of passing bay are proposed along the route of the R572 and the majority will not impact upon any buildings other than the roadside walls which date from the late nineteenth century. There are structures in the vicinity of the proposed visibility splay at Bealbarnish Gap (Fig. 4.13 in Volume 3 of this EIAR) and the easternmost proposed passing bay (Fig. 4.14 in Volume 3).

Plate 15.10 **Three buildings at site of easternmost passing bay**

Near to the site of the easternmost passing bay there are three stone-built structures (Plate 15.10). Two are roofed with corrugated iron and appear to be agricultural buildings, while the third is an unroofed ruin, the gables of which suggest a possible house. None of these buildings were shown on the first-edition Ordnance Survey map of 1842, while only the ruined house appears on the 1903 edition. Two of these structures will be demolished in order to facilitate the construction of the proposed passing bay. These buildings are not of significant architectural heritage importance and, therefore, significant adverse effects will not occur as a result of this element of the proposed works.

Plate 15.11 Derelict house at second passing bay from the east

Near to the site of the second proposed passing bay from the east, there is a derelict building that appears to have been a house. This is single storey, though with rooms in the roof space, and there is a ruined outbuilding on the northern gable. The house is slated and gable ended. This house dates from the early twentieth century and was not shown on the Ordnance Survey map of 1903.

15.5 Description of Potential Impacts

It is proposed to dismantle the majority of the existing cableway infrastructure, including the island-side pylon, the landing platforms and the line station buildings. The mainland-side pylon and operating machinery will be retained as features of interest in the proposed development. A new cableway will be erected, providing a greater capacity for movement of passengers. It is also proposed to construct new line station buildings on both island and mainland, as well as a mainland-side visitor centre, café and expanded visitor car park. Additionally, it is proposed to conduct road works on the principal approach road to the mainland side of the site, the R572, including construction of 10 no. passing bays and 1 no. visibility splay, and completion of a number of additional localised improvements to improve forward visibility. As noted above, there are some buildings near to these proposed passing bays, though they are not of heritage significance and would be classified under the terminology used in the National Inventory of Architectural Heritage as 'record only'.

It is considered that the proposed development will not have any significant adverse effects on any buildings/structures of architectural heritage significance.

15.6 Mitigation and Monitoring Measures

While the Dursey Island Cable Car is not of significance in comparison with similar projects carried out over a very long period in other parts of the world, it has a significance in being the only cable car in Ireland. In view of this significance it is recommended that the existing cable car and its ancillary facilities be recorded through photographic and written description prior to removal and that an exhibition that includes a history of the cable car together with drawings, photographs, newspaper articles and other mementoes be provided in the new Visitor Centre.

It is also recommended that should any of the vernacular structures alongside the R572 be demolished to facilitate the passing bay these should be recorded through photography and written description.

15.7 Residual Impacts

The removal of elements of the existing cableway will be permanent. The provision of an exhibition and the retention of the mainland-side pylon and machinery will minimise this residual impact by allowing the memory of the original cable car to be preserved.

15.8 Difficulties Encountered

No difficulties were encountered in the compilation of this chapter.

15.9 References

Cairns, Henry, and Owen Gallagher, 2003, *A Pictorial History of Bray Co. Wicklow – volume 1: the seafront and environs*, Old Bray Society, Bray.

Cork Examiner, 6th December 1969.

Hamond, Fred and Charles Friel, 2007, *An Industrial Heritage Survey of Railways in Counties Monaghan and Louth*, Monaghan County Council and Louth County Council.

National Inventory of Architectural Heritage, 2017, *NIAH Handbook*.

www.irishcement.ie/wp-content/uploads/2013/Irish-Cement-Celebrating-75-Years.pdf, accessed 17th April 2019

Chapter 16 Material Assets and Land

16.1 Introduction

This Material Assets and Land chapter of the Environmental Impact Assessment Report (EIAR) discusses the impact of the proposed Dursey Island Cable Car and Visitor Centre Development on agricultural property and material assets including utilities, rights of way, property and land.

A development may affect material assets and land if it involves any of the following:

- Acquisition of land;
- Demolition of buildings;
- Revaluation of or change in the development potential of adjoining lands/ properties; or,
- Changes to existing services / infrastructure.

Impacts on material assets and land are also addressed throughout this EIAR, most particularly in the EIAR chapters listed below.

Title	**Relevant Aspect**
Chapter 5 - Traffic and Transport	Road safety
Chapter 6 - Population and Human Health	Human health and nuisance
Chapter 8 - Soils and Geology	Natural resources
Chapter 9 - Hydrogeology	Groundwater
Chapter 10 - Hydrology	Water availability and quality
Chapter 11 - Landscape and Visual	Views and landscaping
Chapter 12 - Noise and Vibration	Noise environment
Chapter 13 - Air Quality and Climate	Air Quality
Chapter 14 - Archaeological and Cultural Heritage	Cultural assets
Chapter 15 - Architectural Heritage	Architectural assets

This chapter also identifies the positive impacts that the development will have, such as the amenity that the development will provide.

16.2 Methodology

This chapter describes the receiving environment and determines the significance of the impact of the proposed development on:

- Agriculture;
- Land use and ownership – an examination of impacts on housing, severance, loss or rights of way or amenities, conflicts, or other changes likely to ultimately alter the character and use of the surroundings;
- Local businesses – an assessment of employment and employment opportunities, property and lands for development. The type and extent of positive and/ or negative impacts of the proposed development to current economic activity will be assessed;
- Infrastructure; and

- Existing services and utilities.

The assessment methodology has considered the following guidelines:

- Advice notes on current practice in the preparation of Environmental Impact Statements (EPA, 2003);
- Guidelines on the information to be contained in Environmental Impact Statements (EPA, 2002); and
- Environmental Impact Assessment of National Road Schemes – A Practical Guide (NRA, 2008).

The following draft guidance documents have also been consulted:

- Guidelines on the Information to be contained in Environmental Impact Assessment Reports, Draft August 2017;
- Revised Guidelines on the Information to be Contained in Environmental Impact Statements, Draft September 2015; and
- Advice Notes for Preparing Environmental Impact Statements, Draft September 2015.

The methodology for the assessment of the significance of impact on material assets and land comprised of a desktop survey of project mapping and information, roadside survey of the proposed development and detailed farm surveys involving landowner consultation. The baseline environment and impact assessment relied on information from various sources as outlined in Table 16.1. Aerial photography, Ordnance Survey Ireland (OSI) maps, Google Maps and a site layout plan of the existing area and proposed development have been consulted.

Table 16.1 Information Used in Assessment and Sources

Information	Source
Land registry / landownership information	Cork County Council and landowner consultation.
Land use, farm details	Landowner consultations and walkover farm surveys.
Agricultural statistics	Statistical Yearbook of Ireland 2017 / Agriculture (Central Statistics Office, 2018). National census of agriculture statistics derived from the June 2010 census of agriculture (Central Statistics Office, 2012).
Soils information	Irish National Soils Map, 1:250,000k, V1b(2014).Teagasc, Cranfield University (Environmental Protection Agency (EPA), 2014). Creamer, R. "Irish SIS Final Technical Report 13: Irish Soil Information System Legend" (EPA, 2014). Creamer, R. "Irish SIS Final Technical Report 10: Soil Profile Handbook" (EPA, 2014).
Planning and zoning objectives	West Cork Municipal District Local Area Plan (2017-2020)
Mapping and project information, Compulsory Purchase Order (CPO) deposit mapping and schedule	Roughan & O'Donovan

The completion of farm surveys and roadside surveys took place between April and May 2019. The detailed farm surveys were carried out and consultation was conducted with the landowners for 15 farm holdings and the shareholders of one area of commonage.

The farm surveys involved on-site meetings with agricultural property owners, a walkover survey of affected lands and the completion of detailed farm questionnaires. The farm survey of the affected lands enabled an assessment of the impact of the proposed development and the possible mitigation measures necessary to alleviate negative impact.

Confirmation of landownership information, landowner feedback on the proposed design and relevant survey information were submitted to the project design team to assist with the preparation of the final design.

16.2.1 Study Area

The study area comprises of the agricultural and non-agricultural land and property directly impacted by the proposed Dursey Island Cable Car and Visitor Centre Development, as presented in Figures 1.1 – 1.3 of Volume 3 of this EIAR. The study area includes agricultural lands in Ballynacallagh Townland on Dursey Island for the proposed cable car site. The study area also includes agricultural lands from Ballaghboy Townland to Killough East Townland for the provision of 10 no. passing bays, 1 no. visibility splay and completion of a number of additional localised improvements along an 8km section of the R572, between its junction with the R575 at Bealbarnish Gap and the cable car site.

There are 16 agricultural properties directly impacted by the proposed Dursey Island Cable Car and Visitor Centre Development and landtake will comprise of approximately 2.1187Ha of lands (including 0.7490Ha roadbed). There are 15 farm holdings on the Beara Peninsula and one commonage on Dursey Island. The agricultural land cover consists mainly of improved grassland on the mainland and upland grazing on the island.

16.2.2 Assessment Methodology

The baseline environment for agricultural property was evaluated on an individual property basis and assigned a baseline rating. This baseline rating combined with a magnitude of impact from construction and operation impacts associated with the proposed development will determine the significance of the agricultural impact.

16.2.2.1 Baseline Rating

Farm holdings within the study area were assigned a baseline rating which is determined by the farm type, farm size, land quality, sensitivity to construction and any existing adverse effects. This information was sourced from landowner consultation and walkover surveys on farm holdings directly affected by the proposed development.

Farm type influences the degree of the baseline rating with higher ratings for specialist farm types or enterprises that consist of the breeding or farming of high value livestock. Enterprises that are farmed at an intensive level, such as dairying i.e. with a high stocking rate, and indoor farm enterprises such as pig or poultry farms are indicative of a high baseline rating. Tillage-based and horticultural farm enterprises are indicative of a high baseline rating. Less intensive farm enterprises such as beef and sheep farms are generally indicative of a medium baseline rating.

Larger farm holdings or single unit farms will allow for greater scale of production and are indicative of a high baseline rating. Farms that are smaller or fragmented in structure are generally indicative of a medium baseline rating.

Land quality on a farm holding will determine farm productivity and lands of good quality will be indicative of a high baseline rating. Farms with lands that are limited in agricultural usage due to soil type, typography or drainage will be indicative of a medium or low baseline rating.

The sensitivity of some farm enterprises to the effects of construction or operational impacts will influence the baseline rating of farm holdings. Such farms will include specialist dairy farms and specialist equine farms. Dairy farms are sensitive to impacts that will reduce available grassland area and existing access to the milking platform, i.e. access for dairy cows between the farmyard and the grazing paddocks. Equine livestock used for the breeding and training of horses can be regarded as sensitive to impacts such as noise, dust and visual impacts. However, there are no dairy or equine holdings affected by the proposed development.

The determination of a baseline rating may also be influenced by existing adverse effects such as the proximity of the lands to urban areas and the zoning of lands for other than agricultural uses.

16.2.2.2 Baseline Rating Criteria

The criteria used to determine the baseline rating for the farm holdings on the proposed development are shown in Table 16.2. The criteria for each of the baseline ratings have been developed in consideration of the relevant EPA guidelines on describing the existing environment.

Table 16.2 Baseline Rating Criteria

Baseline	Criteria
High	Intensively managed farm enterprises. Specialist dairy enterprises or farm enterprises involved in the breeding of high-quality livestock. Tillage enterprises on good quality lands. Mixed livestock and/or tillage enterprises on good quality lands. Agricultural lands used for research and education.
Medium	Livestock and / or tillage enterprises on medium quality lands. Agricultural lands of good quality leased for livestock or tillage production. Agricultural lands of good quality which is zoned or planning permission exists for non-agricultural purposes.
Low	Extensively managed farm enterprises on medium quality lands. Land parcels with limited agricultural capacity due to size or shape. Agricultural lands of medium or poor quality leased for livestock or tillage production. Lands under commercial forestry or woodland. Agricultural lands of medium quality which is zoned or planning permission exists for non-agricultural purposes.
Very low	Extensively managed livestock farm enterprises on poor quality lands. Unused agricultural lands of medium or poor quality. Agricultural lands of poor quality which is zoned or planning permission exists for non-agricultural purposes.

16.2.2.3 Impact Magnitude

Impacts on agricultural properties arising from construction and operation of the proposed development include:

- Landtake;
- Land severance;
- Impact on farm buildings / facilities;
- Other impacts such as on land drainage and services.

Landtake

The effect of agricultural landtake can be significant and the acquired area together with its location and duration will determine the magnitude of impact. The greater the area of landtake indicates a higher magnitude of impact. The area and location of landtake are often interlinked as landtake near a farmyard on a single unit farm will generally be of a greater magnitude than a similar area on a fragmented part of the farm holding. The duration of landtake can vary from permanent (greater than sixty years), short term (one year to seven years) to temporary (less than one year). The degree of the magnitude of impact decreases with shorter durations.

Landtake associated with the approach road comprises of permanent landtake from farm holdings for completion of aforementioned roadworks on the R572. As well as the permanent landtake discussed above, there will be temporary landtake associated with each of the locations to provide for the completion of construction works. The area of temporary landtake, in each case, will not be significant and will comprise of agricultural lands and public road.

Land Severance

The severance of lands is largely determined by the landtake location and can often result in more significant impacts on farm holdings. Similar to the effect of landtake, the area of severed lands, their location relative to remaining lands and the duration of severance will influence the magnitude of impact. The severance of a significant area or proportion of available land will indicate a high magnitude of impact. The severance of lands adjoining a farmyard, particularly an intensive farm such as a dairy farm, will have a higher magnitude of impact than the severance of lands at the external boundary of a farm. The permanent severance of lands will have a greater magnitude of impact than temporary severance.

The proposed development will not result in the severance of agricultural lands. There will be an impact on existing field access to lands on some farm holdings.

Impact on Farm Buildings / Facilities

The impact of a proposed development on farm buildings or facilities is generally indicative of a medium to high magnitude of impact. The degree of magnitude will depend on the type and nature of farm buildings that are affected. Where animal housing and animal manure storage or fodder storage facilities are affected the degree of magnitude will be high. Farm buildings such as general-purpose sheds or animal handling facilities are indicative of a medium magnitude of impact. Other facilities such as the loss of natural shelter are indicative of a medium magnitude of impact.

The proposed development will impact on existing farm buildings on two farms. On one farm there will be an impact on a number of traditional drystone buildings. On one farm there will be an impact on a farmhouse structure (derelict).

Other Impacts Such as Impacts to Land Drainage and Services

The construction activities on a proposed development may result in the disturbance of existing land drainage and the interruption of services such as water, power and other utilities. The magnitude of impact will be influenced by the type of disturbance and the duration involved. These impacts are generally of a temporary to short term duration being limited to the extent of construction works.

The design of the proposed development may temporarily impact on the local drainage network and field drainage. There will be a temporary impact on water supply where existing connections to water mains are affected.

16.2.2.4 Magnitude of Impact Criteria

The criteria used to determine the magnitude of impact for the farm holdings on the proposed development are shown in Table 16.3. The criteria for each of the impact ratings have been developed in consideration of the relevant EPA guidelines on the assessment of impact.

Table 16.3 Magnitude of Impact Criteria

Magnitude	Criteria
Very high	• The impact on the farm is such that the farm enterprise(s) cannot continue. • Permanent landtake of such an area that the farm holding is unworkable. • Permanent land severance of such an area that the farm enterprise is unworkable. • Essential farm buildings / facilities may be significantly impacted.
High	• The impact on the farm is such that the farm enterprise(s) cannot continue without significant management changes. • Permanent landtake of such an area that the continued management of the farm enterprise will require significant change. • Permanent land severance of a nature that the continued management of the farm enterprise will require significant change. • Essential farm buildings / facilities may be directly or indirectly impacted.
Medium	• The impact on the farm is such that the farm enterprise(s) can be continued as before but with increased management difficulties. • Permanent landtake of such an area that the management of the farm enterprise(s) can be continued but with increased difficulties. • Permanent land severance of a nature that the management of the farm enterprise(s) will require management changes. • Farm buildings and/or farm facilities may be directly or indirectly impacted.
Low	• The impact on the farm is such that the farm enterprise(s) can be continued as before with minor management changes. • Permanent or short-term landtake of such an area that the farm enterprise(s) suffer minor difficulties as a result. • Permanent or short-term land severance of a nature that the farm enterprise(s) will require minor management changes. • Farm buildings / facilities would not be directly impacted. There may be indirect impacts. • Temporary construction impacts.
Very low	• The impact on the farm is such that the farm enterprise can be continued as before with temporary or short-term management changes.

Magnitude	Criteria
	• Temporary or short-term landtake of such an area without noticeable consequences. • Permanent landtake involving public roadbed only. • Temporary or short-term land severance of a nature that the farm enterprise can be continued but with minor management changes. • Farm buildings / facilities would not be directly impacted. There may be indirect impacts. • Temporary construction impacts.

16.2.2.5 Impact Significance

The significance of impact on an agricultural property is determined by the baseline rating of a farm holding combined with the magnitude of impact of the proposed development. There are four categories of baseline rating ranging from 'very low' to 'high'. There are five categories of magnitude of impact ranging from 'very low' to 'very high'. The likely significance rating is determined by reference to the matrix in Table 16.4 using the baseline rating and magnitude of impact. The likely significance of impact is prior to the implementation of any mitigation measures.

Table 16.4 Significance of Impact

Baseline Rating	Magnitude of impact				
	Very High	High	Medium	Low	Very Low
High	Profound	Significant	Moderate	Slight	Slight
Medium	Significant	Significant	Moderate	Slight	Imperceptible
Low	Moderate	Moderate	Slight	Slight	Imperceptible
Very Low	Slight	Slight	Slight	Imperceptible	Imperceptible

16.3 Description of Existing Environment

16.3.1 Agricultural Land in Ireland

The proposed development will require the permanent acquisition of agricultural lands which may result in a reduction in the national utilisable agricultural area. In 2016, the agricultural area farmed is 4,447,200ha including rough grazing. When rough grazing is excluded there is 3,563,000ha of silage, hay and pasture; 281,100ha of cereals and 70,600ha of other crops, fruit and horticulture (Central Statistics Office, 2018).

There are 139,860 farms in Ireland with an average farm size of 32.7ha. The main agricultural enterprises are beef (55.6%), dairying (11.2%), mixed grazing livestock (10.5%) and sheep (9.7%). Mixed field crops (6.9%), tillage (3.4%), mixed crops and livestock (1.7%) and other (1%) are the remaining enterprises (Central Statistics Office, 2012).

16.3.2 Agricultural Land in Co. Cork

The total agricultural area of Co. Cork is 561,802ha and when commonage and rough grazing are excluded there is 439,121ha grassland, 40,519ha cereals and 14,623ha of other crops, fruit and horticulture (Central Statistics Office, 2012).

There are 14,222 farms with an average farm size of 38.1ha. The main agricultural enterprises are beef (42.2%), dairy (28.4%), mixed grazing livestock (8.5%), mixed field crops (7.0%), tillage (5.6%), sheep (4.6%), mixed crops & livestock (2.5%) and other (1.2%) (Central Statistics Office, 2012).

16.3.3 Agriculture in the Study Area

The agricultural lands in the study area are typical of the Beara Peninsula and comprise of improved grassland, suited for livestock grazing and fodder production, and upland heath which is suited to extensive livestock grazing. The topography is hilly with elevations for the passing bay location along the R572 of between 50m and 110m. On Dursey Island the elevations are between 10m and 20m. (OSI, 2019).

The affected farm holdings along the approach road (R572) range in size from ~11ha to ~40ha and the average farm size at 19.4ha is lower than the average farm size at a national level and particularly for County Cork. The average farm size does not include the 132ha commonage on Dursey Island that is farmed by several shareholders. Farming enterprises are extensive to moderately intensive in nature and comprise of mixed livestock (43.8%), specialist beef (31.2%), specialist sheep (12.5%) and lands leased out to local farmers (12.5%).

16.3.4 Soils

Soil series information is organised as Soils Associations – the mapping of local soils series or soil types that commonly occur in the landscape. There are two main soil associations found within the study area, Bantry and Schull. The Soil Associations within the study area are presented in Figure 16.1.

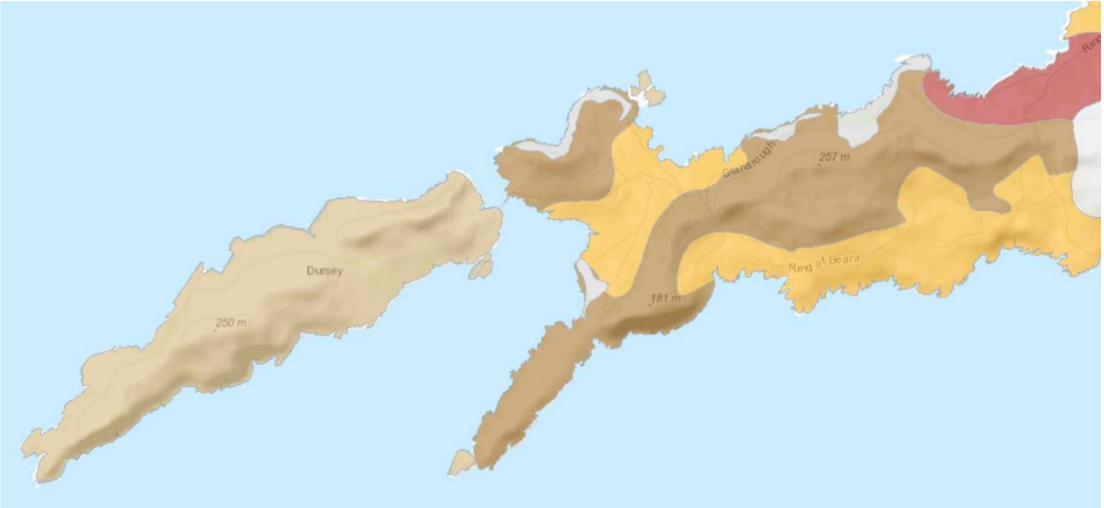

Plate 16.1 Soil Associations (Teagasc, Cranfield University, 2018)

Soil Association Bantry (area shaded in dark brown in Plate 16.1) soils are classified as a Histic Lithosol soil and are defined as peat over sandstone and shale bedrock. They represent unimproved areas of grassland on upland parts of the study area. Land use is mainly extensive grazing by livestock such as cattle and sheep.

Although soil series information is not available in Plate 16.1 for Ballynacallagh Townland on Dursey Island it is closely represented by Soil Association Bantry.

Soil Association Schull (area shaded in dark yellow in Plate 16.1) soils are classified as a Humic Brown Earth and are defined as coarse loamy drift with siliceous stones. These soils represent improved soils on lower lying parts of the study area. Land use is suited to livestock grazing and silage and / or hay production.

Summary details of baseline ratings for agricultural property along the proposed development are presented in Table 16.5.

Table 16.5 Baseline Ratings for Agricultural Property

Baseline Rating	No. of Farms	% of Total
High	0	0.0
Medium	13	81.3
Low	3	18.7
Very Low	0	0.0
	16	**100.0%**

Further detail on farm size, farm type and baseline rating for farms affected by the proposed passing bays are presented in Table 16.7.

16.3.5 Local Economy and Business

Section 6.3.9 of Chapter 6 of Volume 2 of this EIAR -Population and Human Health – provides a detailed description of the local economy in the study area.

There will be some disturbance and nuisance caused during construction due to noise and air emissions and increased construction traffic. However, with the application of appropriate mitigation strategies these will be minimised to an acceptable level.

During operation, the proposed development will impact positively on the local community by increasing tourist numbers in the area. Improved facilities will be provided which will benefit the area, including improved tourism and employment. The provision of the visitor centre and increased car parking facilities will be important assets to the facility. The proposed development will bring many positive impacts for the local community in terms of the provision of an improved cableway and a new visitor centre area and improved connectivity and access to and from Dursey Island.

16.3.6 Services and Utilities

During construction operations, existing overhead lines will be diverted or maintained and protected. It is not expected that there will be any interruptions to local utility services as a result of any diversions carried out.

During the construction of the proposed development, it is proposed to upgrade supporting infrastructure/utilities (including mainland and island water supply and wastewater treatment systems and mainland-side telecommunications connectivity) to facilitate the provision of improved welfare facilities and to accommodate the anticipated increase in visitor numbers associated with the proposed development. These upgrades are detailed below, and further detail is available in Chapter 4 of Volume 2 of this EIAR – Description of the Proposed Development. All of these upgrades will serve the site of the proposed development only, and will not result in any improvements of utilities for local residences.

Mainland Water Supply

Communications with Irish Water have confirmed that there is no water supply network system in place on the mainland side of the site. However, CCC have confirmed that there is a well located in the existing visitor car park.

In order to support the anticipated peak mainland-side demand of 12,705 L/day, a new water supply network will need to be created to service the visitor centre. There is a groundwater well located in the existing visitor car park, which has been tested as part of the site investigations. It is proposed to construct a new bored well adjacent to the existing well. Water will be pumped to reservoir tanks located within the mainland station building. The water distribution network will incorporate a new potable water treatment system and will be gravity fed, minimising the need for ongoing maintenance requirements. The treated potable mains water will be distributed to the mainland-side buildings of the proposed development through a water meter that will be linked to the building management system. Hot water generation plant will be provided locally in each of the buildings. The distribution of hot, cold and mains water throughout the buildings will consist of horizontal distribution generally taken through the corridor ceilings to the user points.

Island Water Supply

There is a small-scale water supply network system on Dursey Island. This supply serves approximately 25 private properties but does not extend to the island side cable car landing point (eastern end of the island).

It is proposed to utilise a new rainwater harvesting/grey water recycling system at the island-side cableway terminal to support the anticipated peak visitor demand of 1,035 L/day. Raw rainwater/grey water will only be used in non-potable applications (e.g. flushing toilets, landscape maintenance). No potable water supply is to be provided at the Island cableway terminal, instead potable water shall be brought to site if required. Water distribution on the Island-side development will be gravity fed, minimising the need for ongoing maintenance.

Mainland Wastewater Treatment

Communications with Cork County Council have confirmed that wastewater from the cableway welfare facilities are being discharged to an on-site septic tank, which is periodically de-sludged. Residences in the vicinity are served by private septic tanks.

It is proposed to construct a tertiary wastewater treatment system with a sand polishing filter to service the visitor centre facilities. This system is detailed in Section 4.6.17.2 of Chapter 4 of Volume 2 of this EIAR – Description of the Proposed Development. Treated effluent will be discharged to ground via the sand polishing filter/percolation area (in raised beds).

Island Wastewater Treatment

There are currently no public toilets available to visitors on the island side of the site. There is no formal wastewater drainage and treatment system in place on the island. Residences are served by private septic tanks.

It is proposed to construct a proprietary wastewater treatment system with a sand polishing filter to service the facilities at the island-side line station. Due to the lack of subsoil at the island-side station, the proposed sand polishing filter will be raised and bunded above existing ground level and formed from imported suitable material.

Telecommunications and Internet Connectivity

EIR's Network Design Bureau Services Office were consulted in relation to the location of phone lines in the vicinity of the proposed Visitor Centre. There is currently a phone line network system in place for the study area. However, there is no broadband connectivity at the site. It is proposed to introduce point-to-point high-speed overhead fibre broadband from Lehanmore Community Centre to the mainland Visitor Centre buildings. Consultation will continue with EIR during the detailed design of the proposed development.

The proposed overhead fibre broadband will necessitate the running of new fibre optic cable along the R572 Regional Road from Lehanmore Community Centre to the proposed development 4.3km away. The new overhead line will utilise existing telephone poles with new fibre optic joint boxes (small black boxes) fixed to the poles at regular intervals. The broadband works will be carried out as part of a separate advanced works contract which will be complete before the main works commence.

Electricity

The site of the proposed development is serviced by a phase 3 supply connectivity. The energy provider to the existing cableway is SSE Airtricity. The meter point reference number (MPRN) is 1000 706 3245. The current maximum import capacity (MIC) is 15 kilovolt-amps (kVA). In order to meet increased electrical demand during the operational phase of the proposed development, it will be necessary to increase the MIC of the site's supply.

Following on from preliminary discussions with ESB Networks, it was agreed that a new/upgraded, dedicated ESB supply will be provided to the site. The ESB will be required to provide an increased 3ph power supply at low voltage to the site. The new utility supply will terminate in a new ESB substation located at the rear of the site. This will be a purpose built ESB substation constructed in line with ESB Networks requirements. The client intake/meter room will be located next to the ESB substation. This room will contain a new client intake panel containing the supply feeding the new mainland buildings and cable car.

Fuel Supply Networks

Communications with Bord Gáis have confirmed that there is no gas networks supply system in place for the study area. In order to run the heating system for the mainland buildings, a fuel supply will be required. Although subject to detailed design it is proposed at this stage that the heating system will be provided by a series of electrically driven Air to Water Heat Pumps. This negates the requirement for fossil fuel storage onsite. The installation of Heat Pump Technology will also satisfy the renewable energy requirements for the "Nearly Zero Energy Buildings." The Heat Pumps indoor unit will be located in the Mechanical Plant Room with the condenser unit located externally. The Heat Pumps will feed the low-pressure hot water heating installation and be distributed through corridor ceiling voids into the heated areas. It is intended to utilise a mix of underfloor heating and radiators at this stage of the project

16.3.7 Rights of Way

Public access will be maintained to two no. access routes via the site throughout construction and operation: a gate leading to private farmland, and the entrance to the Garnish Loop walking route (the latter of which is a public right of way). The existing cableway will remain operational throughout the works insofar as is possible to ensure safe access.

16.4 Description of Likely Impacts

The proposed development will involve a total landtake of approximately 2.1187ha from 16 farm holdings. This figure consists of permanent acquisition of 1.3697ha agricultural lands and 0.7490ha public road.

16.4.1 Impact on Agricultural Land

16.4.1.1 Impact on Agricultural Land Nationally

The permanent acquisition of approximately 1.3697ha of agricultural land is not significant at a national level.

16.4.1.2 Impact on Agricultural land in County Cork

The proposed development will involve the permanent acquisition of approximately 1.3697ha of agricultural land from 16 agricultural properties. This area, which may be significant on some of the individual farms, is not significant at a county level.

16.4.1.3 Impact on Agricultural land in the Study Area

The impact on agriculture is limited to those farm holdings directly impacted by the proposed development. Measures to mitigate the adverse effects of the development are described in Section 16.5. The significance of the residual impact following the implementation of mitigation measures are described in Section 16.6.

A summary of the results of the impact on agriculture assessment is presented in Table 16.6.

Table 16.6 Summary of the Impact on Agricultural Land

Magnitude of Impact	**No. of Farms**	**% of Total**
Very high	0	0
High	0	0
Medium	1	6.3%
Low	12	75.0%
Very low	3	18.7%
	16	**100.0%**
Significance of Impact	**No. of Farms**	**% of Total**
Profound	0	0
Significant	0	0
Moderate	0	0
Slight	13	81.3%
Imperceptible	3	18.7%
	16	**100.0%**

The magnitude of impact on agricultural land and property ranges from Very Low to Medium. There are no agricultural properties where the magnitude of impact is High or Very High.

The significance of impact, which is determined by combining the magnitude of impact and the baseline rating for that farm, ranges from Imperceptible to Slight.
On one farm a traditional farmhouse (derelict) structure will be acquired. On one farm a traditional dry stone shed will be impacted. On these farms the significance of the agricultural impact will be slight.

Increasing the number of visitors on Dursey Island has the potential to adversely affect agricultural land on the island. However, the mitigation measures of Chapter 7 of this

EIAR – Biodiversity – prescribe the formalisation of three waymarked loop trails on existing roads/trails on the island (in agreement with private landowners), and it is considered that formalisation of these trails will discourage walkers from wandering off established paths onto farmland. Thus, it is considered that increased numbers of visitors on the island will not have a significant negative effect on agriculture in the study area.

By increasing ease of access and ease of movement of goods to-and-from Dursey Island, the proposed development may have a positive effect on agriculture on the island, and may contribute to the prevention of land abandonment, which is in evidence.

Further detail of the impact assessment of the proposed development on agriculture is presented in Table 16.7.

Table 16.7 Assessment of the Impact of the Proposed Development on Agricultural Land

No.	CPO Ref.	Size (ha)	Farm Enterprise Type	Public Road (ha)	Agri / Land (ha) (EST)	Baseline Rating	Impact Details	Magnitude of Impact	Impact Significance	Mitigation Measures	Residual Impact Significance
1	CPO 121 and 122	21.0	Mixed livestock - Beef & Sheep	0.096	0.1607	Medium	Reduction in agricultural area due to landtake at junction with R375. Impact on existing field boundaries.	Low	Slight	Replace boundary with permanent stockproof boundary.	Slight
2	CPO 120	17.8	Leased - Long term	0.117	0.102	Low	Reduction in agricultural area. Impact on existing field boundaries. Impact on existing field gate. Impact on old stone sheds. Impact on field water supply and land drainage.	Medium	Slight	Replace field access gate on affected lands. Replace boundary with permanent stockproof boundary.	Slight
3	CPO 119	40.5	Beef	0.061	0.059	Medium	Reduction in agricultural area. Impact on existing field boundaries. Impact on existing field gate. Impact on derelict farm house building.	Low	Slight	Replace field access gate on affected lands. Replace boundary with permanent stockproof boundary.	Slight
4	CPO 117	19.0	Beef	0.013	0.063	Medium	Slight reduction in agricultural area. Impact on existing field boundaries.	Low	Slight	Replace boundary with permanent stockproof boundary.	Slight
5	CPO 118	25.0	Mixed livestock - Beef & Sheep	0.022		Medium	Public road only	Very Low	Imperceptible		Imperceptible

No.	CPO Ref.	Size (ha)	Farm Enterprise Type	Public Road (ha)	Agri / Land (ha) (EST)	Baseline Rating	Impact Details	Magnitude of Impact	Impact Significance	Mitigation Measures	Residual Impact Significance
6	CPO 116	22.7	Mixed livestock - Beef & Sheep	0.088	0.092	Medium	Reduction in agricultural area. Impact on existing field boundaries. Impact on existing field gate. Impact on underground utilities.	Low	Slight	Replace field access gate on affected lands. Replace boundary with permanent stockproof boundary.	Slight
7	CPO 115	12.1	Mixed livestock - Beef & Sheep	0.012		Medium	Public road only	Very Low	Imperceptible		Imperceptible
8	CPO 114	14.0	Mixed livestock - Beef & Sheep	0.064	0.073	Medium	Slight reduction in agricultural area. Impact on existing field boundaries.	Low	Slight	Replace boundary with permanent stockproof boundary.	Slight
9	CPO 112	14.0	Sheep	0.069	0.018	Medium	Slight reduction in agricultural area. Impact on existing field boundaries.	Low	Slight	Replace boundary with permanent stockproof boundary.	Slight
10	CPO 113	Na	Beef	0.013	-	Medium	Public road only	Very Low	Imperceptible		Imperceptible
11	CPO 111	14.0	Beef	0.023	0.038	Medium	Slight reduction in agricultural area. Impact on existing field boundaries.	Low	Slight	Replace boundary with permanent stockproof boundary.	Slight
12	CPO 110	16.2	Leased - Short term	0.078	0.041	Low	Slight reduction in agricultural area. Impact on existing field boundaries.	Low	Slight	Replace boundary with permanent stockproof boundary.	Slight
13	CPO 109	11.3	Sheep	0.023	0.011	Medium	Slight reduction in agricultural area. Impact on existing field boundaries.	Low	Slight	Replace boundary with permanent stockproof boundary.	Slight

No.	CPO Ref.	Size (ha)	Farm Enterprise Type	Public Road (ha)	Agri / Land (ha) (EST)	Baseline Rating	Impact Details	Magnitude of Impact	Impact Significance	Mitigation Measures	Residual Impact Significance
14	CPO 108	16.2	Mixed livestock - Sheep & Ponies	0.013	0.009	Medium	Slight reduction in agricultural area. Impact on existing field boundaries.	Low	Slight	Replace boundary with permanent stockproof boundary.	Slight
15	CPO 104	27.9	Beef	0.036	0.082	Medium	Reduction in agricultural area. Impact on existing field boundaries. Impact on existing field gates. Impact on land drainage.	Low	Slight	Replace field access gate on affected lands. Replace boundary with permanent stockproof boundary.	Slight
16	CPO 101	132.3	Commonage - Beef & Sheep	0.021	0.621	Low	Reduction in agricultural area. Temporary impact on stock movement.	Low	Slight	Replace boundary with permanent stockproof boundary.	Slight
Total	-	-	-	0.749 (35%)	1.3697 (65%)	-	-	-	-	--	

16.4.2 Impact on Utilities and Rights of Way

It is not expected that there will be any impacts to utilities during the construction of the proposed development.

16.4.3 Construction Impacts

The assessment of the impact on agricultural land includes the effects of the construction impacts of the proposed passing bays. Construction activity associated with the proposed development will give effect to further temporary impacts on agricultural property such as:

- Construction noise;
- Dust;
- Restricted access to land;
- Disturbance of field drainage;
- Disturbance of services.

The nature of each specific impact is discussed below.

Construction Noise

The activity of earth moving machinery, transport lorries and other ancillary vehicles will generate additional noise emissions in the immediate vicinity of the road construction. Noise can be of significance for farm animals (i.e. when noise becomes excessively loud). In general, animals become accustomed to regular noises and sounds. Intermittent noises can cause fright and distress. Blasting activity can be of particular concern with certain farm enterprises such as breeding and training of horses. However, there are no equine holdings in the study area and blasting is not an expected element of the proposed works. Intermittent noises close to farm buildings can distress livestock.

Dust

Dust generated from the exposure of soil to the atmosphere during construction may cause annoyance or nuisance to the farmer and farm animals. Livestock are at risk of eye irritations from high levels of windblown dust particles. This stress may reduce productivity and increase management difficulties, particularly on equestrian farms.

Restricted Access to Land

Generally speaking, access to land will be maintained throughout the construction and operation of the proposed development. During the construction phase, every effort will be made to maintain access to-and-from Dursey Island via the existing cableway. However, it is conceivable that access to the cableway will be temporarily restricted at times, for reasons of safety. This may pose temporary, slight negative impacts for farmers with land on the island. However, corresponding mitigation measures have been set out in Chapter 6 of Volume 2 of this EIAR – Population and Human Health – which require that residents and farmers of Dursey Island shall be informed of any interruptions to the service, 1 week prior to interruptions, where possible. This measure will serve to reduce negative effects related to restricted access to land. However, these mitigation measures may not be sufficient for farmers, who may to require access to land during this period for herding and/or feeding of animals.

Disturbance of Field Drainage

Field drainage systems currently in situ may be disturbed by the construction works. These systems will be restored as part of the proposed development. However, there may be temporary impaired drainage in the period of time between initial disturbance and final reinstatement of such drainage works.

Disturbance of Services

Access to piped water may be affected during construction through the severance of piping on the farm. Electric fencing used on farms to stock proof farm boundaries or control the movement of stock may also be affected.

Disturbance of Field Boundaries

Field boundaries within the proposed development boundary are earthen embankments or a mixture of earthen embankments and dry-stone walls. These field boundaries may be impacted by the proposed roadworks during construction.

16.5 Mitigation Measures

This section describes the measures that when implemented will mitigate the adverse impact on agricultural land. The assessment does not consider at this stage measures such as compensation for land acquisition and disturbance. These matters will be agreed with landowners or their representative(s) once approval for the proposed development has been granted. In the event that agreement is not possible, such compensation will be decided upon by a property arbitrator.

The following general mitigation measures will be provided:

- Access will be restored to lands where it is removed or restricted. Required replacement field access gates are identified in Table 16.7. The location of such field access gates will be at a suitable location and, where possible, with the agreement of the landowner.
- In general, permanent fencing will comprise of timber post and tension mesh fencing in accordance with CC-SCD-00320. Where field boundaries, that comprise of dry-stone walls, are removed as a result of the construction of the proposed development, the Contractor shall be responsible for the restoration of the section of the field boundary in question to dry-stone wall using stone from the affected field boundary. This restoration work shall be carried out by a suitably qualified and experienced professional, such that the wall is of the same style as the vernacular dry-stone walls of the region. Further fencing details are presented in Chapter 4 of this EIAR.
- Where boundaries at dwelling houses are removed as part of the proposed development, the boundary treatment is proposed on a like for like basis subject to final agreement on accommodation works with individual property owners.
- All existing land drains and watercourses severed by the proposed development will either be piped or re-directed into the existing drainage outfall.
- Any services that are interfered with as a result of the proposed development will be repaired / replaced without unreasonable delay.
- Ducting for the restoration of water and power supply services will be provided, as necessary, at a suitable location with the agreement of the landowner.

Details of mitigation measures for individual farms affected by the proposed development are presented in Table 16.7.

The following mitigation measures will be implemented during the construction stage:

- Measures to mitigate noise impacts on sensitive receptors are detailed within Chapter 12 Noise and Vibration. Good communication between the contractor and adjacent landowners during the construction phase, especially when excessively loud activities are programmed, will prevent undue disturbance to farm animals due to noise. It will also facilitate farm enterprises so that valuable livestock sensitive to noise can be moved away from the construction work during critical times.
- Measures to control the production of dust will be put in place by the contractor (refer Chapter 13 Air Quality and Climate which presents a series of measures to control dust). Good communication between the contractor and the farmers in the proximity of construction activities will facilitate on-going farm enterprises so that valuable livestock are kept as far as possible from the construction work during critical times.
- Access will be restored to lands where it is removed or restricted by the proposed development. The location of such access will be at a suitable location and, where possible, with the agreement of the landowner. Good communication between individual farmers and the contractor will minimise difficulties caused by the restriction of access to land. Temporary fencing will be erected as required to delineate the site boundary and to minimise disturbance to adjacent lands. Temporary access gates may be required until such time as the permanent access arrangements are in place.
- The residents and farmers of Dursey Island shall be informed of any interruptions to the cableway service, 1 week prior to interruptions, where possible. In cases in which access to-and-from Dursey Island is restricted for more than two days, or where more regular access is required by farmers with livestock on the island, alternative access to-and-from the island shall be provided for farmers by CCC.
- In cases where impeded drainage during construction will cause obvious difficulty to a particular landowner, temporary measures will be looked at on a site-specific basis. This may include allowing waters to drain to less critical areas, so as to minimise the impact.
- Where required, an alternative source of water / electricity will be provided to ensure that disruption to farming is minimised during the construction phase.

16.6 Residual Impacts

The significance of the residual impact on agriculture has been assessed following the implementation of general mitigation measures. A summary of the residual impact on agriculture is presented in Table 16.8.

Table 16.8 Summary of the Residual Agricultural Impact

Significance of Impact	No. of Farms	% of Total
Profound	0	0
Significant	0	0
Moderate	0	0
Slight	13	81.3%
Imperceptible	3	18.7%
	16	**100.0%**

There is no Profound, Significant or Moderate residual impact on agriculture as a result of the proposed development. Furthermore, no residual impacts are predicted on material assets as a result of the proposed development.

Chapter 17 Interrelationships, Major Accidents and Cumulative Effects

17.1 Introduction

In addition to the assessment of impacts on individual topics presented in the previous chapters of this Environmental Impact Assessment Report (EIAR), the interactions between these factors have also been considered and are presented in Table 17.1. This chapter also assesses the expected effects arising from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project. Finally, the cumulative effects of the proposed development with those of previous developments, current development in planning and proposed future developments which are reasonably foreseeable have also been assessed and are described in this chapter. Potential transboundary impacts are also assessed.

17.2 Methodology

17.2.1 Interrelationships

The determination of interrelationships was facilitated through an iterative design process that included consultation between designers, environmental specialists and technical specialists. In addition, the process was informed by consultation with statutory and non-statutory consultees and in particular with the Department of Culture, Heritage and the Gaeltacht (the National Monuments Service and National Parks and Wildlife Service). Where potential exists for interaction between two or more environmental topics, the relevant specialists have taken these into account when making their assessment and, where possible, complimentary mitigation measures have been proposed. The findings from this assessment are presented in Section 17.3.

17.2.2 Major Accidents and Disasters

Article 3 of the Environmental Impact Assessment (EIA) Directive, as amended by Directive 2014/52/EU, requires that: *"The effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned".* Furthermore, Annex IV, Section 8 of the Directive states that the EIAR shall contain:

> *"A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned."*

The Directive also states that where appropriate:

> *"this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies."*

This chapter comprises an assessment of the vulnerability of the proposed development to risks of major accidents and/or disasters which are relevant to the proposed development.

The assessment of major accidents and disasters is a new requirement and national guidelines are not yet available. In the absence of such guidance, Highways England's (equivalent body to Transport Infrastructure Ireland (TII)) guidance has been consulted.

As identified in the EIAR chapters, the proposed development is designed, and will be built and operated, in accordance with best practice. It has been ensured that the proposed development is capable of being constructed safely and without risk to health, can be maintained safely, and complies with all relevant health and safety legislation.

An understanding of the potential consequences of major accidents and disasters due to the proposed development was gained through a desktop study, the results of which are discussed in Section 17.4.

In assessing the expected effects arising from the vulnerability of the project to risks of major accidents and disasters that are relevant to the project, the assessment has assessed:

- The potential of the project to cause major accidents and disasters, including implications for human health, cultural heritage, and the environment; and
- The vulnerability of the project to potential accidents and disasters, including the risk to the project of both natural disasters (e.g. flooding) and man-made disasters (e.g. technological disasters).

The methodology adopted included three main stages, as follows:

- Stage 1: a long list of all possible major accident and disaster events was developed. This list drew upon a variety of sources, including the UK Government's Risk Register of Civil Emergencies. Major events with little relevance (for example volcanic eruptions) were not included. Stage 1 also included an initial review of potential receptors to identify any groups that were considered necessary to include in the assessment;
- Stage 2: a screening exercise was undertaken to review the long list of major events and to give consideration to their relevance to the proposed scheme, and therefore whether they should be included on the project specific short list of events requiring further consideration; and
- Stage 3: where further design mitigation is unable to remove the potential interaction between a major accident and disaster event and a particular topic, the relevant EIAR chapter identifies the potential consequence for receptors covered by the topic and gives a qualitative evaluation of the potential for the significance of the reported effect to be increased as a result of that event.

The qualitative evaluation of the potential for the significance is presented in Table 17.2 of this chapter. The residual assessment is based on the exceptionality of the major accident and disaster event to the proposed development and whether there is a significant effect after the application of mitigation.

17.2.3 Cumulative Effects

In assessing cumulative effects, the following were the principal sources consulted:

- An Bord Pleanála website;
- Cork County Council Planning Department; and
- EIA Portal.

Development objectives in the relevant current development plans were also considered. This cumulative assessment has considered cumulative impacts that are:

a) Likely;
b) Significant; and

c) Relating to an event which has either occurred or is reasonably foreseeable together with the impacts from this development.

Proposed and existing developments and plans, identified as having potential for cumulative effects in combination with the proposed development, are assessed in Section 17.5 of this chapter.

17.3 Interrelationships

Interrelationships arise from the interaction between the impacts and proposed mitigation for one discipline with another associated discipline. An example of this would be the provision of noise barriers to mitigate the impacts of noise on the surrounding environment could have a negative impact in terms of landscape and visual impact.

The impacts and the mitigation provided has been considered by all disciplines to ensure all the interactions have been fully considered within this EIAR.

Table 17.1 shows the principal interrelationships identified for the proposed development and they are described in this section.

Table 17.1 Matrix of Key Interrelationships

Receptor Activity	Traffic and Transport	Population and Human Health	Biodiversity	Soils and Geology	Hydrogeology	Hydrology	Landscape and Visual	Noise and Vibration	Air Quality and Climate	Archaeology and Cultural Heritage	Architectural Heritage	Material Assets and Land
Traffic and Transport	■	✓	✓			✓	✓	✓	✓			✓
Population and Human Health	✓	■	✓									
Biodiversity		✓	■	✓			✓	✓				✓
Soils and Geology	✓	✓	✓	■	✓	✓	✓	✓	✓	✓		✓
Hydrogeology					■							
Hydrology		✓	✓			■	✓					✓
Landscape and Visual		✓	✓				■			✓		✓
Noise and Vibration		✓	✓				✓	■				✓
Air Quality and Climate		✓	✓						■			✓
Archaeology and Cultural Heritage		✓								■		
Architectural Heritage											■	
Material Assets and Land	✓	✓			✓	✓	✓					■

17.3.1 Traffic and Transport Will Interact / Interrelate with the Following:

Population and Human Health

During the construction stage, the construction traffic will result in heavy goods vehicles (HGVs) transporting materials and plant/machinery along the R572 Regional Road. This is likely to have an impact on local residents and road users as well as visitors, adding to the noise and vibration, air quality and visual impacts. A Traffic Management Plan (TMP) will be implemented during the construction stage to facilitate ongoing access to the existing cable car throughout the construction phase, as far as is practicable.

Operation stage traffic will also interact with population on R572 including residents and road users. The visitor numbers to the Dursey Island cableway are likely to increase at peak times due to the increased capacity of the cableway and the car parking areas, increasing the volume of traffic along the R572. A Visitor Management Plan will be implemented to control the visitor numbers during peak times and to ensure a more evenly spread of visitors throughout the season, reducing the impact on local residents and road users. Additionally, the upgrades to a portion of the R572 will have a positive impact on both visitors and locals by easing the existing congestion problems.

Biodiversity

The impact of construction traffic and construction machinery required have been assessed in Chapter 07 Biodiversity for their impact on the biodiversity within Beara Peninsula and the surrounding European and nationally designated sites. Air quality and dust emissions as a result of construction traffic and the potential for interactions with designated sites have also been assessed in Chapter 13 Air Quality and Climate. Air quality mitigation measures including a Dust Minimisation Plan, will reduce impacts on the biodiversity of the area as a result of construction traffic.

Hydrology

As a result of the provision of the proposed development, there is a risk to water quality through pollution and spillage accident risk. Best practice guidelines will be adhered to during the construction and operation phases to minimise the risk of spillage and pollution.

Landscape and Visual

The increase in construction traffic related to piling rigs, cranes and other plant and machinery will result in temporary negative visual impacts. These impacts will be mitigated through the use of high-quality hoarding around the construction site. During operation, more organised car parking arrangement and will represent positive landscape and visual impacts.

Noise and Vibration

Noise and vibration levels will increase as a result of construction traffic along the R572. Mitigation measures, as well as compliance with measures outlined in the Outline Construction Environmental Management Plan (CEMP) in Appendix 4.1 of this EIAR, will be put in place during construction to reduce the short-term noise impacts of construction traffic.

Operation stage traffic will increase noise and vibration levels within the surrounding area. The increased volume of traffic is anticipated due to the provision of greater capacity car parking areas and cableway. The assessment of the impacts on noise and vibration levels is detailed in Chapter 12 Noise and Vibration of this EIAR and has taken into account the predicted traffic levels modelled for operation stage.

Air Quality and Climate

Air pollutant emissions will also increase during the construction stage as a result of construction traffic. Mitigation measures such as a Dust Minimisation Plan have been developed and are presented in Chapter 13 Air Quality and Climate of this EIAR to mitigate potential short-term air quality impacts from construction traffic.

The increase in operation stage traffic levels from increased number of visitors entering and exiting the Dursey Island cableway site will result in an increase in air quality emissions within the project location and its surrounding area. The assessment of the impacts on air quality and climate is detailed in Chapter 13 Air Quality and Climate and has taken into account the predicted traffic levels modelled for operation stage.

Material Assets and Land

The construction stage of the proposed development will include an upgrade to a portion of the R572. Short term impacts on local users and visitors will arise due to these road works. The impact of this on road users is addressed in Chapter 16 Material Assets and Land.

During the operation phase, the upgraded portion of the R572 is likely to alleviate current congestion along the route and to anticipate for volumes of traffic generated by the proposed development. The impact has been addressed in Chapter 5 Traffic Analysis and Chapter 16 Material Assets and Land. The impact of this requirement on the demand for parking within the area has been addressed in Chapter 5 Traffic Analysis and Chapter 16 Material Assets and Land.

17.3.2 Population and Human Health Will Interact / Interrelate with the Following:

Traffic and Transport

The construction stage of the proposed development will increase traffic along the R752 due to the haulage of materials in and out of site. The impact of these traffic movements has been incorporated in the traffic assessment in Chapter 5 of this EIAR.

The anticipated increase in visitor numbers to the proposed development are likely to increase traffic volumes during peak times and will likely impact the local residents and road users. The online booking system will be implemented to ensure a more even spread of visitors throughout the day and will thus ease congestion along the R572 during peak times.

Biodiversity

Increased visitors to the site during operation will alter the existing setting of the site and will result in potential impacts on the receiving biodiversity environment. Appropriate mitigation will be implemented to ensure that the increase in visitor numbers will not result in impacts on biodiversity. Impacts on the biodiversity of the site are discussed in Chapter 7 Biodiversity of this EIAR.

17.3.3 Biodiversity Will Interact / Interrelate with the Following:

Population and Human Health

The removal of Invasive Alien Species (IAS) from the site will remove the risk of spreading of IAS in its current state by population and human beings visiting the site during both construction and operation stages. Therefore, the resultant risk of damage to nearby properties and infrastructure will be removed and the site will be more appealing to the population. An Invasive Species Management Plan is in place at the site and is presented in Appendix 7.4 of this EIAR.

Soils and Geology

The removal of IAS from the site will improve the soil quality and remove the risk of IAS spreading across the site.

Landscape and Visual

The existing biodiversity and coastal character of the site has been incorporated into the Landscape Design Statement for the site which is included in Appendix 4.6 of this EIAR. Planting species that can withstand the harsh maritime environment have been selected to be included within the landscape plan to ensure the robust landscape plan compliments the site's unique location on the water.

Noise and Vibration

It is expected that biodiversity will reduce noise and vibration impacts as the sensitivity of migratory fish to noise and vibration impacts has resulted in the implementation of noise and vibration mitigation measures. For example, reduced working hours for piling operations are required to reduce noise and vibration impacts on migratory fish.

Material Assets and Land

The removal of IAS will remove the threat of spread to neighbouring properties. The presence of IAS can devalue and degrade properties and land. An Invasive Species Management Plan will be put in place at the site and is presented in Appendix 7.4 of this EIAR.

17.3.4 Soils and Geology Will Interact / Interrelate with the Following:

Traffic and Transport

During the construction stage of the proposed development, the construction traffic will be generated from earthworks which will involve import of infill material as well as export of waste material off site. The construction traffic for the earthworks station of construction has been assessed in Chapter 5 Traffic and Transport and will not create significant impacts.

Population and Human Health

The excavation of soil and rock from the foundation and parking footprint will create slight temporary negative impact related to noise and dust generation to visitors to the site. As the excavated rock will be substantially reused on site and minimal volume of fill will be required to be brought in, there will be no impact to human health generated by the construction activities or construction traffic. The ground investigation showed no areas of contaminated land, therefore there is no predicted impact from the contaminated ground to either construction workers or members of public.

During the construction stage, construction traffic will arise due to earthworks which is required to transport material in and out of site. These transportation and excavation of material movements are likely to result in short-term/momentary traffic impacts to local residents, road users and visitors over the short term.

Biodiversity

Earthworks during the construction stage have the potential to impact on the Kenmare River Special Area of Conservation (SAC) and the Beara Peninsula Special Protection Area (SPA) through construction site runoff, the risk of release of contaminants from the ground, noise and vibration, and air quality impacts. A suite of best practice techniques, mitigation measures and guidelines have been outlined in Chapter 09 Hydrogeology, Chapter 10 Hydrology, Chapter 07 Biodiversity and the Outline CEMP and Environmental Operating Plan (EOP) presented in Appendices 4.1 and 4.2 of this EIAR to mitigate impacts on the European and nationally designated sites within the site of the proposed development and the surrounding area.

Hydrogeology

During earthworks have the potential to release contaminants to the surface which is discussed in Chapter 09 Hydrogeology of this EIAR.

Hydrology

During construction stage, earthworks within and alongside surface waters can have an impact on the water quality of watercourses. The source of contamination may be elevated silt/sediment loading in construction site runoff. A suite of mitigation measures has been proposed to mitigate water quality impacts due to earthworks, as contained in Chapter 7 Biodiversity, Chapter 10 Hydrology and within the Outline CEMP presented in Appendix 4.1 of this EIAR.

Landscape and Visual

Earthworks during construction stage will have an impact on the landscape of the site. The landscape is of high importance however, any landscape and visual impact due to earthworks and the movement of material will be short term and hoarding will be provided during construction to mitigate impacts the effect will be short term. Additionally, as the majority of the construction activities will be undertaken during off peak visitor times, the impact on visitors is likely to not be significant. Landscape and visual effects have been assessed in Chapter 11 Landscape and Visual Analysis of this EIAR.

Noise and Vibration

During construction stage, the construction machinery required for earthworks will potentially have short term impacts on noise and vibration. The noise modelling for earthworks have been included in the assessment and mitigation measures are outlined in Chapter 12 Noise and Vibration and in the Outline CEMP. The mitigation measures will mitigate noise and vibration impacts due to earthworks as well as impacts associated with movement of construction materials where possible.

Air Quality and Climate

Earthworks and the movement of construction materials during construction stage have the potential to create airborne dust. A Dust Minimisation Plan is presented in Appendix 13.2 of this EIAR and aims to mitigate this short term potential impact.

Archaeological and Cultural Heritage

Two cultural heritage assets will be directly impacted by the earthworks during construction stage of the proposed development; (a) Dursey Island Cable Car and associated infrastructure, and (b) the site of a vernacular structure. Mitigation measures to reduce the impact from earthworks are outlined in Chapter 14 Archaeology and Cultural Heritage of this EIAR.

Material Assets and Land

Earthworks during the construction stage have the potential to impact the visitor numbers, and consequently the local economy. However, the impact will be short term and earthworks will be carried out during off peak visiting times. The potential impacts and mitigation measures are outlined in Chapter 16 Material Assets and Land and within the Outline CEMP attached as Appendix 4.1 of this EIAR.

17.3.5 Hydrology Will Interact / Interrelate with the Following:

Population and Human Health

The upgraded water drainage system and water treatment system as well as telecommunications (on mainland side only) will have a positive impact on the visitors of the proposed development during operation. The SuDS features will mitigate any potential impacts relating to changes in runoff rates and volumes whilst also maintaining quality of water in vicinity of Dursey Sound.

Biodiversity

Construction activities have the potential to pose a risk to nearby watercourses, particularly in this case to Dursey Sound, which could affect a range of marine species. Chapter 07 Biodiversity, Chapter 10 Hydrology and the Outline CEMP set out mitigation measures to prevent the runoff of contaminants during construction stage. These measures will mitigate the risk to biodiversity within the Kenmare River SAC and any other European Sites.

During the operation phase, the SuDS water treatment features will mitigate any potential impacts on water quality, whilst also maintaining quality of water in vicinity of Dursey Sound.

Landscape and Visual

During the operation of the proposed development, SuDS features, will be incorporated into the Landscaping Strategy (see Appendix 4.6) and will create landscaped areas which will be integrated into the planting and surface finishes.

Material Assets and Land

The provision of SuDS surface water drainage system during operation stage will provide treatment to surface water runoff prior to discharge to Dursey Sound. The upgraded system will incorporate the anticipated visitor numbers to the site of the proposed development.

17.3.6 Landscape and Visual Will Interact / Interrelate with the Following:

Population and Human Health

The development of a public realm and landscaping design as detailed in Chapter 4 of this EIAR and included in Appendix 4.6 will provide positive impacts on population and human health during the operation stage. The use of native plants and species and settings which incorporate the current setting of the site will help mitigate the impact of the development as a whole and will also create a modern urban quarter for the population and visitors to enjoy.

Biodiversity

The Landscaping Strategy (see Appendix 4.6) encourages the use of native tree species and has been developed in conjunction with the recommendations of the project ecologist. Species have been chosen for the site and for the green roofs to enhance and support biodiversity within the site. Pollinator friendly species and coastal grasses have been selected to enhance the biodiversity of the site as part of the landscaping scheme. These mitigation and enhancement measures are provided in Chapter 7 Biodiversity and Chapter 11 Landscape and Visual Analysis of this EIAR.

Archaeological and Cultural Heritage

Construction haulage and construction machinery are likely to have a visual impact on the sites of cultural heritage. These impacts and mitigation measures are provided in Chapter 11 Landscape and Visual.

Material Assets and Land

During operation, landscape mitigation measures will help create a modern urban quarter which will attract visitors and tourists to the area, representing a positive impact on material assets and land.

17.3.7 Noise and Vibration Will Interact / Interrelate with the Following:

Population and Human Health

Noise and Vibration impacts from the construction noise will potentially interact with population and human health over short term. Population and human health impacts as a result of noise and vibration increases have been assessed in Chapter 12 Noise and Vibration and Chapter 06 Population and Human Health of this EIAR.

Biodiversity

During construction and operation, noise and vibration impacts have potential to interact with the biodiversity within the Beara Peninsula, namely that of the Kenmare River SAC and the Beara Peninsula SPA. The predicted impacts are discussed in Chapter 07 Biodiversity and mitigation measures have been included in the Outline CEMP located in Appendix 4.1 of this EIAR.

Landscape and Visual

Noise mitigation measures during construction has potential to positively interact with landscape and visual impacts. The use of high quality noise mitigating hoarding around the site during construction will help mitigate the visual impacts of the construction stage.

Material Assets and Land

Noise and vibration levels during construction stage will also interact with Material Assets and Land. Residential properties and Businesses along the R572 may be subject to indirect impacts during construction and operation as a result of noise and vibration increases.

17.3.8 Air Quality and Climate Will Interact / Interrelate with the Following:

Population and Human Health

The construction activities are likely to increase air pollutant and dust emissions and have the potential to impact population and human health. During the operation stage, traffic-related air emissions are likely to generate a number of air pollutants into the atmosphere. Mitigation measures during both the construction and operation stages are discussed in Chapter 13 Air Quality and Climate and Chapter 06 Population and Human Health in this EIAR.

Biodiversity

Air pollutant and dust emissions have the potential to interact with the biodiversity of the area due to pollutant deposition. The potential for deposits on the Kenmare River SAC and Bears Peninsula SPA are assessed in Chapter 13 Air Quality and Climate of this EIAR.

Material Assets and Land

Dust generated from construction activities may cause annoyance or nuisance to businesses and residents within the area. Measures to control the production of dust such as the Dust Minimisation Plan, which has been prepared as part of this EIAR, will be put in place by the contractors to reduce any potential impacts experienced by receptors. Good communication between the contractors and business owners as well as residents in the proximity of construction activities will facilitate on-going operations.

17.3.9 Archaeological and Cultural Heritage Will Interact / Interrelate with the Following

Population and Human Health

The existing mainland pylon will be retained onsite as per the mitigation measures outlined in Chapter 14 Archaeological and Cultural Heritage will enhance the cultural element at the proposed development site for the local population and visitors to enjoy.

17.3.10 Material Assets and Land Will Interact / Interrelate with the Following:

Traffic and Transport

The road improvement works to a portion of the R572 will have a positive impact on traffic by relieving congestion problems for the road users including residents, local road users as well as visitors.

Population and Human Health

The provision of a new Dursey island cableway and a visitor centre will have positive impacts on population and human health. The development will enhance the leisure experience in the area for locals and visitors alike. The development of the visitor centre and the provision of an increased capacity car parking area will provide jobs to the locals and will bring more visitors to the area, having a beneficial effect on the local economy.

Hydrogeology

The upgrade to the supporting infrastructure and utilities within the study area of the proposed development and its surroundings (including mainland and island water supply and wastewater treatment systems) will improve welfare facilities and will cater for the anticipated increase in visitor numbers.

Hydrology

The upgrade to the supporting infrastructure and utilities within the study area of the proposed development and its surroundings (including mainland and island water supply and wastewater treatment systems) will improve welfare facilities and will cater for the anticipated increase in visitor numbers. The surface water drainage system will comprise SuDS features which will attenuate and cleanse the surface water runoff from the dirt prior to discharge to Dursey Sound.

Landscape and Visual

The development of the land will have an impact on the Landscape and Visual setting of the site. The impact as a result of the development the visitor centre and the expansion of the car parking area is contained in Chapter 11 Landscape and Visual.

17.4 Major Accidents and Disasters

17.4.1 Potential for Major Accidents and Disasters

In the absence of national guidance on assessment of major accidents and disasters, the following methodology has been developed:

- Identifying hazards;
- Screening these hazards;
- Defining the impact;
- Assessing the likelihood of occurrence; and
- Assessing the remaining risks.

17.4.2 Stage 1 Assessment

A copy of the long list of major accident and disaster events is provided in Table 17.2. Although the majority of these major events are already considered under other legislative or design requirements, this is not considered to be sufficient reason to eliminate them from further consideration. However, where it is concluded that the need for compliance is so fundamental, and the risk of any receptors being affected so remote, such major events have not been included on the shortlist.

Likewise, it is considered reasonable and proportionate to exclude certain receptor groups from the outset. Construction workers, as a receptor, can be excluded from the assessment, because existing legal protection is sufficient to minimise any risk from major events to a reasonable level.

Table 17.2 Stage 1 Assessment for Accidents and Disasters

		Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in EIAR? If so, where?	Continue to Stage 3 (see Chapter 4)?
Natural Disasters						
1 Geological Disasters						
1.1	Avalanches and landslides	Yes	Landslides have been considered as a fundamental part of the design. This will ensure that the risk is designed out, both in terms of the vulnerability of the proposed development to these types of events, and also in terms of the potential for the proposed development to increase the risk of such an event happening. It is considered that there is no receptor that could therefore be of greater risk.	N/A	N/A	No
1.2	Earthquakes	No	The site is not in a geologically active area and as such, earthquakes are not considered to be a real risk or serious possibility.	N/A	N/A	No
1.3	Sinkholes	No	The geology of the study area is not prone to sinkholes.	N/A	N/A	No
2 Hydrological Disasters						
2.1	Floods	Yes	Both the vulnerability of the project to flooding and its potential to exacerbate flooding have been covered in the Hydrology chapter of this EIAR and has been reported on in the EIAR, both in terms of the risk to the proposed development and increased risk due to the proposed development.	The proposed visitor centre, car park and cable car landing points	Yes - Chapter 10: Hydrology	No
2.2	Tsunami / Storm surge	Yes	The site is exposed to sea levels and the effect of storm surges have been considered in the assessment of flood risk. See Item 2.1 above.	The proposed visitor centre, car park and cable car landing points	Yes - Chapter 10: Hydrology	No

		Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in EIAR? If so, where?	Continue to Stage 3 (see Chapter 4)?
3 Meteorological Disasters						
3.1	Blizzards	No	Blizzard conditions could affect users of the proposed development. However the risk is no different from other coastal developments in Ireland.	Visitors and residents	N/A	No
3.2	Cyclonic storms	No	No - not applicable.	N/A	N/A	No
3.3	Droughts	No	Droughts are only considered as a disaster due to water shortages for essential services and where there are indirect impacts on food production, loss of soils etc. The proposed development is not considered to be vulnerable to drought.	N/A	N/A	No
3.4	Thunderstorms	Yes	The proposed building and cableway design will consider the potential risk of lightning strikes, though the risk is not considered to be any greater than any other buildings.	Visitors and residents	No	No
3.5	Hailstorms	No	No	N/A	N/A	No
3.6	Heat waves	Yes	The proposed development design will consider the effect of high temperatures; however the proposed development will be no more vulnerable than any other development.	N/A	N/A	No
3.7	Tornadoes	No	Although there are tornadoes in Ireland, their destructive force tends to be much less than in other parts of the world and the proposed development is not particularly vulnerable to any potential effects.	N/A	No	No
3.8	Wildfires	Yes	The landscaping proposed for the proposed development will not be dense, however the risk of wildfires is thought to be no greater than for other existing urban developments.	Development users, habitats and species.	No	No
3.9	Air Quality Events	Yes	Although relevant, as vehicles emissions can contribute to poor air quality, it is not considered necessary to undertake any more assessment than is already proposed for the air quality assessment.	Visitors and residents	Yes - Chapter 13: Air Quality and Climate	No

		Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in EIAR? If so, where?	Continue to Stage 3 (see Chapter 4)?
4 Space Disasters						
4.1	Impact events and airburst	No	The proposed development is considered to be no more vulnerable than any other development.	N/A	N/A	No
4.2	Solar flare	No	The proposed development is considered to be no more vulnerable than any other development.	N/A	N/A	No
5 Transport						
5.1	Road Accidents	Yes	The risk posed by spillage from hazardous loads as a result of a road traffic accident e.g. fuel tankers is considered in the Hydrology and Hydrogeology chapters of this EIAR.	Road users, aquatic environment.	Yes - Chapter 9: Hydrogeology and Chapter 10: Hydrology	Yes
5.2	Rail Accidents	No	No	N/A	No	No
5.3	Aircraft Disasters	No	There is not considered to be an increased risk to visitors or residents.	N/A	N/A	No
5.4	Maritime Disasters	Yes	The proposed development is located adjacent to the sea and the effect of extreme tidal levels, wave and wind conditions were considered during the design of the proposed development.	Visitors and residents	Yes – Chapter 16: Material Assets	No
6 Engineering Accidents/Failures						
6.1	Bridge Failure	No	There is no bridge proposed as part of the proposed development	N/A	No	No
6.2	Tunnel Failure or Fire	No	There are no proposed tunnels as part of the proposed development	N/A	N/A	No
6.3	Dam Failure	No	There are no dams that would affect the proposed development	N/A	N/A	No
6.4	Flood Defence Failure	Yes	The site has been designed to protect against flooding by means of ensuring the proposed development is of a certain height.	N/A	Chapter 4: Description of the Proposed Development	No
6.5	Mast and Tower Collapse	Yes	Roadside signs and lighting will be part of the proposed development. They will be designed to modern design standards.	Road users	No	No

		Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in EIAR? If so, where?	Continue to Stage 3 (see Chapter 4)?
6.6	Building failure or fire	Yes	The proposed buildings have been designed to the latest design standards and measures.	Population, Biodiversity	Chapter 4: Description of the Proposed Development	Yes
6.7	Utilities failure (gas, electricity, water, sewage, oil, communications)	Yes	Utilities including water and wastewater provisions have been designed and will be provided as part of the proposed development.	Hydrology, Hydrogeology, Material Assets	Chapter 04: Description of the Proposed Development Chapter 09: Biodiversity Chapter 16: Material Assets	No
7 Industrial Accidents						
7.1	Defence industry	No	None in the study area	N/A	No	No
7.1	Energy Industry (fossil fuel)	No	None in the study area	N/A	No	No
7.1	Oil and gas refinery / storage	No	None in the study area	N/A	No	No
7.1	Food Industry	Yes	A café is proposed as part of the development. Health and Safety will be implemented by the occupier when appointed.	Population, Biodiversity, Material Assets	No	No
7.1	Chemical Industry	No	None nearby	N/A		
7.1	Manufacturing Industry	No	None nearby	N/A	N/A	No
7.1	Mining Industry	Yes	None nearby	N/A	No	No

		Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in EIAR? If so, where?	Continue to Stage 3 (see Chapter 4)?
8 Crime/Civil Unrest						
8.1	Crime or Civil Unrest	No	No more vulnerable than any other developments.	N/A	No	No
8.2	Cyber attacks	Yes	No more vulnerable than any other developments.	N/A	No	No
9 Disease						
9.1	Human disease	No	No more vulnerable than any other development.	N/A	No	No
9.2	Animal and Plant disease	Yes	The removal of onsite Invasive Alien Species is required to permit development. Biosecurity will be considered in the construction and operational phases.	Biodiversity	Chapter 07 Biodiversity	Yes

17.4.3 Stage 2 Assessment

In general, major accident and disaster events, as they relate to the proposed development, will fall into three categories:

- Events that could not realistically occur, due to the type of development or its location;
- Events that could realistically occur, but for which the proposed development, and associated receptors, are no more vulnerable than any other development; and
- Events that could occur, and to which the proposed development is particularly vulnerable, or which the proposed development has a particular capacity to exacerbate.

The screening stage was undertaken primarily to identify this third group of major events, which would then form the shortlist of events to be taken forward for further consideration.

17.4.4 Stage 3 Assessment

Stage 3 of the assessment requires more detailed consideration of the short list of major events developed during Stage 2, though this may only mean that the risk needs to remain on the design risk register until it is closed out through design. Major events that were included on the short list and which have subsequently been considered in more detail are presented in Table 17.3.

Table 17.3 Assessment of Remaining Risks Associated with the Proposed Development

Major Event	**Reason for consideration on Short List**	**Potential Receptors**	**Mitigation**	**Residual Significance**
Road Accidents	The risk posed by spillage from hazardous loads as a result of a road traffic accident, e.g. fuel tankers, is considered in the Hydrology and Hydrogeology chapters of this EIAR. The proposed development will introduce these types of vehicles to the site.	Road users, aquatic environment.	Due to the history of very few road accidents in the area and the low speed limits in the area, it is expected that spillages as a result of traffic accidents will be unlikely. Chapter 10 Hydrology of this EIAR has assessed spillage events during construction such as accidental spillages of hydrocarbons, concrete, cement products etc. Mitigation measures have been included in Chapter 10 Hydrology and in the Outline CEMP and Outline EOP prepared for the development which will, as a minimum, require the development to be formulated in consideration of standard best practice. An Outline Incident Response Plan has also been included in the Outline EOP for the construction stage. Mitigation measures will attenuate and cleanse the surface water runoff from the site prior to discharge to Dursey Sound.	Not significant
Building Failure or Fire	The proposed buildings, car park and cableway structures have been designed to the most recent design regulations and fire exits have been incorporated into the designs.	Visitors and residents	Once the proposed development is in operation, it is not likely to cause any major accidents and/or disasters due to the nature of the development. The proposed development will comply with safety requirements listed in the Outline Recovery and Evacuation Report prepared by Roughan & O'Donovan for Dursey Island Cable Car in 2019. The proposed buildings are designed to comply with Building Regulations Technical Guidance Documents (TGD) Part B – Fire Safety (2006).	Not Significant
Animal and Plant disease	There is currently IAS within the study area which will be dealt with before construction. However biosecurity will be considered in the construction and operational phases for the proposed development.	Visitors, residents, biodiversity	An Invasive Alien Species Management Plan has been developed to control IAS within the site prior to construction. A site survey will be carried out prior to development to ensure that IAS have been eradicated as per the Management Plan and that no regrowth has occurred. The contractors will be in charge of the management of IAS during construction and where eradication has not been successful they will put in place a Management Plan for the treatment of any remaining IAS.	Not significant

There are no "Seveso" sites (establishments within the meaning of the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015) in close proximity to the proposed development. The closest Seveso site, Zenith Energy Bantry Bay Terminal Ltd. in Reenrour, Bantry, is located approximately 43km east of the proposed development.

- Weather Events;

  The assessment identified that weather events are the principal hazards encountered with respect to cable car and visitor centre operation, including rainfall, wind and ice and their potential contribution to natural disasters and major accidents such as collisions. Flooding is a likely event that may occur in the vicinity of the proposed development and impacts associated with flooding are examined in Chapter 10 Hydrology of this EIAR.

  The principal objectives for the proposed drainage system include:

  - To provide improved water quality by means of treatment prior to discharge;
  - To ensure that the impact of the drainage outfalls on the receiving Dursey Sound is negligible; and
  - To minimise the impact of runoff on the receiving environment.

  The maintenance and operation of the proposed cableway will be in line with the 2016 report for the existing cableway "Safety Requirements for Dursey Island Cable Car – Precommissioning Inspection, Maintenance, Operational Inspection and Checks".

  The elements of the proposed development which are envisaged to be operated and maintained are as follows:

  - Landscaping maintenance of all landscaping areas;
  - Road sweeping and de-icing operations of the carpark and approach road;
  - Regular maintenance of the permeable pavements in the form of brushing and vacuuming;
  - Resurfacing works of the carpark and approach road, as necessary; and
  - Periodic inspection and maintenance of all civil infrastructure elements.

  The maintenance and operation of the visitor centre and café will include the following:

  - Maintenance of all mechanical and electrical (M&E) equipment located within each building; and
  - Internal and external cleaning

- Risk of Slope Failure

  The proposed development has been designed to ensure that the cablecar landing points and the visitor centre are positioned at a distance from the rock face. The rock slopes are considered too distant from the landing points to have an adverse effect. Therefore, the likelihood of slope failure resulting in impacts on the cable car or visitor centre is negligible.

Ensuring the proposed development is resilient to major accidents and disasters includes the provision of warning systems to warn users of incidents in advance of hazards, and the management and operation of the proposed development. The likelihood of the proposed development causing major accidents and/or disasters is negligible. During construction, workers will be vulnerable to accidents while working on site, however the contractor will have a safety statement and safety plan in place which will include procedures to protect their employees while on site. The likelihood of the proposed development causing major accidents and /or disasters is very small and is not significant.

Likewise, it is considered reasonable and proportionate to exclude certain receptor groups from the outset. Construction workers, as a receptor, can be excluded from the assessment, because existing legal protection is sufficient to minimise any risk from major events to a reasonable level. Another potential source of major events related to the proposed development is road traffic accidents during its operation. These can clearly impact on people though fatalities and serious injury, but can also impact on the environment through the spillage of fuel and hazardous loads. However, for the proposed development, Chapter 5 Traffic Analysis of this EIAR has included elements in its design to minimise this risk. The likelihood of the proposed development causing major accidents and /or disasters is very small and is not significant.

17.5 Cumulative Effects

Projects

- Barry O'Neill
- Lehanemore Community Co-operative Society Ltd.;
- Telefonica Ireland Ltd.;
- RTE Transmission Network Ltd.;
- Allihies Parish Co-operative Society Limited;
- Dzogchen Beara Trust;
- Hutchison 3G Ireland;
- Meat Packing Facility;
- Retention of Office, Hatchery and Seaweed Production; and
- Café and Tourist Accommodation

17.5.1 Barry O'Neill [Planning Ref.: 19473]

In July 2019, permission was sought from CCC by Barry O'Neill for the construction of a detached tourist accommodation and facility building to incorporate (i) a café, (ii) guest accommodation and (iii) facilities for walkers and cyclists, and also for the installation of a wastewater treatment system and all associated site works in the townland of Ballynacallagh, on Dursey Island. However, the planning application in question was withdrawn on the 30th of August 2019. It is possible that, at some point in the future, permission will again be sought for this project or some derivation thereof. However, no details are known of when or in what form a planning application for this project might be re-submitted. Therefore, it is neither possible nor appropriate to make a full assessment of the nature or significance of any potential adverse effects arising from this project in combination with the proposed development.

17.5.2 Lehanemore Community Co-operative Society Ltd [Planning Refs.: 09198, 12439 and 1973]

Lehanemore Community Co-operative Society Ltd. received permission to construct a car park with all associated site works in 2009. Subsequently, in July 2012, Lehanemore Community Co-operative Society Ltd. submitted a planning application for the construction of a car park, erection of safety barriers, construction of a vehicular entrance and associated site works. Permission was granted with conditions in September 2012. They then applied for planning permission for the construction of car park and vehicular entrance, erection of safety barriers and associate site works in

February 2019 and are awaiting a result. No likely significant cumulative impacts are predicted due to the construction of the car park and associated works which is located 1.7km northeast of the proposed development.

17.5.3 Telefonica Ireland Ltd. [Planning Ref.: 14735]

In December 2014, Telefonica Ireland Ltd. sought permission for the retention of existing 30m high telecommunications support structure carrying antennas and link dishes together with associated equipment containers and security fences which was previously granted under reference number 08/2030 and forms part of their cellular and digital broadband communications network at Knockaura, Coom, Allihies, Co Cork. Telefonica was granted planning permission with conditions in March 2015. No likely significant cumulative impacts are predicted due to the retention of the telecommunications support structure which is located 11.3km northeast of the proposed development.

17.5.4 RTE Transmission Network Ltd. [Planning Ref.: 12691]

In November 2012 RTE Transmission Network Ltd. sought permission for the retention of a 36-metre high tower, concrete bases and chain-link fencing for the continuation of use as a communications station as granted in 2013. The tower is within an existing chain-link fence compound using an existing access route. (This application is subsequent and subject to alterations to a previous grant of permission by Cork County Council planning reference 07/2700). No likely significant cumulative impacts are predicted due to the retention of the communication tower which is located 12km northeast of the proposed development.

17.5.5 Allihies Parish Co-operative Society Ltd. [Planning Ref. 10327]

Permission was granted for the construction of a storage shed, outdoor seating and an exhibition area at the rear of Allihies Mine Museum Building in 2010. No likely significant cumulative impacts are predicted due to these upgrades to the museum which is located 8.2km northeast of the proposed development.

17.5.6 Dzogchen Beara Trust [Planning Refs.: 10350 and 14517]

Permission was granted in 2010 for a proposed development which consisted of an expansion of the existing Dzoghen Beara Retreat Centre Facility, consisting of a temple building 14.5min height, along with three adjacent single storey ancillary buildings and connection to existing onsite sewage and water facilities. Ancillary building No. 1 includes provision of two self-contained accommodation units (one for a caretaker of the temple building, and one for a resident monastic). Ancillary building No. 2 provides toilet facilities, and ancillary building No. 3 provides additional storage for the temple building, and all ancillary site works. In 2014 permission was granted for the extension of the duration of this permission. No likely significant cumulative impacts are predicted due to this development which is located 12.1km southeast of the proposed development.

17.5.7 Hutchison 3G Ireland [Planning Refs.: 09716 and 09717]

Permission was granted in September 2009 for the construction of a 12m slim line monopole with 3 no. 2.1m panel antennas and 1 no. 0.6m radio link dishes attached, equipment cabinet, fencing and associated site works as part of the Governments National Broadband Scheme. No likely significant cumulative impacts are predicted due to this monopole which is located 12km east of the proposed development, in Lickbarrahane.

In September 2009, permission was also granted for the construction of a 24m slim line monopole with 3 no. 2.1m panel antennas and 1 no. 0.6m radio link dishes attached, equipment cabinet, fencing and associated site works as part of the Governments National Broadband Scheme. No likely significant cumulative impacts are predicted due to this development which is located 15km northeast of the proposed development, in Coulagh.

17.5.8 Meat Packing Facility [Planning Ref.: 12109]

Permission was granted with conditions for the construction of a meat packing facility and associated site works in August 2012. No likely significant cumulative impacts are predicted due to the construction and operation of the meat packing facility which is located 10km northeast of the proposed development, in Caherkeen.

17.5.9 Retention of Office, Hatchery and Seaweed Production [Planning Ref.: 13162]

Retention of the following was granted with conditions in June 2013: (a) office/toilet prefabricated unit and permission to relocate same within site boundaries, (b) two storage containers for general storage and permission to relocate same within site boundaries, (c) two vehicular entrances, (d) a hatchery unit, (e) a drier unit and (f) septic tank system and planning permission for the following: (i) alterations to an existing vehicular entrance, (ii) close up the second vehicular entrance and construct a new vehicular entrance, (iii) removal of three containers from site, (iv) construct a new agricultural building for seaweed line preparation and seaweed drying (existing hatchery unit and drier unit to be relocated and incorporated in this building) and (v) revise the existing yard layout to include hard surfaced areas and open green areas, and also to include all associated site works.

No likely significant cumulative impacts are predicted due to this development, which is located 15km east of the proposed development, in Oakmount.

17.5.10 Cork County Development Plan 2014-2020

This Development Plan sets out Cork County Council's policies and objectives for the proper planning and sustainable development of the County from 2014 to 2020. Key strategic sites supporting and fostering entrepreneurship are promoted. The proposed development supports the Cork County Development Plan and it is therefore considered that there will be positive cumulative impacts as a result of the proposed development.

17.5.11 West Cork Municipal District Local Area Plan

This Local Area Plan sets out detailed planning strategy and land use zoning as appropriate for the towns and villages of the West Cork Municipal District from 2017. The policies, objectives and zoning objectives for existing and future development of the West Cork Municipal District have been considered as part of the proposed development. Therefore, it is considered that there will be positive cumulative impacts as a result of the proposed development.

17.5.12 Dunmanus - Bantry - Kenmare Flood Risk and Management Plan (CFRAM)

The purpose of the Plan is to set out the strategy, including a set of proposed measures, for the cost-effective and sustainable, long-term management of flood risk in the River Basin, including the areas where the flood risk has been determined as being potentially significant.

The proposed development will satisfy the proposals outlined in the Plan and therefore, it is considered that there will be positive cumulative impacts as a result of the proposed development.

17.6 Potential Future Developments

The Applicant (CCC) is aware that, since the proposed development will promote economic development on Dursey Island and in the vicinity on the mainland, it is also likely to induce further development (particularly that which relates to tourism and recreation) nearby, including on Dursey Island. Since such developments are purely hypothetical, potential in-combination effects between these and the proposed development cannot be assessed at this juncture. However, it should be noted that CCC has every intention to manage development in the area in accordance with national, regional and local policies, including the West Cork Island Integrated Development Strategy (2010), the Cork County Development Plan 2014 – 2020, and the West Cork Municipal District Local Area Plan (2017), the latter of which states that *"Development on [Dursey Island] will only be permitted where it is shown that it is compatible with the requirements of the Habitats Directive and the protection of these sites".* Furthermore, in the process of developing the EIAR and NIS for the proposed development, CCC have developed a more in-depth understanding of the management measures that are required in order to conserve the various aspects of the environment on Dursey Island, and in the vicinity of the cable car site on the mainland. This knowledge will be used to inform subsequent judgements of CCC with respect to planning proposals for the area in question that are submitted to them in the future.

17.7 Conclusion

Interrelationships

The interrelationships between the individual environmental disciplines have been considered and assessed. It is concluded that once relevant mitigation measures are implemented, no residual likely significant effects will exist as a result of the construction or operation of the proposed Dursey Island Cable Car and Visitor Centre.

Major Accidents and Disasters

There are no "Seveso" sites (establishments within the meaning of the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015) in close proximity to the proposed development. The closest Seveso site, Zenith Energy Bantry Bay Terminal Ltd. in Reenrour, Bantry, is located approximately 43km east of the proposed development.

The design of the proposed development has taken account of the potential for flooding and it is considered that there is minimal flood risk as a result of the proposed development. In relation to accidents resulting in a spillage of polluting material, the risk of these occurring will be significantly reduced and if a spillage should occur the proposed development incorporates drainage to allow the spilled material to be contained and treated prior to discharge.

Cumulative Impacts

It is considered that the scale of the works and implementation of effective environmental control measures will avoid all likely significant effects on environmental parameters. There is no potential for cumulative impacts arising in combination with any other plans or projects and therefore no potential for in combination effects on environmental parameters.

Based on the above, it can be objectively concluded, in view of best scientific knowledge, on the basis of objective information and provided effective mitigation is in place, that the proposed development, individually or in combination with other plans and projects, will not have a significant adverse effect on the receiving environment.

Chapter 18 Mitigation Measures

18.1 Introduction

Mitigation measures are the measures proposed in order to avoid, reduce or, where possible, remedy the significant adverse environmental effects of the proposed Dursey Island Cable Car and Visitor Centre. Mitigation measures have been incorporated into the design of the proposed development and will be applied during both the construction and operation phase where they have been assessed as necessary.

This chapter provides a summary of the mitigation measures for the proposed Dursey Island Cable Car and Visitor Centre as contained within chapters 5 – 17 of the Environmental Impact Assessment Report (EIAR). This is a summarised version stating only the mitigation measures to be provided and does not discuss the requirement for the measure to be applied or the residual impacts. This chapter also deals only with mitigation measures to be applied to the proposed Dursey Island Cable Car and Visitor Centre and does not address the avoidance or reduction mitigation which has been applied through the design development.

18.2 General Mitigation and Monitoring Measures

Table 18.1 General Mitigation and Monitoring Measures

No.	Description
1.1	**Construction Environmental Management Plan** Prior to any demolition, excavation or construction a Construction Environmental Management Plan (CEMP) will be produced by the successful contractor for the proposed development. The CEMP will set out the Contractor's overall management and administration of a construction project. An Outline CEMP has been prepared as part of this EIAR (see Appendix 4.1b). The CEMP will be developed by the Contractor during the pre-construction phase to ensure commitments included in the statutory approvals are adhered to. The Contractor will include details in relation to all of the following in the CEMP • Details of working hours and days; • Details of emergency plan - in the event of fire, chemical spillage, cement spillage, collapse of structures or failure of equipment or road traffic incident within an area of traffic management. The plan must include contact names and telephone numbers for: Local Authority (all sections/departments); Ambulance; Gardaí and Fire Services; • Details of chemical/fuel storage areas (including location and bunding to contain runoff of spillages and leakages); • Details of construction plant storage, temporary offices; • A Traffic Management Plan (to be developed in conjunction with the Local Authority's Roads Section) including details of routing of network traffic; temporary road closures; temporary signal strategy; routing of construction traffic; programme of vehicular arrivals; on-site parking for vehicles and workers; road cleaning; other traffic management requirements; • Truck wheel wash details (including measures to reduce and treat runoff); • Dust management to prevent nuisance (demolition and construction); • Site run-off management; • Noise and vibration management to prevent nuisance (demolition and construction); • Landscape management;

No.	Description
	• Management of contaminated land including asbestos and lead-based paint and assessment of risk for same by suitably qualified, trained and licenced personnel; • Management of demolition of all structures and assessment of risks for same; • Stockpiles; • Project procedures & method statements for: o Site clearance, site investigations, excavations and working with asbestos containing materials (ACMs) if necessary; o Management and removal of ACMs if necessary; o Demolition and removal of buildings, services, pipelines (including risk assessment and disposal); o Diversion of services; o Excavation and blasting (through peat, soils and bedrock); o Construction of pipelines; o Temporary hoarding & lighting; o Borrow pits and location of crushing plant; o Disposal of surplus geological material (peat, soils, rock etc.); o Earthworks material improvement; and o Protection of watercourses from contamination and silting during construction; and o Site Compounds. The production of the CEMP will also detail areas of concern with regard to health and safety and any environmental issues that require attention during the construction phase. The adoption of good management practices listed in the CEMP during the construction phase will contribute to reducing environmental impacts.
1.2	**Environmental Operating Plan** The Environmental Operating Plan (EOP) is defined as a document that outlines procedures for the delivery of environmental mitigation measures and for addressing general day-to-day environmental issues that can arise during the construction phase of a construction project. Essentially the EOP is a project management tool. It is prepared, developed and updated by the Contractor during the project construction stage and sets out mitigation measures proposed by the EIAR, NIS and An Bord Pleanála's decision. An Outline EOP has been included in Appendix 4.1 of this EIAR and will be further developed by the Contractor. Before any works commence on site, the Contractor will be required to prepare an EOP in accordance with the National Roads Authority (NRA), now known for operational purposes as Transport Infrastructure Ireland (TII), guidance document *Guidelines for the Creation and Maintenance of an Environmental Operating Plan*. Details within the plan will include: • All environmental commitments and mitigation measures included as part of the planning approval process and any requirements of statutory bodies such as the National Parks and Wildlife Service (NPWS) as well as a method documenting compliance with the measures; • A list of all applicable environmental legislation requirements and a method of documenting compliance with these requirements; and • Outline methods by which construction work will be managed to avoid, reduce or remedy potential adverse impacts on the environment. To oversee the implementation of the EOP, the Contractors will be required to appoint a person to ensure that the mitigation measures included in the EIAR, the EOP and the statutory approvals are executed in the construction of the works and to monitor

No.	Description
	that those mitigation measures and planning conditions are functioning properly. The EOP integrates the requirements of the Incident Response Plan (IRP), the Construction Environmental Management Plan (CEMP) and the Construction and Demolition Waste Management Plan (CDWMP), which are described in turn in the following sections.
1.3	**Construction and Demolition Waste Management Plan (CDWMP)** The Construction and Demolition Waste Management Plan (CDWMP) will clearly set out the Contractor's proposals regarding the treatment, storage and disposal of waste related to the construction of the proposed development. An Outline CDWMP has been prepared for the proposed development (see Appendix 4.1c). The Outline CDWMP is a live document that will be amended and updated to reflect current conditions on site as the project progresses. The obligation to develop, maintain and operate a CDWMP will form part of the contract documents for the project. The plan itself will contain, but not be limited to, the following measures: • Details of waste storage to be provided for different waste; • Details of where and how materials are to be disposed of - landfill or other appropriately licensed waste management facility; • Details of storage areas for waste materials and containers; • Details of how unsuitable excess materials will be disposed of where necessary; and • Details of how and where hazardous wastes such as oils, diesel and other hydrocarbon or other chemical waste are to be stored and disposed of in a suitable manner.

18.3 Mitigation and Monitoring Measures for Traffic and Transport

Table 18.2 Mitigation and Monitoring Measures for Traffic and Transport

No.	Description
2.1	No mitigation measures for traffic and transport are deemed necessary. No significant impacts are predicted as standard best practice measures are incorporated into the project design.

18.4 Mitigation and Monitoring Measures for Population and Human Health

Table 18.3 Mitigation and Monitoring Measures for Population and Human Health

No.	Description
3.1	The Contractor shall undertake a more detailed asbestos survey prior to the commencement of works.
3.2	A Construction Environmental Management Plan (CEMP) shall be developed by the Contractor in agreement with the location authority, prior to the commencement of works. As stated in Chapter 4, the CEMP should address any potential risks related to working nears asbestos and lead-based paint. This document shall also include a Dust Management Plan, including the following measures to prevent adverse effects related to lead-based paints: • A HEPA-filter vacuum shall be employed to clean up debris resulting from the removal (accidental or otherwise) of paints on the structures in question. • Where paint removal is required, a wet-based method shall be applied.

No.	Description
	• Any paint debris shall be disposed of in accordance with the Waste Management Act. • All personnel engaged in the removal of (or otherwise working on or near) structures which have been determined to be coated with lead-containing paint shall wear appropriate protective clothing.
3.3	A Stakeholder Management and Communication Plan shall be developed by the Contractor in agreement with Cork County Council prior to the commencement of the construction phase. It shall include measures addressing the communication of information to local residents, those working in the area, businessowners and visitors regarding the nature and duration of works to be carried out. The Plan shall be implemented throughout the duration of the construction works.
3.4	All of the mitigation measures set out in Chapters 7, 9, 10, 12 and 13 of this EIAR are required to be implemented.
3.5	When restrictions/changes to the operation of the cableway are required the Contractor shall be required to: • Provide written notice and/or verbal notice to all Dursey Island residents and landowners at least 1 week prior to the first day of the interruption, or as soon the interruption is known. • In the event of emergency situations, the contractor will be required to notify the 2 Dursey Island residents and landowners immediately or as soon as is practicable by phone/in person and in writing to notify them of changes to the operation of the cableway. • Provide up to date notifications to the general public about any interruptions to the service via a webpage set up for the purpose on the site website (for example on: DurseyIsland.ie). The notification(s) should include details regarding the nature of the interruption (i.e. whether the cableway is partly operational or fully out of service) and the duration of the interruption.

18.5 Mitigation and Monitoring Measures for Biodiversity

Table 18.4 Mitigation and Monitoring Measures for Biodiversity

No.	Description
4.1	A Construction Environmental Management Plan (CEMP) shall be developed by the Contractor prior to the commencement of works. This document serves to ensure that the construction of the proposed development does not lead to any unanticipated negative impacts on the environment. It shall be developed in accordance with the description of the CEMP set out in Chapter 4 of this EIAR – Description of the Proposed Development – and based on the Outline CEMP which has been included in Appendix 4.1 of this EIAR.
4.2	An Environmental Operating Plan (EOP) shall be developed by the Contractor prior to the commencement of works. This document sets out the protocol for addressing environmental issues which may arise during the construction phase. This document shall be developed in accordance with the TII (n.d.; formerly NRA) guidelines, '*Guidelines for the Creation and Maintenance of an Environmental Operating Plan*' and based on the Outline EOP which has been included in Appendix 4.2 of this EIAR.
4.3	The Contractor will appoint a Site Environmental Manager prior to the commencement of works. This person shall be responsible for carrying out environmental monitoring and ensuring that the mitigation measures proposed in this EIAR (as well as the CEMP and EOP) are adhered to.
4.4	An Ecological Clerk of Works (ECoW) shall be appointed by CCC prior to the commencement of works. It shall be their responsibility to supervise and provide

No.	Description
	recommendations on the execution of any and all works which have the potential to give rise to negative effects on biodiversity/ecological integrity.
4.5	In order to prevent/minimise potential negative effects as a result of the introduction and/or spread of terrestrial and aquatic IAS during the construction of the proposed development: • An IAS Management Plan [Appendix 7.1] has been developed and shall be implemented, as required, during the construction of the proposed development. • Landscaping of the proposed development shall use native species of plants of national provenance only and, insofar as possible, soil reused from on-site excavations. If soil/substrate needs to be imported to the site for the purposes of the proposed development, the Contractor shall ensure that the imported soil/substrate is free from IAS. • All land-based construction works shall be executed in accordance with the TII guidelines, '*Guidelines on the Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads'* (2010). The Contractor shall ensure that the hull of the vessel(s) used during proposed works is not fouled with any IAS prior to its arrival at the site. Efforts shall also be made to ensure that any plant/equipment (including PPE equipment) is not carrying seeds or plant materials from IAS. The Contractor shall refer to the Invasive Species Ireland '*Marina Operators Code of Conduct'* (Kelly & Maguire, 2009).
4.6	In order to prevent any potential destruction of betony (Betonica officinalis) as a result of the construction of the proposed development, a pre-construction survey shall be carried out of the site of the proposed development, and any plants/clusters of plants of the species identified in vulnerable locations (i.e. where they are at risk of destruction as a result of the proposed works) shall be translocated under NPWS license by a suitably qualified, competent professional to area(s) where the destruction of the plants will be avoided. Additionally, if individual plants or clusters of betony (in addition to those already identified and translocated) are identified by the ECoW at vulnerable location(s) during the construction phase, they shall be translocated as described previously. If necessary, works at the location(s) in question shall be suspended until such time that it is considered ecologically appropriate (by the ECoW) to carry out translocations.
4.7	In order to prevent significant, negative effects on bats as a result of the construction of the proposed development: • Demolition of existing buildings at the site of the proposed development shall be completed either during the autumn or spring months in order to minimise the risk of disturbance of roosting bats. Care shall be taken during the removal of rooves. If bats are identified in structures during demolition works, the local NPWS Conservation Ranger shall be contacted to facilitate safe translocation. • Bat boxes shall be erected in association with buildings/structures on the mainland side of the site of the proposed development. These shall be of a design and placement that is in accordance with the Bat Conservation Ireland guidelines, '*Bat Boxes: Guidance Notes for: Agri-environmental Schemes*' (Bat Conservation Ireland, 2015) and the NRA guidelines, '*Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*' (TII, n.d.). Bat boxes shall be inspected, maintained and relocated (if required) in accordance with the TII guidelines. Boxes shall be incorporated into or onto external walls away from artificial lighting. Recommended units (all available at nhbs.com) are as follows: o 8 no. 2FE Schwegler Wall-mounted Bat Shelter (to be hung on external walls), or o 6 no. 1FE Schwegler Bat Access Panel (with back plate) (to be hung on external walls), or o 4 no. 2FR Schwegler Bat Tube (to be built into external walls), or

No.	Description
	o 4 no. 1FQ Schwegler Bat Roost (to be hung on external walls).
4.8	In order to prevent pollution of the marine environment and surface-groundwater during the construction of the proposed development, which could potentially give rise to negative effects on biodiversity in marine and freshwater aquatic habitats, all of the mitigation measures outlined in Chapters 8, 9 and 10 of this EIAR – Soils & Geology, Hydrogeology and Hydrology, respectively – shall be implemented.
4.9	In order to prevent/minimise potential negative effects as a result of the introduction and/or spread of terrestrial and aquatic IAS during the operation of the proposed development: • CCC shall commit to undertaking treatment by a competent professional, in accordance with the recommended physical treatment set out in Appendix 7.1, with a view to eradicating the occurrence of hottentot-fig on Dursey Island prior to the commencement of operation of the proposed development (subject to agreement with the landowner). Monitoring shall be carried out by a competent professional for five years to ensure no re-growth occurs. • An IAS Management Plan [Appendix 7.1] has been developed and shall be implemented during the operation of the proposed development, with the objectives of, (i) where possible, eradicating IAS (especially on Dursey Island), (ii) preventing the introduction of new IAS to the area (especially Dursey Island), and (iii) in all other instances, managing existing occurrences of IAS with a view to preventing their spread.
4.10	Three looped, waymarked walking trails (as set out in Plate 7.17) shall be formalised on Dursey Island prior to the commencement of the operation of the proposed development. This approach is widely used in outdoor recreation areas (Slaymaker, 2017). According to the National Trails Office (NTO) '*Guide to Planning and Developing Recreational Trails in Ireland*', (2012, p.4), "*Developing recreational trails is a very effective way of managing recreational activity in the outdoors and protecting the natural environment*". Indeed, research indicates that walkers tend to stick to established paths, even when they have the 'right to roam' (Keirle & Stephens, 2004; Synge, 2004; Kuba *et al*., 2018). Formalisation of these trails shall not involve the creation of new paths, but rather the formal waymarking of routes on existing roads and paths. Formalisation of these paths shall involve the following: 1. Placement of suitably spaced colour-coded waymarker posts of recycled plastic, featuring directional arrows, at appropriate locations along the existing routes set out in Plate 7.18 in Chapter 7 of this EIAR; 2. Erection of a mapboard at a clearly visible location at the trailhead (i.e. on CCC lands near the island-side cable car station) displaying a map of colour-coded routes with: i. approximate length (km), ii. duration (hours/minutes), iii. a conservative estimate of difficulty level from 'Easy' to 'Moderate' to 'Strenuous' to 'Very Difficult' (according to the NTO guidelines, '*Classification and Grading for Recreational Trails*' (2008)), and iv. a message instructing walkers to stay on the trails (according to the recommendations set out in Appendix 7.2, '*Design of Outdoor Signage*').; 3. Erection of 'minimum impact behaviour' (MIB) signage at key sensitive locations for chough and/or habitat conservation along trails. Research from Portugal has shown that erection of such signage can effectively reduce the impact of human disturbance on breeding little tern (*Sterna albifrons*), with a 34-fold greater likelihood of breeding success at nest sites with such protective measures in place (Medeiros *et al*., 2007). At a minimum, this MIB signage shall include:

No.	**Description**
	i. a note on the trailhead mapboard instructing visitors to stay on the trails; and ii. a sign at the western end of the Tillickafinna/Signal Tower Loop instructing walkers not to venture any further westward onto the chough 'hotspot'. The design of this signage shall be in accordance with the recommendations set out in Appendix 7.2, '*Design of Outdoor Signage*'. Research conducted on Bear Island, Maryland, U.S.A. (Hockett *et al*., 2010), found that principle reasons for visitors to leave the established trail were: i. to view and/or photograph a scenic vista; ii. to pass other walkers on the trail; iii. to avoid challenging trail conditions; and also iv. because of poor waymarking. Accordingly, trails should offer opportunities for scenic vistas/photos, should be well marked and should not be too challenging. The direction of all three looped trails shall be anticlockwise, with walkers travelling along the established off-road trails on the outbound journey, and returning to the trailhead via the public road on the return journey. Travelling in this direction, walkers undertaking the Tillickafinna/Signal Tower Loop will have had plenty of 'photo opportunities', and will have completed the most strenuous portion of the trail (the 'high route') by the time they reach Tillickafinna and, for these reasons, may feel less inclined to venture further westward. As stated previously, formalisation of these trails shall not involve the creation of any new paths but rather, will serve to encourage walkers to stay on existing, established paths/roads, and provide options for walkers of varying abilities. Provision of complete (and conservative) information on the nature and duration of routes, coupled with the provision of two shorter options, may discourage certain walkers from attempting the full loop and travelling to the western end of the island. Any existing signage which contradicts these trails shall be removed, as required. CCC shall be responsible for the maintenance of these trails for the duration of the operation of the proposed development. Additionally, an existing informal walking trail on Crow Head shall be more clearly marked using recycled plastic waymarkers. However, no sign (or other indicator which might draw attention to the walk) should be erected. Responses to the visitor survey indicate that this is not a very popular walk and no undue attention should be drawn to it. Instead, efforts should be made to control the movements of those few walkers who do venture onto the headland. This approach is supported by success elsewhere. In the Hohe Tauern National Park in Austria, for example "*Staff have found that without a trail, people wander in all directions, but if there is a clear and unmistakable path, nearly all stick to it*" (Synge, 2004). CCC shall be responsible for the maintenance of this trail.
4.11	An education campaign shall be launched to inform visitors of the sensitivity of (i) species (i.e. choughs and ground-nesting bird species) to human disturbance and (ii) habitats to degradation as a result of visitor footfall. The objective of the campaign is to discourage visitors from wandering off the established walking routes on the island, particularly at sensitive locations for chough (i.e. at the western end of the island and potential roost sites). The campaign shall have the following characteristics: • It shall be three-tiered in that it will be featured in: 1. Exhibition materials in the Visitor Centre; 2. An audiovisual presentation in the outbound journey of the cable cars; and 3. Outdoor signage on Dursey Island. • The educational materials used shall be aesthetically pleasing and emotionally engaging to encourage buy-in from visitors. The design of outdoor signage shall be in accordance with the recommendations set out in Appendix 7.2 All outdoor signage shall be designed for the exposed and corrosive nature of the site.

No.	Description
4.12	Not including island residents/farmers, no more than 12,835 persons shall be permitted to travel to Dursey Island in any month of the year during the operation of the proposed development (see Appendix 7.2). This numerical carrying capacity shall be implemented using a strictly enforced CCC ticketing system.
4.13	Not including guide dogs, pets and/or working dogs of island residents and farmers, dogs shall be prohibited from travelling to Dursey Island. This restriction will be clearly displayed on the Dursey Island Cable Car and Visitor Centre website and promotional materials.
4.14	Not including bicycles for the personal use of island residents/farmers, visitors shall be prohibited from bringing bicycles to the island in the cable cars. This restriction will be clearly displayed on the Dursey Island Cable Car and Visitor Centre website and promotional materials.
4.15	Insofar as is possible in view of safety requirements, lighting shall be turned off at the closure of the proposed development each night (i.e. once all visitors have left).
4.16	Bulbs used in outdoor lighting shall be of a type which does not emit ultraviolet (UV) light. No spotlights shall be used.
4.17	In order to prevent pollution of the marine environment and surface-groundwater during the operation of the proposed development, which could potentially give rise to negative effects on biodiversity in marine and freshwater aquatic habitats, all of the mitigation measures outlined in Chapters 8, 9 and10 of this EIAR – Soils & Geology, Hydrogeology and Hydrology, respectively – shall be implemented.
4.18	In order to minimise the volume of litter being discarded on Dursey Island and in the vicinity of the proposed development on the mainland, segregated waste bins (at a minimum, separate recycling and residual waste bins) shall be provided in the mainland-side Visitor Centre, café and at the island station. To prevent overflow, these bins shall be emptied regularly. An appropriate waste collection service shall be arranged by CCC.
4.19	In order to support environmentally sustainable development and management of future developments on the west coast – particularly of tourism and recreation-related developments – CCC shall commit to implementing a 10-year monitoring scheme at the site of the proposed development, including the following: 1. Monitoring of visitor movements and activities in the vicinity of the proposed development, involving the following methods: • Trail counters shall be installed at suitable locations on walking trails on Dursey Island, on the Garinish Loop walk and on the walk at Crow Head. On Dursey Island, a trail counter shall be placed at an appropriate location on the western end of the island, so as to record approximately how many visitors leave the established trail (disregarding the MIB sign) to wander onto this key area for chough. CCC shall be responsible for the maintenance of these counters. • A visitor survey shall be carried out on an annual basis, to establish approximately how visitors respond to MIB signage, what proportion of visitors follow each of the three looped trails, and what proportion of visitors remain on established trails and vice versa. 2. The conservation status of the Dursey Island chough population shall be monitored on an annual basis (during the breeding season). The monitoring programme in question shall, at a minimum, involve the measurement (by a suitably qualified and competent ecologist) of the following parameters: • Number of breeding pairs (confirmed, probable and possible); • Locations of nest sites; and • Productivity of population.

No.	Description
	3. The conservation status of the habitats on Dursey Island shall be monitored on an annual basis. The monitoring programme in question shall, at a minimum, involve identification (by a suitably qualified and competent ecologist) of any areas where the ecological integrity of habitats is being negatively affected by land use (especially grazing regime) and/or any other pressures/threats. The data gathered as a result of all monitoring undertaken shall be shared with Fáilte Ireland so that it can feed into their WAW Environmental Surveying and Monitoring Programme, and can inform the development and management of similar/related developments, plans and projects. Information should also be shared with NPWS and, upon request, and as appropriate, with research institutions and state authorities. Results of monitoring shall be analysed and conclusions drawn in terms of management implications for developments of a similar nature/environmental context.

18.6 Mitigation and Monitoring Measures for Soils and Geology

Table 18.5 Mitigation and Monitoring Measures for Soils and Geology

No.	Description
5.1	The bedrock excavated on site will be reused as fill to structures, below the structures' floor slab where the slab is above the existing ground level, and to level the parking area. The laboratory tests carried out on rock samples confirm that the rock won on site can be used for structures' fill purposes in accordance to Specifications for Road Works. The majority of the excavated bedrock will be reused on site and there will be very limited and/or no need for off-site disposal. The design also ensures that the cut and the fill requirements are balanced, so that only small volumes of imported fill will be required.
5.2	Stripped topsoil will be temporarily stored and reused throughout the development area, for instance over the currently paved area next to the existing station.
5.3	A geotextile screen and boom with oil barrier will be required around the perimeter of the construction works to prevent the runoff of silt, oil or other deposits generated by construction activities.

18.7 Mitigation and Monitoring Measures for Hydrogeology

Table 18.6 Mitigation and Monitoring Measures for Hydrogeology

No.	Description
6.1	A project-specific Environmental Operating Plan (EOP) will be prepared for the development. It will be maintained by the Contractor for the duration of the construction phase. The EOP will cover all potentially polluting activities and include an emergency response procedure. All personnel working on the site will be trained in the implementation of the procedures. As a minimum, the EOP for the proposed development will be formulated in consideration of the standard best practice. The EOP will include a range of site-specific measures which include: • *Earthworks shall be carried out such that surfaces promote runoff and prevent ponding and flooding.* • *Runoff will be controlled and treated to minimise impacts to surface and groundwater.* • *All hazardous materials will be stored within secondary containment designed to retain at least 110% of the storage contents. Temporary bunds for oil/diesel storage tanks will be used on the site during the construction phase.*

No.	Description
	• *Safe materials handling of all potentially hazardous materials will be emphasised to all construction personnel employed during construction.* • *Mitigation measures during the construction phase will include implementing best practice during excavation works to avoid sediment entering the Atlantic Ocean (Kenmare River SAC).*
6.2	All other potential impacts have been identified as slight in the operational phase and as such no long-term mitigation measures are proposed.
6.3	A maintenance agreement shall be entered into between the operator of the site and a suitably qualified wastewater provider for both On-Site Wastewater Treatment Systems. This maintenance agreement shall include for regular checks, up-keep and maintenance and on-going desludging.
6.4	All conditions of the Groundwater Discharge Licence (once granted) shall be adhered to in full including any and all compliance monitoring specified.

18.8 Mitigation and Monitoring Measures for Hydrology

Table 18.7 Mitigation and Monitoring Measures for Hydrology

No.	Description
7.1	Site works will be limited to the minimum required to undertake the necessary elements of the project;
7.2	As far as is practicable, construction works shall proceed within predetermined Construction Areas on a phased basis. These areas will be determined by the contractor during the construction phase of the project.
7.3	Surface water flowing onto the construction area will be minimised through the provision of berms, diversion channels or cut-off ditches.
7.4	Management of excess material stockpiles to prevent siltation of watercourse systems through runoff during rainstorms will be undertaken. This may involve allowing the establishment of vegetation on the exposed soil and the diversion of runoff water from these stockpiles to the construction settlement ponds.
7.5	Protection of waterbodies from silt load will be carried out through the use of timber fencing with silt fences or earthen berms to provide adequate treatment of runoff to surface waterbodies.
7.6	Settlement ponds, silt traps and bunds will be used. Where pumping of water is to be carried out, filters will be used at intake points and discharge will be through a sediment trap.
7.7	The anticipated site compound/storage facilities will be fenced off at a minimum distance of 10m from the top of the edge of the sea/cliff edge. Any works within the 10m buffer zone will require measures to be implemented to ensure that silt laden or contaminated surface water runoff from the compound does not discharge directly to the sea/watercourse. See the OCEMP within the EOP in Appendix 4.1.
7.8	Protection measures will be put in place to ensure that all hydrocarbons used during the construction phase are appropriately handled, stored and disposed of in accordance with the NRA/TII document "Guidelines for the crossing of watercourses during the construction of National Road Schemes". All chemical and fuel filling locations will be contained within bunded areas and set back a minimum of 20m from watercourses.
7.9	Foul drainage from all site offices and construction facilities will be contained and disposed of in an appropriate manner to prevent pollution.

No.	Description
7.10	The construction discharge will be treated such that it will not reduce the environmental quality standard of the receiving waterbodies.
7.11	Riparian vegetation (if present) along the minor watercourse will be fenced off at a distance of 3m either side of the proposed crossing point to provide a buffer zone for its protection.
7.12	Hydrophilic grout and quick-setting mixes or rapid hardener additives shall be used to promote the early set of concrete surfaces exposed to water.
7.13	When working in or near the surface water and the application of in-situ materials cannot be avoided, the use of alternative materials such as biodegradable shutter oils shall be used.
7.14	Any plant operating close to the water will require special consideration on the transport of concrete from the point of discharge from the mixer to final discharge into the delivery pipe (tremie). Care will be exercised when slewing concrete skips or mobile concrete pumps over or near surface waters.
7.15	Placing of concrete near surface waterbodies will be carried out only under the supervision of the Ecological Clerk of Works (ECoW).
7.16	There will be no hosing into surface water drains of spills of concrete, cement, grout or similar materials. Such spills shall be contained immediately, and runoff prevented from entering surface waterbodies.
7.17	Concrete waste and wash-down water will be contained and managed on site to prevent pollution of all surface watercourses and lakes.
7.18	On-site concrete batching and mixing activities will only be allowed at the identified construction compound areas.
7.19	Washout from concrete lorries, with the exception of the chute, will not be permitted on site and will only take place at the construction compound (or other appropriate facility designated by the manufacturer).
7.20	Chute washout will be carried out at designated locations only. These locations will be signposted. The Concrete Plant and all Delivery Drivers will be informed of their location with the order information and on arrival to site.
7.21	Chute washout locations will be provided with an appropriate designated, contained impermeable area and treatment facilities including adequately sized settlement tanks. The clear water from the settlement tanks shall be pH corrected prior to discharge (which shall be by means of one of the construction stage settlement facilities) or alternatively disposed of as waste in accordance with the Contractor's Waste Management Plan.
7.22	The risk to the groundwater supply will be mitigated by restricting the use of the existing groundwater well as a potable water supply during construction. Instead potable water shall be brought to site. In addition, with the application of standard construction methods, the EOP and mitigation measures detailed in this chapter, any impacts to water supply and quality are found to be unlikely and temporary in nature. Therefore, there is a slight impact on human health during the construction phase. Physico-chemical groundwater quality monitoring will be undertaken prior to and post construction.
7.23	The proposed surface water drainage system will comprise predominantly SuDS features which will attenuate and treat the surface water runoff from the site prior to discharge to sea. Permeable paving will allow infiltration to the underlying subsoils.
7.24	In the event of a pump failure at the proposed foul pumping station, mitigation measures have been proposed. The pumping station has been designed to provide 24-hour effluent storage in case of failure. Standby pumps will also be provided.

No.	Description
7.25	The proposed surface water drainage system will comprise predominantly SuDS features which will attenuate and cleanse the surface water runoff from the site prior to discharge to sea by percolation into the subsoil. The incorporation of a SuDS based approach will ensure that discharge will be controlled, and treatment of runoff will take place within the SuDS components.
7.26	The proposed retaining wall drainage will incorporate a hydrocarbon separator prior to discharging to the minor watercourse. The implementation of this mitigation measure will reduce the associated impact from slight/moderate to slight. Physio-chemical water quality monitoring will be undertaken at the outfall location prior to and post construction.
7.27	All rainwater outlets including sinks and faucets will bare clear warnings as to the hazard posed by rainwater consumption.
7.28	It is envisaged that surface water sampling and chemical testing will be undertaken immediately downstream of the proposed outfall location in the minor watercourse. Surface water samples will be tested for physical and chemical parameters to assess water quality and indicate possible contamination at the site. The water samples will be tested for the following parameters: • Biochemical Oxygen Demand (BOD); • Chemical Oxygen Demand (COD); • pH value; • Suspended Solids; • Total Coliforms; • Ammonia; • Nitrate; • Nitrite; • Ortho Phosphate; and • Hydrocarbons. The surface water monitoring regime will be undertaken prior to, during and after completion of the proposed works. Samples will be taken at fortnightly intervals from the minor watercourse with a minimum of 4 samples taken prior to the works and 6 samples taken after completion of the works.
7.29	Groundwater sampling will also be undertaken prior to, during and after completion of the proposed works from the existing and proposed groundwater well. Samples will be taken at fortnightly intervals from each well with a minimum of 4 samples taken prior to the works and 6 samples taken after completion of the works. The groundwater samples will be tested for a range of physical and chemical parameters (as listed in Mitigation Measure 7.28 above) in order to assess water quality and indicate possible contamination at the site.

18.9 Mitigation and Monitoring Measures for Landscape and Visual

Table 18.8 Mitigation and Monitoring Measures for Landscape and Visual

No.	Description
8.1	Removal of cable car platform, building and hard surfacing, on the mainland side to be carried out, and the natural regeneration of area around the existing cable car station on the mainland side is to be facilitated. This is to be carried out by appropriate storage of topsoil to avoid compaction during construction, and the soil re-spread following construction. No seeding other than a sowing of red fescue to re-establish surface covering is to be carried out.

No.	Description
8.2	The proposed development has been designed to minimise cut and fill, and to sit the development into the landscape, working with the topography where possible.
8.3	Built form is low to blend into the landscape.
8.4	Natural materials and weathered steel are used to blend the buildings into the landscape.
8.5	The new visitor car park is presented at two levels to minimise cutting and thus optimise integration in the landscape. The parapet style walls which are provided to screen vehicles will be finished out with natural stone to reflect the local drystone walling styles. The parking spaces are to be finished out with a reinforced grass system which will have a softening green effect on these significant spaces.
8.6	The landscape plan for the mainland site indicates a simple approach with minimal intervention, indicating surface treatments which will include natural stone paving, exposed aggregate, and native planting to the scheme.
8.7	Further softening of the hard surfaced areas and car park with vegetation (small trees/shrubs, climbers etc. and walls can be explored at detailed design stage to further reduce the visual effects of the large areas of hard surface.
8.8	The green roof to the energy building slightly reduces the hard surface area.

18.10 Mitigation and Monitoring Measures for Noise and Vibration

Table 18.9 Mitigation and Monitoring Measures for Noise and Vibration

No.	Description
9.1	With regard to construction activities, best practice control measures for noise and vibration from construction sites are found within BS 5228:2009 +A1 2014, *Code of Practice for Noise and Vibration Control on Construction and Open Sites - Parts 1 and 2*. It is expected that the contractor will ensure that all best practice noise and vibration control methods will be used, as necessary, in order to ensure effects on nearby residential noise-sensitive locations are not significant.
9.2	No plant used on-site will be permitted to cause an ongoing public nuisance due to noise.
9.3	The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on-site operations.
9.4	All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract.
9.5	Compressors used will be attenuated models fitted with properly lined and sealed acoustic covers, which will be kept closed whenever machines are in use, and all ancillary pneumatic tools shall be fitted with suitable silencers.
9.6	Machinery that is used intermittently will be shut down or throttled back to a minimum level when not in use.
9.7	The contractor will manage the works so as to comply with noise limits outlined in BS 5228-1: 2009 + A1 2014*, Part 1 – Noise.*
9.8	All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.
9.9	Limiting the hours during which site activities which are likely to create high levels of noise or vibration are permitted.

No.	Description
9.10	Monitoring levels of noise and vibration during critical periods and at sensitive locations.
9.11	Establishing channels of communication between the contractor/developer, Cork County Council and residents so that receptors are aware of the likely duration of activities likely to generate higher noise or vibration.
9.12	The Contractor shall appoint a Site Environmental Manager (SEM) who is responsible for matters relating to noise and vibration.
9.13	Selection of plant with low inherent potential for generation of noise and/or vibration.
9.14	Erection of good quality, printed site hoarding around the South Quays which will act as a noise barrier to general construction activity at ground level.
9.15	Erection of barriers as necessary around items such as generators or high duty compressors.
9.16	Situate any noisy plant as far away from sensitive properties as permitted by site constraints.
9.17	Normal working times will be 07:00 to 19:00hrs Monday to Friday and 08:00 to 16:30hrs Saturday and Sunday. Works will not be undertaken outside these working hours without the written permission of Cork County Council.
9.18	During the operational phase of the development, noise from building services equipment serving the Visitor Centre will be selected such that the noise emission does not exceed 85dB(A) at 1m from the plant item.

18.11 Mitigation and Monitoring Measures for Air Quality and Climate

Table 18.10 Mitigation and Monitoring Measures for Air Quality and Climate

No.	Description
10.1	The main contractor will be responsible for the coordination, implementation and ongoing monitoring of the dust management plan.
10.2	Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
10.3	Any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.
10.4	Vehicles exiting the site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads.
10.5	Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates.
10.6	Vehicles delivering material with dust potential (soil, aggregates) will be enclosed or covered with tarpaulin at all times to restrict the escape of dust.
10.7	Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary.
10.8	Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
10.9	During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

No.	Description
10.10	A High Efficiency Particulate Air (HEPA)-filter vacuum shall be employed to clean up debris resulting from the removal (accidental or otherwise) of paints on the structures in question.
10.11	Where paint removal is required, a wet-based method shall be applied.
10.12	Any paint debris shall be disposed of in accordance with the Waste Management Act.
10.13	All personnel engaged in the removal of (or otherwise working on or near) structures which have been determined to be coated with lead-containing paint shall wear appropriate protective clothing.
10.14	In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.
10.11	On-site or delivery vehicles will be prevented from leaving engines idling, even over short periods.
10.12	Waste of materials due to poor timing or over ordering on site will be minimised to reduce the embodied carbon footprint of the site.

18.12 Mitigation and Monitoring Measures for Archaeological and Cultural Heritage

Table 18.11 Mitigation and Monitoring Measures for Archaeological and Cultural Heritage

No.	Description
11.1	Excavation works associated with the construction of the passing bays shall be monitored by a fully qualified archaeologist. Full provision will be made available for the excavation of any archaeological features and/or deposits that may be identified, if that is deemed the most appropriate manner in which to proceed.
11.2	In order to mitigate the impact of the proposed development on the existing cable car and associated infrastructure, a full written and photographic record of the cultural heritage asset should be made prior to its removal.
11.3	In order to mitigate the impact of the proposed development on vernacular structures (CH 37 – 38), a full written and photographic record of the cultural heritage assets should be made prior to removal.

18.13 Mitigation and Monitoring Measures for Architectural Heritage

Table 18.12 Mitigation and Monitoring Measures for Architectural Heritage

No.	Description
12.1	It is recommended that the existing cable car and its ancillary facilities be recorded through photographic and written description prior to removal and that an exhibition that includes a history of the cable car together with drawings, photographs, newspaper articles and other mementoes be provided in the new visitor centre.

18.14 Mitigation and Monitoring Measures for Material Assets and Land

Table 18.13 Mitigation and Monitoring Measures for Material Assets and Land

<table>
<tr><th>No.</th><th>Description</th></tr>
<tr><td>13.1</td><td>Access will be restored to lands where it is removed or restricted. Required replacement field access gates are identified in Table 16.7. The location of such field access gates will be at a suitable location and, where possible, with the agreement of the landowner.</td></tr>
<tr><td>13.2</td><td>In general, permanent fencing will comprise of timber post and tension mesh fencing in accordance with CC-SCD-00320. Where field boundaries, that comprise of dry-stone walls, are removed as a result of the construction of the proposed development, the Contractor shall be responsible for the restoration of the section of the field boundary in question to dry-stone wall using stone from the affected field boundary. This restoration work shall be carried out by a suitably qualified and experienced professional, such that the wall is of the same style as the vernacular dry-stone walls of the region. Further fencing details are presented in Chapter 4 of this EIAR.</td></tr>
<tr><td>13.3</td><td>Where boundaries at dwelling houses are removed as part of the proposed development, the boundary treatment is proposed on a like for like basis subject to final agreement on accommodation works with individual property owners.</td></tr>
<tr><td>13.4</td><td>All existing land drains and watercourses severed by the proposed development will either be piped or re-directed into the existing drainage outfall.</td></tr>
<tr><td>13.5</td><td>Any services that are interfered with as a result of the proposed development will be repaired / replaced without unreasonable delay.</td></tr>
<tr><td>13.6</td><td>Ducting for the restoration of water and power supply services will be provided, as necessary, at a suitable location with the agreement of the landowner.</td></tr>
<tr><td>13.7</td><td>Mitigation measures related to individual properties shall be implemented, as set out in Table 16.7 in Chapter 16 of this EIAR, and summarised here:
<table>
<tr><th>Agricultural Property No.</th><th>Mitigation Measure</th></tr>
<tr><td>1</td><td>Replace boundary with permanent stockproof boundary.</td></tr>
<tr><td>2</td><td>Replace field access gate on affected lands. Replace boundary with permanent stockproof boundary.</td></tr>
<tr><td>3</td><td>Replace field access gate on affected lands. Replace boundary with permanent stockproof boundary.</td></tr>
<tr><td>4</td><td>Replace boundary with permanent stockproof boundary.</td></tr>
<tr><td>5</td><td>N/A</td></tr>
<tr><td>6</td><td>Replace field access gate on affected lands. Replace boundary with permanent stockproof boundary.</td></tr>
<tr><td>7</td><td>N/A</td></tr>
<tr><td>8</td><td>Replace boundary with permanent stockproof boundary.</td></tr>
<tr><td>9</td><td>Replace boundary with permanent stockproof boundary.</td></tr>
<tr><td>10</td><td>N/A</td></tr>
<tr><td>11</td><td>Replace boundary with permanent stockproof boundary.</td></tr>
<tr><td>12</td><td>Replace boundary with permanent stockproof boundary.</td></tr>
<tr><td>13</td><td>Replace boundary with permanent stockproof boundary.</td></tr>
<tr><td>14</td><td>Replace boundary with permanent stockproof boundary.</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>No.</th><th>Description</th></tr>
<tr><td></td><td><table>
<tr><th>Agricultural Property No.</th><th>Mitigation Measure</th></tr>
<tr><td>15</td><td>Replace field access gate on affected lands. Replace boundary with permanent stockproof boundary.</td></tr>
<tr><td>16</td><td>Replace boundary with permanent stockproof boundary.</td></tr>
</table></td></tr>
<tr><td>13.8</td><td>Measures to mitigate noise impacts on sensitive receptors are detailed within Chapter 12 Noise and Vibration. Good communication between the contractor and adjacent landowners during the construction phase, especially when excessively loud activities are programmed, will prevent undue disturbance to farm animals due to noise. It will also facilitate farm enterprises so that valuable livestock sensitive to noise can be moved away from the construction work during critical times.</td></tr>
<tr><td>13.9</td><td>Measures to control the production of dust will be put in place by the contractor. Good communication between the contractor and the farmers in the proximity of construction activities will facilitate on-going farm enterprises so that valuable livestock are kept as far as possible from the construction work during critical times.</td></tr>
<tr><td>13.10</td><td>Access will be restored to lands where it is removed or restricted by the proposed development. The location of such access will be at a suitable location and, where possible, with the agreement of the landowner. Good communication between individual farmers and the contractor will minimise difficulties caused by the restriction of access to land. Temporary fencing will be erected as required to delineate the site boundary and to minimise disturbance to adjacent lands. Temporary access gates may be required until such time as the permanent access arrangements are in place.</td></tr>
<tr><td>13.11</td><td>The residents and farmers of Dursey Island shall be informed of any interruptions to the cableway service, 1 week prior to interruptions, where possible. In cases in which access to-and-from Dursey Island is restricted for more than two days, or where more regular access is required by farmers with livestock on the island, alternative access to-and-from the island shall be provided for farmers by CCC.</td></tr>
<tr><td>13.12</td><td>In cases where impeded drainage during construction will cause obvious difficulty to a particular landowner, temporary measures will be looked at on a site-specific basis. This may include allowing waters to drain to less critical areas, so as to minimise the impact.</td></tr>
<tr><td>13.13</td><td>Where required, an alternative source of water / electricity will be provided to ensure that disruption to farming is minimised during the construction phase.</td></tr>
</table>

Dursey Island Cable Car and Visitor Centre

Non-Technical Summary of the Environmental Impact Assessment Report

Table of Contents

1.0 INTRODUCTION

This Environmental Impact Assessment Report (EIAR) has been prepared in respect of the construction and operation of the proposed Dursey Island Cable Car and Visitor Centre development, hereafter referred to the 'proposed development'. It has been prepared by Roughan & O'Donovan Consulting Engineers (ROD) and a team of specialist sub-consultants, with the assistance of the Applicant, Cork County Council (CCC).

This EIAR is presented in three volumes: the standalone Non-Technical Summary is Volume 1; Volume 2 contains the main text; and Volume 3 contains the associated Figures.

This EIAR has considered and assessed the likely significant effects of the construction and operation of the proposed development in respect of:

- Traffic and transport;
- Population and human health;
- Biodiversity;
- Soils and geology;
- Hydrogeology;
- Hydrology;
- Landscape and visual amenity;
- Noise and vibration;
- Air quality and climate;
- Archaeology and cultural heritage;
- Architectural heritage;
- Material assets and land; and,
- Interactions, major accidents and cumulative environmental impacts.

It should be noted that the surveys, assessments and information that form the basis of this EIAR are based on the current design of the proposed development, which has been developed to a stage that permits a fully informed Environmental Impact Assessment (EIA). While some refinements of the current design may occur during the detailed design stage, changes will not be made which could give rise to any significant adverse environmental impacts not addressed within this EIAR.

1.1. Overview

The Dursey Island Cable Car is located at the western tip of the Beara Peninsula in west County Cork. It spans the Dursey Sound, linking the eastern coast of Dursey Island with the mainland at Ballaghboy, Lambs Head. Originally constructed in 1969 to transport island inhabitants, farmers and livestock to and from the mainland, the cableway is now predominantly used by tourists, particularly during the summer months. In recent years, limited passenger capacity and turnaround of the cableway have resulted in a supply deficit. During the peak months of July and August, queuing times for the Cable Car in the region of 1 – 2 hours are commonplace on both the island and mainland.

In 2018, CCC, working in partnership with Fáilte Ireland, commissioned ROD to provide multidisciplinary consultancy services including engineering, architectural, landscape architectural, quantity surveying, cultural heritage, planning, environmental consultancy services and tourism consultancy services for the proposed development. The proposed development involves the replacement of the existing cableway, the construction of two new Cable Car stations, an expanded mainland-side visitor car park, a mainland-side visitor interpretive centre (the 'Visitor Centre') and a mainland-side café. It is also proposed to update the associated infrastructure including telecommunications, drinking water supply and wastewater treatment systems. Localised road improvement works are also proposed for the primary approach road to the site (the R572), on the 12km stretch between its junction with the R575 (at Bealbarnish Gap) and the cable car site, in order to ease existing congestion and support the increase in traffic volumes anticipated during the operation of the proposed development.

The proposed development will allow a greater number of visitors (an annual maximum of 80,000, as decided by CCC) to make the cable car journey to and from Dursey Island, with up to 100,000 persons expected to visit the mainland side of the site.

1.2. Requirement for an EIAR

The proposed development does not meet the thresholds for which the preparation of an EIAR is a mandatory requirement under Schedule 5 of the *Planning and Development Regulations* 2001 - 2015. However, the footprint of the proposed development is in direct proximity to the foreshore and the proposed Cable Car will traverse the foreshore. Therefore, Section 226 of the *Planning and Development Act* 2000 is applicable. As stated in Section 226:

"*Where development is proposed to be carried out wholly or partly on the foreshore—*

(a) by a local authority that is a planning authority, whether in its capacity as a planning authority or otherwise, or
(b) by some other person on behalf of, or jointly or in partnership with, a local authority that is a planning authority, pursuant to an agreement entered into by that local authority whether in its capacity as a planning authority or otherwise […]

[…] Section 175 shall apply to proposed development belonging to a class of development, identified for the purposes of Section 176"

Further, Section 175 of the *Planning and Development Act* 2000 stipulates that:

"*Where development belonging to a class of development, identified for the purposes of Section 176, is proposed to be carried out—*

(a) by a local authority that is a planning authority, whether in its capacity as a planning authority or in any other capacity, or
(b) by some other person on behalf of, or jointly or in partnership with, such a local authority, pursuant to a contract entered into by that local authority whether in its capacity as a planning authority or in any other capacity, within the functional area of the local authority concerned (hereafter in this section referred to as "proposed development"),

the local authority shall prepare, or cause to be prepared, an environmental impact statement [now referred to as an EIAR] in respect thereof."

Therefore, preparation of an EIAR for submission as part of the planning application to the Competent Authority (An Bord Pleanála) is a mandatory requirement for the proposed development.

2.0 NEED FOR THE PROPOSED DEVELOPMENT

The execution of the proposed development is consistent with the objectives of the following European, national, regional and local planning policy documents:

Multilateral Policy

- United Nations 2030 Agenda for Sustainable Development

European Policy

- Europe 2020 Strategy

National Policy

- Project Ireland 2040: National Planning Framework (2018) and the National Development Plan (2018-2027)
- Rural Development Plan (2014-2020)
- Realising Our Rural Potential – Action Plan for Rural Development (2017)
- People, Place and Policy – Growing Tourism to 2025 (2015)
- Building on Recovery - Infrastructure and Capital Investment (2016 – 2021)
- The National Spatial Strategy (2002 – 2020)

Regional Policy

- Draft Southern Regional and Spatial Economic Strategy (2019-2031)

Local Policy

- Cork County Development Plan (2014-2020)
- Kerry County Development Plan (2015-2021)
- Cork Tourism Strategy 2016: Growing Tourism in Cork – A Collective Strategy
- West Cork Municipal District Local Area Plan (2017)
- West Cork Islands Integrated Development Strategy (2010)

The proposed development is considered necessary for the following principal reasons:

- The capacity and turnover of the existing Dursey Island Cable Car cannot meet current or future demand for its use, and there is significant untapped tourism potential at the site. Replacement of the cableway with a state-of-the-art equivalent would allow a greater number of annual visitors to the site, and to Dursey Island. As a result, greater revenue would be generated by the attraction. Additionally, indirect economic benefits would likely also accrue to other businesses in the Beara, west Cork and west Kerry regions, and other attractions on the Wild Atlantic Way (WAW). By delivering growth in the local and regional tourism sectors, the proposed development would contribute to achievement of objectives set out in a number of national, regional and local policy documents, including the '*Action Plan for Rural Development 2017'*, '*People, Place and Policy Growing Tourism to 2025*', the '*Draft Southern*

Regional, Spatial and Economic Strategy 2019 – 2031', the '*Cork County Development Plan 2014 – 2020*', the '*Kerry County Development Plan 2015 – 2021*', the '*Cork Tourism Strategy 2016: Growing Tourism in Cork – A Collective Strategy*', the '*West Cork Municipal District Local Area Plan 2017*' and the '*West Cork Islands Integrated Development Strategy 2010*'.

- The existing infrastructure is substantially corroded and non-compliant with European Standards for '*The Safety Requirements for Cableway Installations Designed to Carry Persons*', S.I. No. 470/2003 or S.I. 766/2007. While there are no immediate safety concerns for those using the existing cableway, the infrastructure in its current form will need to be replaced in the short- to medium-term in order to maintain safe and convenient access to the island for island residents/farmers and visitors.
- At present, the Dursey Island Cable Car provides visitors with a suboptimal visitor experience. During the peak months of July and August, waiting times to board the carrier cabin of 2 hours and upwards are commonplace on the island and mainland. In terms of comfort and shelter, facilities are inadequate, with visitors sometimes having to queue outdoors during inclement weather. Furthermore, there are no welfare facilities (i.e. toilets) for visitors on the island. Visitors have also complained about a lack of information on Dursey Island regarding walking trails, history and natural heritage. The proposed development would offer a substantially enhanced visitor proposition without queues, with comfort and shelter, with interpretive information on cultural and natural heritage and activities on the island, and with adequate welfare facilities.
- As is stated in the '*West Cork Islands Integrated Development Strategy 2010'*, Dursey Island is threatened with permanent depopulation in the short-term and it is an explicit objective of the strategy to "*retain and enhance population levels on the [West Cork] islands*". At present, there are just two permanent residents living on the island and abandonment of homes and farmland is in evidence. As such, any development which makes permanent residence on the island more feasible is desirable. By improving ease-of-access to-and-from the island (i.e. shorter, more comfortable and safer journeys), the proposed development may contribute to the prevention of depopulation on the island. By increasing the number of annual visitors to the island, it will also create new opportunities for local businesses, which might also increase the viability of life on the island. Similarly, the proposed development may also increase the viability of farming on the island, which in turn would contribute to the maintenance of a sufficient area of suitable foraging habitat for red-billed chough (*Pyrrhocorax pyrrhocorax*) (for further details, please refer to Chapter 7 of this EIAR – Biodiversity).

3.0 ALTERNATIVES CONSIDERED

During the preliminary design stage of the proposed development, the following alternative design options were considered:

- Four no. Cableway Technology Options;
- Three no. Cableway Alignment Options; and
- Nine no. Architectural Design Options.

3.1 Cableway Technology Options

The following four cableway technology options were considered:

1. Detachable gondola;
2. Pulsed ropeway;
3. Synchronised reversible ropeway; and,
4. Desynchronised reversible ropeway.

The merits of these options were assessed in terms of the following criteria:

1. Investment-cost ratio;
2. Operating cost ratio;
3. Wind resistance;
4. Operational flexibility;
5. Quality of the experience provided; and,
6. Transport capacity range.

Accordingly, it was decided that the most appropriate technological solution for the Dursey Island Cable Car is Technology Option 4 – a de-synchronised reversible ropeway with two cable cars on two independent tracks and an overall maximum capacity of 200 – 300 persons per hour in each direction.

3.2 Cableway Alignment Options

The following three options were considered for the alignment of the proposed cableway:

1. Existing to existing (offset 14m to the north),
2. Slipway to slipway, and
3. Slipway to existing.

Each of these three options were considered in the various architectural design options, as set out in the following Section (3.3).

3.3 Architectural Design Options

Nine no. architectural design options were considered for the proposed development, as set out below. Options 1 – 3a were developed at Options Stage, and were assessed in a multi-criteria analysis (MCA), as described in the following Section (3.4). Options 3b – 3d were developed subsequently, and may be regarded as refinements of Options 3a.

1. *Architectural Design Option 1 – Concourse*

   In this option, the proposed development is situated in roughly the same location as the existing site. A 184-space terraced visitor car park dominates the mainland side of the site, with the proposed 'conourse' Visitor Centre (including an exhibition hall, shop, large café/restaurant and office space) occupying the undercroft beneath. A glazed façade faces south, offering views over the Dursey Sound from the Visitor Centre, and an external viewing platform is cantilevered over the rocky shore. The mainland station is positioned on the high ground immediately north-east of the existing car park, with the cable cars travelling out and over the proposed Visitor Centre and viewing platform, to a wishbone-shaped pylon, and onwards to Dursey Island. On the island, it is proposed to construct a simple, scaled-back station with seating area, welfare facilities and shelter.

   Alignment: Existing to existing

2. *Architectural Design Option 1a*

   This option may be regarded as a scaled-back version of Option 1, with a 90-space car park, and smaller undercroft Visitor Centre.

   Alignment: Existing to existing

3. *Architectural Design Option 2 – Vertical Interchange*

   In this option, the mainland side of the proposed development is situated at the location of the existing slipway, immediately south-east of the existing Cable Car site. The Visitor Centre is conceived as a 6 – 7 storey tower building with the mainland Cable Car station on the top storey. A largely flat, 177-space car park is located to the rear of the Visitor Centre. On the island too, a multi-storey tower structure is proposed – this to be situated at the location of the existing Dursey Island slipway, immediately south-west of the existing island station. The use of towers eliminates the need for pylons.

   Alignment: Slipway to slipway

4. *Architectural Design Option 2b*

   This option constitutes an amalgamation of Options 1 and 2, wherein the island station is identical to that of Option 1 (i.e. scaled back and situated at the same location as the existing station) and the mainland station and Visitor Centre design is the same as that in Option 2 (i.e. multi-storey tower block), except that the mainland tower building is rotated 21° clockwise to support the alternative alignment (slipway to existing).

   Alignment: Slipway to existing

5. *Architectural Design Option 3*

   In this option, the mainland side of the proposed development is situated in roughly the same location as the existing infrastructure. A small Visitor Centre building with ticket desk, welfare facilities and exhibition area is positioned to the north-west of a 109-space single level car park. A diving-board like viewing platform projects south-westwards over the Dursey Sound, and the mainland station is positioned immediately north-west of the Visitor Centre building. Similar to Design Option 1, the island station is a scaled-back structure in roughly the same location as the existing infrastructure.

   Alignment: Existing to existing

6. *Architectural Design Option 3a*

   This design is very similar to that of Option 3, except the Visitor Centre building is slightly larger, extending along the western edge of the visitor car park (which is smaller, with 100 spaces and a coach bus bay). Additionally, it is proposed to incorporate an outdoor terrace extending from the southern edge of the car park along the south-west-facing façade of the the Visitor Centre building, and onwards to the north-west, connecting the proposed development with the existing Garinish Loop walking trail.

   Alignment: Existing to existing

7. *Architectural Design Option 3b*

   This design is very similar to that of Option 3a, except:

   - The footprint of the Visitor Centre is extended westward.

- The Visitor Centre is broken into two buildings – the interpretive exhibition space ('Visitor Centre') and café. These two structures and the mainland station (which is situated immediately north-east of the café) are connected via ramps.
- Vehicular access and a service yard have been added to the rear of the mainland station, to facilitate access for residents/farmers (who often need to move goods on the cableway) and maintenance personnel.

Alignment: Existing to existing

8. *Architectural Design Option 3c*

This design differs from 3b principally in that:

- The mainland station has been moved westwards so that it is now positioned immediately north-west of the Visitor Centre; and,
- The Visitor Centre has been reverted to a single structure, containing both Visitor Centre and café.

The purpose of these design changes was to maintain access to an existing right of way on the north-western boundary of the site.

Alignment: Existing to existing

9. *Architectural Design Option 3d*

In this design, the Visitor Centre is again divided into two separate structures – the Visitor Centre and a café (as in Option 3b) and the mainland station is situated on the same north-south axis as these buildings. The Visitor Centre, café and station are connected via landscaped outdoor areas. There are no underground elements. There were concerns that with Option 3c, the mainland pylon would be situated too near to the water's edge, and the changes made within the design of Option 3d allowed the pylon to be shifted inland away from the high water mark (and out of the Kenmare River Special Area of Conservation (SAC)).

Alignment: Existing to existing

3.4 Multi-Criteria Analysis Applied

At Options Stage, Options 1 – 3a were appraised in a multi-criteria analysis (MCA) based on the following criteria:

- Environmental merit,
- Aesthetic merit,
- Technical merit,
- Buildability and disruption impact during construction,
- Durability and maintenance requirements,
- Capital construction costs,
- Economic viability, and
- Project risk.

As described in the previous section, since Options 3b – 3d were developed prior to the completement of the Options Report, they were not specifically assessed in the MCA. However, since they are refinements of Options 3a, it is considered that they would score very similarly to Option 3a in terms of the criteria. The results of the MCA are presented in Table 3.1, below.

Table 3.1 Results of Multi-criteria Analysis of options including all assessment criteria

Assessment Criteria	Weighting	Scores				
		Option 1	*Option 2a*	*Option 2b*	*Option 3*	*Option 3a*
Environmental merit	100%	7	6	8	9	8
Aesthetic merit	100%	8	9	8	7	8
Technical merit	100%	8	6	7	6	7
Buildability and disruption impact during construction	75%	8	4	5	9	9
Durability and maintenance requirements	100%	6	3	4	7	7
Capital construction costs	75%	4	0	3	7	6
Economic viability	100%	9	4	8	6	8
Project risk	100%	8	3	3	8	8
Assessment Score		58	35	46	59	61
Weighted Assessment Score		55	34	44	55	57
Rank		**2**	**5**	**4**	**2**	**1**

While Options 3a, b, c and d would have scored approximately equally in terms of the criteria applied, 3d was considered to be the preferred option by CCC, since it allowed vehicular access to the rear of the Cable Car, *and* allowed the mainland pylon to be situated back from the high water mark (and the Kenmare River Special Area of Conservation), *and* facilitated maintenance of an existing right of way. Thus, the design option being put forward for the proposed development is Option 3d.

4.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The location of the proposed development is directly adjacent to the existing Dursey Island Cable Car in west County Cork (Plate 4.1). CCC owns and operates the cableway.

The proposed development will involve the decommissioning of the existing Dursey Island Cable Car, demolition of associated structures, and the construction of a new cableway and associated structures. In order to address existing traffic problems and facilitate anticipated increases in traffic volume to the site, it is also proposed to carry out road improvement works on the R572 approach road between the cable car site and the R572 -R575 junction at Bealbarnish Gap. These roadworks will involve construction of 10 no. passing bays and 1 no. visibility splay at Bealbarnish Gap, and completion of a number of other localised improvement works to improve forward visibility. Variable Message Signs (VMS) will also be placed at a number of locations on the approach roads to the site to inform visitors about parking/ticket availability. It is also proposed to upgrade the supporting site utilities infrastructure in order to facilitate the provision of improved welfare facilities and to accommodate the anticipated increase in visitor numbers associated with the proposed development. It has been projected that the proposed development will facilitate an anticipated annual maximum of 100,000 visitors to the mainland side of the site, with a maximum of 80,000 of these being permitted to make the cable car journey to Dursey Island per year (as decided by CCC).

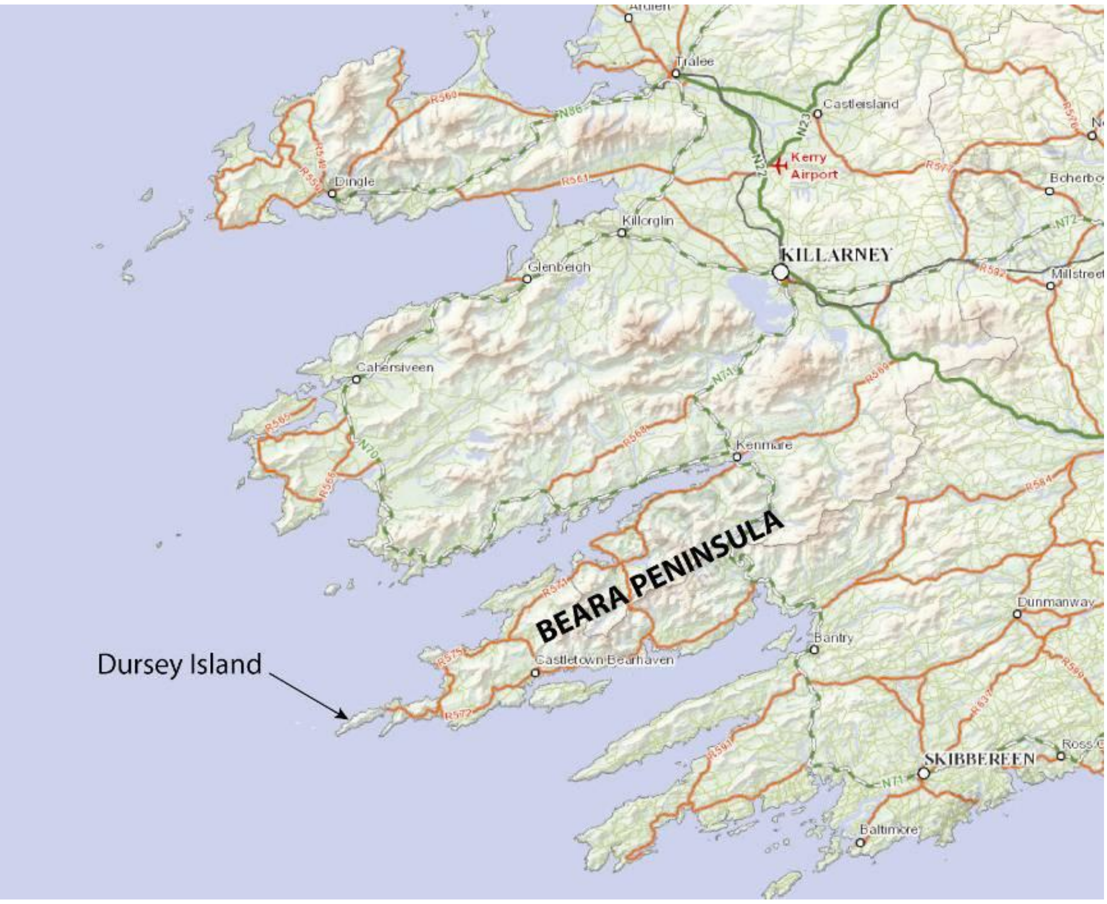

Plate 4.1 Location of Dursey Island in relation to the Beara Peninsula

The proposed cableway will run parallel to the existing alignment, offset by approximately 14m to the north. The end-to-end length of the proposed cableway will be approximately 375m. The infrastructure will include a two-car desynchronised reversible ropeway with a maximum capacity of 200-300 passengers per hour in each direction (although this volume of visitors will not be permitted to use the cableway) and two pylons – one each on the island and mainland. Some elements of the existing cableway infrastructure (the mainland pylon and the cable car itself) will be retained on-site as relics of the historic cableway.

On the mainland, it is proposed to construct a new 100-space visitor car park, an interpretive exhibition space ('Visitor Centre'), an 84-seater café, a new mainland station, and all associated facilities, utilities, infrastructure and landscaping. On Dursey Island, a new station and associated welfare facilities and waiting area will be constructed alongside the existing platform. A small existing residents' car park (approx. 10 spaces) will be retained on the island.

The majority of the proposed works will be carried out on lands currently owned by CCC, with the exception of the island works and R572 roadworks, which will necessitate the acquisition of some private land by Compulsory Purchase Order (CPO).

An 18-month construction phase is proposed. During construction works, the main site compound will be situated on the mainland, adjacent to the existing cableway in the widest section of the existing carpark. The compound will be established at the commencement of the contract and remain in place throughout the construction period. Additionally, it is expected that the Contractor will require a smaller storage compound on Dursey Island. Suitable site security measures will be implemented on both sides of the site.

In order to prevent certain environmental impacts, it is proposed to carry out the most disruptive elements of the proposed works (e.g. earthworks) during the off-season months (i.e. October – April). Additionally, efforts will be made to maintain the operation of the existing cableway throughout works, insofar as is possible to ensure safe access.

An Outline Construction Environmental Management Plan (CEMP) has been developed and will be finalised by the successful Contractor prior to the commencement of any works, in order to ensure that commitments of the statutory approvals are adhered to. This Outline CEMP includes an Outline Environmental Operating Plan, an Outline Incident Response Plan, and an Outline Construction and Demolition Waste Management Plan.

5.0 TRAFFIC AND TRANSPORT

The site of the proposed development is accessed principally via the R572 Regional Road. Currently, about 22,000 visitors use the cable car in a year (not including residents/farmers), with the peak months of July and August seeing a total of nearly 10,000 journeys (i.e. roughly half of all use). A greater number again travel to the site just to look at the cableway, or with the intention of travelling on the cableway, only to turn away at the prospect of lengthy queues.

During construction, import and export movements of construction materials to the construction site will be via the R572. It is assumed that most of the construction traffic will come from the Castletownbere/Glengarriff direction since this is the main route from Cork City. Temporary traffic management arrangements will be implemented to facilitate ongoing access to the existing cable car and construction access points throughout the works. Marine access will be required for construction works on Dursey Island. Materials required for works on the island will be ferried to the slipway on the island via the slipway immediately south-east of the existing Cable Car or from the pier at Garinish Point. From the slipway on Dursey Island, materials will be transported to the construction site via the most direct route on the existing slipway access track and public road.

A Construction Traffic Management Plan (CTMP) and a CEMP, prepared by the Contractor, will be implemented to reduce associated traffic impacts and restrict the main construction activities and associated traffic to the off-season months, when traffic on the surrounding road network is considerably less than that of the peak season.

During operation, it is anticipated that there will be a greater number of site visitors making the cable car journey to Dursey Island than there are at present. CCC have decided that they will allow no more than 80,000 persons to make the journey each year. Furthermore, according to the mitigation measures set out in Chapter 7 of this EIAR – Biodiversity – visitor numbers on Dursey Island will be limited to a maximum of 12,835 per month. Thus, there are two temporal restrictions on visitor numbers to the island: an annual maximum of 80,000; and a monthly maximum of 12,835. These limits will be enforced using an appropriately designed web-based ticketing system. The traffic impact assessment has concluded that the improved approach road and proposed visitor car park will be able to accommodate traffic volumes associated with these numbers.

6.0 POPULATION AND HUMAN HEALTH

The proposed development is situated in a sparsely populated rural area, dominated by pastoral agriculture. Dursey Island is one of 7 inhabited islands off the coast of west Co. Cork. It currently has just two year-round residents and is at risk of depopulation in the short to medium-term. Principal land use types in the study area are agriculture, transportation, and, tourism/recreation/amenity. Community infrastructure, utilities and services are poorly developed in the study area, particularly on Dursey Island. The Pobal HP Deprivation Index Score for the study area is 'Marginally below average', meaning the area is somewhat disadvantaged in terms of economic development. Since the mid-60s, the Dursey Island Cable Car has served as a critical mode of transportation for island residents and farmers. The existing cableway infrastructure is substantially corroded and is not (and cannot be) compliant with the relevant EU safety standards. Dangerous seafaring conditions in the Dursey Sound have prevented the establishment of a dedicated ferry service, although islanders do occasionally use marine craft to transport livestock to-and-from the island. The existing road network in the study area is narrow and winding, with poor forward visibility and, along some stretches, insufficient space for the passing of oncoming traffic. During the in-season months, congestion and informal parking are known to occur on the R572. The area is popular for tourism and recreation, particularly for walking, birdwatching and whale/dolphin watching. Excluding the main entrance to the site (via the R572), there are two access points entering/exiting the mainland side of the Cable Car site, one of which is a public right of way leading onto the Garinish Loop walking trail.

Key findings of the population and human health impact assessment are as follows:

Agriculture

By improving ease of access to-and-from Dursey Island, the proposed development may support the repopulation of Dursey Island and prevent agricultural land abandonment.

Tourism, Recreation and Amenity Value

Nuisance caused by noise, vibration, dust and adverse visual effects during construction are likely to result in a temporary, insignificant loss of amenity value of recreational activities in the immediate vicinity of the construction site. By substantially improving the overall experience of site visitors (e.g. by providing toilets, shelter and interpretive information) and attracting more visitors to the site and greater Beara region, the operation of the proposed development will result in significant positive effects on tourism, recreation and amenity in the study area.

Journey Characteristics, Journey Amenity and Severance

Construction traffic will result in a temporary increase in heavy goods vehicles (HGVs) and plant/machinery on the R572. There will also be less parking available at the Cable Car site throughout the duration of works (as a result of the construction compound). However, it is proposed to carry out the most disruptive elements of works (i.e. earthworks) during the off-season months, and a CTMP, to be prepared by the Contractor, will be implemented for the duration of works. The existing cableway will continue to operate throughout the duration of works (insofar as possible), and access to slipways on the mainland and island will be maintained. A Stakeholder Management and Communication Plan, setting out a protocol for the communication of information to local residents/workers, shall be developed by the Contractor, and, in the unlikely event of interruptions to the Cable Car service, local residents/farmers shall be provided with prior notice. Access will also be maintained to the two existing access points entering/exiting the mainland side of the site throughout the construction and operation of the proposed development. Completion of road improvement works will improve journey amenity for local residents. Additionally, the operation of the proposed development will increase ease-of-access between Dursey Island and the mainland, reducing severance between the two communities. Furthermore, travelling in the proposed cable car will be much quicker and more comfortable than the equivalent journey in the existing infrastructure. It is considered that the proposed development will have significant, positive effects on journey characteristics (including amenity) and severance in the study area.

Economic Activity

The two mobile catering facilities currently operating at the Cable Car site (one on the island and one on the mainland) may need to relocate during the construction works and during the operation of the proposed development. Job opportunities will be created during both the construction and operation of the proposed development. During construction, approx. 20 – 30 persons will be employed on-site at any one time. As stated previously, nuisance noise/vibration/dust and visual impacts associated with the construction phase are likely to have insignificant, adverse effects on tourism, recreation and amenity in the study area. However, the fact that the most disruptive elements of works will be carried out during the off-season months will mitigate to some degree against associated adverse effects on local businesses – the majority of which are seasonal in nature. It has been estimated that approx. 7 – 8 seasonal jobs will be created at the proposed Visitor Centre, with approx. 3 full-time employees retained during the off-season months (when it is proposed to close the Visitor Centre). By increasing the number of visitors at the site and in the greater Beara region, and by promoting other attractions/businesses in the area, the proposed development is expected to have significant, positive effects on regional economic activity.

Human Health

A preliminary asbestos survey found no evidence of asbestos-containing materials at the site of the proposed development, but a more detailed survey will be required prior to the commencement of works to rule out potential adverse health effects. A paint sample analysis identified lead-containing paints on a number of structures at the site of the proposed development, and appropriate mitigation measures will need to be incorporated into the CEMP to prevent adverse health effects arising to construction site workers. Mitigation measures to prevent the release of harmful air pollutants have been set out in Chapter 13 – Air Quality and Climate. Chapter 12 – Noise and Vibration – sets out mitigation measures to prevent significant, negative effects related to these aspects of the development. Chapters 9 and 10 – Hydrogeology and Hydrology, respectively – set out mitigation measures to prevent pollution of surface and groundwater which might result in significant negative human health effects. Increased volume of construction traffic at the site of the proposed development and in the vicinity may increase the risk of accidental collisions; however, it is considered that the implementation of the CTMP will prevent such events from occurring. Furthermore, completion of road improvement works on the R572 is likely to reduce the risk of road traffic accidents occurring on this stretch of road. While there may be some minor nuisance as a result of the construction of the proposed development, it is not considered that significant, negative psychosocial impacts will occur as a result. Commencement of operation of the proposed development will significantly improve the safety and comfort of travelling in the Dursey Island Cable Car.

It is considered that, provided the mitigation measures set out in the Population and Human Health chapter – and those of the other chapters of this EIAR – are implemented, no significant, negative, residual effects on population and human health will occur.

7.0 BIODIVERSITY

The biodiversity impact assessment identified the following Key Ecological Receptors (KERs) which, without the implementation of appropriate mitigation measures, may be subject to significant, negative impacts as a result of the construction and/or operation of the proposed development:

Bats

Soprano pipistrelle (*Pipistrellus pygmaeus*) and common pipistrelle (*Pipistrellus pipistrellus*) (both of which are protected under Annex IV of the Habitats Directive) have been recorded foraging in the Zone of Influence. While the bat survey concluded that the probability of bats roosting in the buildings associated with the existing Cable Car site was low, roosting at the site of the proposed development cannot be ruled out. Since bats are sensitive to lighting, the lighting design of the proposed development could negatively affect roosting and foraging bats. As such, it is considered that there is a small likelihood of significant negative effects accruing to bat species.

Red-billed chough (*Pyrrhocorax pyrrhocorax*)

This species is a Qualifying Interest (QI) of the Beara Peninsula SPA. The site supports an internationally important breeding population of the species, which forages in terrestrial habitats in the Zone of Influence. The area of potential foraging habitat lost as a result of the construction of the proposed development is considered to be not significant. It is proposed to execute the noisiest elements of the works during the winter months (i.e. outside of the breeding season, when birds are most susceptible to disturbance). Extant primary literature indicates that the species is vulnerable to human disturbance while foraging and, as such, it is considered that potential negative effects may occur as a result of the proposed development.

European herring gull (*Larus argentatus*)

The site supports a resident breeding population of the species. Herring gulls tend to nest on sea cliffs but may also nest at more accessible locations (e.g. on sloping ground near sea cliffs). The occurrence of substantial numbers of nesting herring gulls in urban areas would indicate that the species can become well habituated to human disturbance and it is not considered that the species will be negatively affected in this respect. Herring gulls typically forage at sea but may also take eggs of other seabirds and exploit food scraps left by humans. As such, substantial growth in the resident population (as a result of increased availability of food scraps as an indirect result of the proposed development) may potentially result in greater predation of eggs of more sensitive populations of seabird, such as chough. For this reason, potential significant negative effects (not on this species but potentially as a result of the foraging ecology of this species) as a result of the proposed development cannot be ruled out at this stage.

Great black-backed gull (*Larus marinus*)

As *L. argentatus*.

Ground-nesting passerines

All ground-nesting passerines are protected under the Wildlife Acts. A number of such species have been recorded in the Zone of Influence, some of which (Northern wheatear, Eurasian skylark, meadow pipit and stonechat) have been observed breeding in the area during field surveys. Others (yellowhammer and linnet) possibly breed in the Zone of Influence in small numbers, although no evidence was found during field surveys. Others (twite, grasshopper warbler) are not thought to breed in the Zone of Influence but may occasionally forage there. Loss of habitats used by these species as a result of the proposed development will be minimal and any associated effects will be imperceptible. However, since these species all nest on or near to the ground, increased visitor numbers as a result of the proposed development may result in significant negative effects related to disturbance / destruction of nests.

Raptors

All species of raptors are protected under the Wildlife Acts and some are also subject to statutory protections under Annex I of the Birds Directive. While certain raptors which have been recorded in the Zone of Influence are likely to use the site for occasional foraging only (e.g. merlin, hen harrier and short-eared owl) and are unlikely to be affected by the proposed development, others may also breed in or near the Zone of Influence (e.g. kestrel and peregrine, the latter of which is known to breed in the Beara Peninsula SPA). While significant negative effects are unlikely, they cannot be ruled out.

Common snipe (*Gallinago gallingo*)

It is possible that this protected species breeds in the Zone of Influence in small numbers. Since this is a ground-nesting species, increased visitor numbers as a result of the proposed development may result in significant negative effects related to disturbance/destruction of nests.

Eurasian oystercatcher (*Haematopus ostralegus*)

This protected species has been observed breeding in the Zone of Influence. Since this is a ground-nesting species, increased visitor numbers as a result of the proposed development may result in significant negative effects related to disturbance/destruction of nests.

Betony (*Betonica officinalis*)

The Zone of Influence is a refuge for this rare, *Flora Protection Order* (2015) plant species. Clusters of the plant which may have been destroyed as a result of construction of the proposed development have been translocated and no other plants have been identified in the area. However, it is possible that the plant does or will occur in other sensitive areas in the Zone of Influence and may be damaged or destroyed as a result of the construction or operation of the proposed development.

Invasive alien species (IAS)

There are a number of IAS with potentially very high negative ecological impacts in the Zone of Influence, including on Dursey Island, which, as an island, is especially vulnerable to the negative effects of such species. The potential introduction and distribution of IAS cannot be ruled out. As such, there are potential significant negative effects associated with these species. The presence of hottentot-fig is noteworthy, since this species is at a very early stage of invasion in Ireland, and, as such, there is an opportunity to contribute to the eradication/prevent the broader establishment of this relatively novel species in Ireland.

Large shallow inlets and bays

This habitat is a QI of the Kenmare River SAC. The entire marine area in the vicinity of the cableway, including the Dursey Sound, corresponds to this habitat classification. As such, potential negative effects as a result of the proposed development cannot be ruled out.

Reefs

This habitat is a QI of the Kenmare River SAC. Much of the sea bed in the vicinity of the proposed development, including the Dursey Sound, which the proposed cable car crosses, corresponds to this habitat classification. Owing to the proximity of the proposed development to this habitat type and the sensitivity of the latter to water quality impacts, which may arise during construction, there is considered to be a risk of significant negative effects on this habitat type arising from the proposed development.

Vegetated sea cliffs of the Atlantic and Baltic coasts

This habitat is a QI of the Kenmare River SAC. The cliffs in the immediate vicinity of the cableway correspond to this habitat classification. Owing to the proximity of the proposed development to this habitat type and the potential for increased erosion due to walkers and the risk of import of IAS to the area, there is considered to be a risk of significant negative effects on this habitat type arising from the proposed development.

European dry heaths

This habitat is a QI of the Kenmare River SAC. The heath habitats in the immediate vicinity of the site of the proposed development potentially correspond to this habitat type. As such, there is a potential for negative effects on the habitat as a result of the proposed development.

In order to mitigate against these potential negative impacts, mitigation measures have been prescribed. Key measures are as follows (for full list of measures, please refer to Chapter 7 of this EIAR):

- An IAS Management Plan shall be implemented by the Contractor during construction works and by CCC during the operational phase.
- Landscaping shall use native species and IAS-free soil.
- CCC shall commit to undertaking eradication treatment of hottentot-fig on Dursey Island prior to the commencement of the operation of the proposed development.
- Prior to the operation of the proposed development, three looped, waymarked walking trails of various lengths and difficulty levels (and associated signage) shall be formalised on Dursey Island. Formalisation of these trails will not necessitate the establishment of any new paths, but rather will serve to encourage walkers to stay on the established roads/paths, and present route options for walkers of all abilities. Routes of these trails have been designed to minimize footfall in open habitat and prevent disturbance of chough and ground-nesting birds.

- Prior to the operation of the proposed development, an existing loop walk on Crow Head shall be formalised with waymarkers to discourage footfall in open habitat and prevent disturbance of chough and ground-nesting birds.
- A three-tiered educational campaign shall be implemented during the operation of the proposed development, with the objective of discouraging (i) footfall in open habitats and (ii) disturbance of wildlife, especially chough. It shall involve the following:
    - Exhibition materials in the Visitor Centre,
    - An audiovisual presentation in the cable car itself, and
    - Outdoor signage on Dursey Island.
- In order to prevent harmful levels of human disturbance of chough during the operation of the proposed development, a monthly numerical carrying capacity of 12,835 visitors shall be enforced for Dursey Island. This carrying capacity is based on findings of peer-reviewed research on disturbance of chough by tourists.
- Visitors shall be prohibited from bringing dogs or bicycles to the island via the proposed Cable Car.
- In order to facilitate adaptive management of the island, monitoring programmes shall be implemented by CCC during the operation of the proposed development with respect to the following:
    - Visitor numbers and movements on Dursey Island;
    - The conservation status of the Dursey Island chough population; and
    - The conservation status of habitats on Dursey Island.
- During the construction phase, bat boxes shall be erected, and bat-friendly practices shall be implemented during demolition of structures.
- During the operation phase, bat-friendly lighting shall be employed, and lighting shall be turned off at the closure of the proposed development each night.
- Segregated waste bins shall be put in place on the island and mainland prior to the commencement of operation of the proposed development in order to prevent the accumulation of food waste litter, which might otherwise attract greater numbers of gulls.

It is considered that, provided the mitigation measures set out in Chapter 7 of this EIAR – and all other Chapters of this EIAR – are implemented, that the proposed development will not give rise to significant, negative impacts on any of the identified KERs in the study area.

8.0 SOILS AND GEOLOGY

The construction phase of the proposed development will require excavation of approximately 6,500m² of overburden and bedrock from the foundation footprint and from a part of the parking area on the mainland side. The rock will be reused on-site as fill to structures. All excavated bedrock will be reused on site and there will be no need for off-site disposal. The design also ensures that the cut and fill requirements are balanced, so that there will be no need for the importation of fill. The bedrock is proven to be of medium strength to very strong and suitable as structures foundation medium. Therefore, no negative impacts are expected on soils/geology as a result of the construction of the proposed development. There are no predicted impacts related to soils/geology during the operation of the proposed development. Provided the prescribed mitigation measures are adhered to, no significant residual impacts related to soils/geology are anticipated as a result of the proposed development.

9.0 HYDROGEOLOGY

Excavation of made ground will take place during construction. The excavation of any localised areas of ground contamination will result in a permanent, slight, positive effect on the soil environment due to the requirement to remove the material off-site and dispose of or treat it in accordance with relevant legislation. Any improvement to the quality of soils will have a corresponding benefit to the underlying groundwater resources due to the removal of a potential source of contamination of percolating water. This positive effect is considered to be slight and permanent in nature.

There is a potential risk of localised contamination from construction materials leeching into the underlying soils by exposure, dewatering or construction-related spillages, resulting in a permanent, negative effect on soils. In the case of soils, the magnitude of this adverse effect is considered to be small, as the requirement of good construction practices will necessitate the immediate excavation/remediation of any such spillage resulting in a very low risk of pollution to the soils and, consequently, the underlying aquifers.

There is a potential risk of localised contamination of the surface water and groundwater bodies due to construction activities (i.e. construction spillages, leaks from construction plant and material, etc.), resulting in permanent, negative effects on waterbodies. The main surface waterbody that might be affected is the Atlantic Ocean (i.e. the Kenmare River SAC) which is immediately adjacent to the site of the proposed development.

Excavation of material on-site will have the effect of locally increasing the vulnerability rating of the underlying aquifer (although the vulnerability rating is already 'X-Extreme'). However, the majority of the areas where the material will be excavated will be covered in hardstanding, which will mitigate the potential for contaminants to enter the underlying aquifer from the surface. As such, the potential effect may be deemed to be slight in magnitude and temporary in duration.

During the operation of the proposed development, there will be new parking facilities and an improved entrance road at the site. It is proposed to allow run-off from the entrance roads to drain to permeable parking bays where it will percolate through porous media and subsequently be collected via a subsurface collector drain. This drain will discharge to the adjacent Ballaghboy Stream via a petrol interceptor. The potential for contaminated road run-off to percolate and enter the underlying aquifer presents a very low risk due to the presence of the collector drain and the pre-treatment, which will occur within the permeable porous media. The potential effect is, therefore, considered to be permanent in duration and slight in magnitude.

Domestic wastewater from the proposed development will be treated on-site by means of a proprietary Wastewater Treatment Plant (WWTP) with the final treated effluent being discharged to ground through a sand-polishing filter. The removal of primary treated effluent entering the Kenmare River SAC will, therefore, result in a permanent, positive effect on water quality.

A project-specific Outline Environmental Operating Plan (EOP) and Outline CEMP have been prepared for the proposed development, and will be finalised by the successful Contractor. The finalised EOP will address all potentially polluting activities and include an emergency response procedure. As a minimum, the EOP for the proposed development will be finalised in consideration of the standard best practice procedures.

It is considered that, provided the prescribed mitigation measures are implemented, the significance of all residual impacts with respect to hydrogeology will be imperceptible (i.e. not significant).

10.0 HYDROLOGY

Surface water features located in the vicinity of the proposed development are located entirely within the South Western River Basin District. A minor watercourse (the Ballaghboy Stream) discharges to the sea at the south-eastern end of the mainland side of the site of the proposed development.

During construction, works within and alongside surface waters can contribute to the deterioration of water quality and can physically alter the watercourse bed, bank and coastal morphology with the potential to alter erosion and deposition rates in the vicinity of the development. Activities within or close to the watercourse channels can lead to increased turbidity through re-suspension of bed sediments and release of new sediments from earthworks. The magnitude associated with the potential impact of the proposed development is considered to be moderate to significant in magnitude.

During the operational phase, the risk of pollution to both surface and groundwater resulting from accidental spillage is considered to be negligible. It is not anticipated that any chemicals or hydrocarbons will be transported via the proposed cableway. Therefore, it is not considered that there is a risk of spillage. Increased run-off from hardstanding areas such as roads, car parks, roofs and footpaths will be generated. Unmitigated, this would increase the rate of run-off from the site and as a result, the associated potential effect is deemed to be moderate to significant.

As stated in the previous section, new wastewater treatment systems will be implemented at both the mainland and island facilities, and treated effluent will be discharged to ground. The mainland WWTP will require pumping to a raised infiltration area. Due to the reliance on pumps, there is a potential, moderate to significant effect on the receiving environment, were the pumps to fail.

The use of sustainable drainage systems (SuDS) features will mitigate any potential impacts related to changes in surface water run-off rates and volumes whilst also maintaining the quality of water in the vicinity of Dursey Sound. There will, therefore, be an imperceptible impact as a result of the proposed development during the operational phase.

The potential impact associated with discharging untreated surface water into the Dursey Sound is considered moderate to significant in magnitude, due to the environmental sensitivities of the area. The proposed development also requires the drainage of retaining walls. The retaining wall drainage will discharge to the minor watercourse on the eastern boundary of the site. Due to the potential preferential pathway for contaminates, the unmitigated impact on water quality is predicted to be slight to moderate.

Construction shall be undertaken in accordance with the measures outlined in the EOP. There will be a slight residual impact during the construction of the proposed development. The recommended mitigation measures in the EIAR will negate potential risk of significant negative impacts on hydrology in the study area.

11.0 LANDSCAPE AND VISUAL AMENITY

The site is located in a relatively remote, rugged and highly scenic landscape and seascape, with a strong sense of naturalness. The landscape sensitivity of the area, including both the mainland site, island site, and surrounds, is considered to be High.

The construction phase of the proposed development (demolition, earthworks, rock-breaking, etc.) will result in a short-term, slight to moderate, negative landscape effect on both the mainland and island side of the site of the proposed development. It will also give rise to short term, slight, negative visual effects.

During the operational phase, localised change in landscape character is likely, though over a limited area, including the site of the proposed development, and the eastern end of Dursey Island, where the proposed development introduces a large element of built form into a relatively unchanged, remote and rugged landscape. The significance of the effect on the landscape character of the study area on both sides of Dursey Sound, while relatively localised, is considered to be slight to moderate. Negative effects include a considerable increase in the hard surface footprint through the removal of the open and expansive nature of the existing parking area/viewing area, with emphasis on vehicular circulation, and the removal of areas or rock, and heath and acid grassland habitats.

During the operational phase, the more elevated viewpoints close to the site on the mainland and on Dursey Island will experience pronounced visual effects. The high-quality design, use of materials and the low-level built form and viewing areas are positive elements that correspond well with the topography. However, the considerable horizontal extent of the development and extensive areas of hard surfaces are also evident in some views.

The proposed development is an intervention in a highly scenic and sensitive landscape. A development of this nature is likely to result in a change to the landscape and to the views and there are both beneficial and adverse aspects to the visual effects. The anticipated residual visual effects range from a slight to moderate/significant in magnitude, and the majority are neutral. In general, the residual visual effects are relatively localised, and will not affect a wide area.

12.0 NOISE AND VIBRATION

Construction noise has been predicted at the nearest noise sensitive location to the site of the proposed development. A variety of items of plant will be used for the purposes of site clearance and construction. There will be vehicular movements to and from the site, that will make use of existing roads. Due to the nature of these activities, there is potential for the generation of elevated levels of noise.

During the construction phase, excavators will be used to remove existing soil. Standard construction tools and methods will be employed for general construction and landscaping. Approximately 6,500m^3 of overburden and bedrock will be excavated from the foundation footprint and from a part of the parking area on the mainland side. Because of the nature of the bedrock, which is very thinly bedded or laminated and nearly vertically oriented, it is not considered that blasting of rock will be required. Instead, it is anticipated that rock ripping will be sufficient to excavate bedrock during this stage and, as such, it is not expected that blasting will be required.

The results of the assessment have indicated that at distances of 10m from the works, the construction daytime noise limit of 65dB L_{Aeq} is likely to be exceeded. This scenario applies only to locations which are in immediate proximity to road works along the R572, which are expected to last for a very short duration. At distances of 50m and greater, noise levels associated with construction plant items are further reduced and are typically within the limits of daytime noise construction criterion. While calculations have demonstrated that works can be conducted within the adopted criteria at certain distances, it is recommended that the various best practice working methods to control noise and vibration are adopted by the Contractor during all works.

The potential for vibration at neighbouring sensitive locations during construction is typically limited to excavation works, road rolling and lorry movements on uneven road surfaces. The more significant of these is the vibration from road rolling, the method for which will be selected and controlled to ensure there is no likelihood of structural or even cosmetic damage to existing neighbouring dwellings.

During the operational phase, considering the distance from the proposed Visitor Centre and associated buildings to the nearest sensitive location is >200m, and provided that new plant is controlled such that noise emissions do not exceed 85dB at 1m, the requirements of BS4142: 2014 *'Methods for Rating and Assessing Industrial and Commercial Sound'* will be met, and the existing noise climate is not expected to change. The relative increase in noise level associated with traffic movements on the existing road network has also been considered. Traffic flow data for the peak hour period during the peak season have been assessed and determined that the proposed development is expected to have a negligible impact on the noise climate at the site of the proposed development. No significant vibration emissions are expected from the operation of the proposed development.

Provided mitigation measures set out in Chapter 12 of this EIAR – Noise and Vibration – are implemented, it is considered that the proposed development will not result in significant, negative effects in terms of noise and vibration.

13.0 AIR QUALITY AND CLIMATE

During the construction of the proposed development, the worst-case scenario dust emission magnitude can be classified as 'medium', since the construction will involve pouring of concrete. Therefore, there is an overall low risk of temporary dust soiling and human health impacts as a result of the proposed construction activities. In terms of receptor sensitivity to dust soiling, there are no sensitive receptors within 20m of the proposed works and less than 10 sensitive receptors within 50m of the proposed works. Dust emission magnitude from trackout can be classified as 'small' since there is likely to be less than 10 outward HGV movements per day. As the overall sensitivity of the area to ecological impacts is high, there is an overall 'medium' risk of ecological impacts associated with air quality and climate as a result of the proposed works.

In order to ensure that no dust nuisance occurs during the demolition, earthworks, construction and trackout activities, a range of dust mitigation measures associated with a medium risk of dust impacts have been prescribed. The proactive, preventative control of fugitive dust will ensure the prevention of significant emissions. The main Contractor will be responsible for the coordination, implementation and ongoing monitoring of the Dust Management Plan. There is the potential for emission of several types of greenhouse gases to the atmosphere during the construction phase. Construction vehicles, generators, machinery, *etc*., may give rise to CO_2 and N_2O emissions. However, based on the scale and nature of construction for the proposed development and the short-term nature of the construction phase, the impact on the climate is considered to be short-term and imperceptible.

During operation, the proposed development will not increase traffic volume (AADT or HGVs), speeds or change the road alignment by an amount greater than the criteria outlined in the IAQM guidance. Therefore, no road links impacted by the proposed development satisfy the criteria for quantitative assessment and an assessment of the impact of traffic emissions on ambient air quality and climate is not necessary. It can, therefore, be determined that the impact to air quality from traffic emissions during the operational stage of the development will be long-term and imperceptible.

Provided the mitigation measures set out in Chapter 13 of this EIAR – Air Quality and Climate – are adhered to, it is considered that the proposed development will have an imperceptible (i.e. insignificant) impact on ambient air quality and climate.

14.0 ARCHAEOLOGICAL AND CULTURAL HERITAGE

The existing Dursey Island Cable Car was constructed in 1969 and, although a modern feature, is considered to be of cultural heritage value. As the only operational passenger cableway in Ireland, and one of the few cableways in Europe to traverse the Atlantic Ocean, the existing Dursey Island Cable Car and its associated infrastructure are important elements of the cultural landscape, to both the local residents of the island and mainland, and as a tourist attraction.

There are no known archaeological sites or recorded monuments located within the footprint of the proposed development, on the island or mainland. The potential for previously unrecorded archaeological sites to be present is considered low on Dursey Island considering the disturbance already present. Potential is also considered low for the proposed development area on the mainland due to previous disturbance and the topography of the area. The land-take required for the construction of the passing bays along the route of the R572 is limited, however a number of previously undisturbed greenfield areas will be impacted. There is, therefore, some potential for the proposed development to have an impact on previously unknown archaeological sites. Excavation works associated with the construction of the passing bays shall be monitored by a fully qualified archaeologist. Full provision will be made available for the excavation of any archaeological features and/or deposits that may be identified, if that is deemed the most appropriate manner in which to proceed.

There are three cultural heritage assets located within the proposed development area: Dursey Island Cable Car and associated infrastructure (CH 1) and two upstanding vernacular structures (CH 37–38). Of the existing cableway infrastructure, it is proposed to retain the mainland-side pylon and hauling machinery (currently encased in the mainland-side line station) and remove all other structural elements. In order to mitigate the impact of the proposed development on the cable car and associated infrastructure, a full written and photographic record of the cultural heritage asset should be made prior to removal.

The site of the vernacular structures (CH 37–38) are located within the footprint of two of the proposed passing bays. The widening of the roadway in these areas will result in the demolition of these structures. This will result in a direct significant adverse effect on structures. In order to mitigate the impact of the proposed development on these vernacular structures, a full written and photographic record of the cultural heritage assets should be made prior to removal.

Provided the prescribed mitigation measures are adhered to, it is considered that there will be no residual impacts on the archaeological or cultural heritage resources of the study area as a result of the proposed development.

15.0 ARCHITECTURAL HERITAGE

Historically, the land in the vicinity of the proposed development has not been cultivated. No field boundaries are present in the vicinity of either end of the proposed cable car route, nor are they depicted on the first edition Ordnance Survey of Ireland (OSi) map, dating from the early 1840s. At present, excluding the buildings associated with the existing Dursey Island Cable Car, there are no buildings in the immediate vicinity of the site of the proposed development, nor are there records of such on the historical OSi maps. The nearest structure on the mainland, other than those associated with the Cable Car, is the slipway approx. 90m to the south-east. On the island, the nearest structure is a small building associated with the island-side slipway, which is approximately 160m away from the proposed development.

It is proposed to dismantle the majority of the existing Cable Car infrastructure, including the island-side pylon, the landing platforms and the station buildings. The mainland-side pylon and operating machinery will be retained as features of historical interest in the proposed development. Therefore, it is considered that the proposed development will not have any significant adverse effects on any buildings/structures of architectural heritage significance. As has been discussed in the previous section, while the Dursey Island Cable Car is not of significance in comparison with similar projects carried out over a very long period in other parts of the world, it has a significance as the only Cable Car in Ireland. Accordingly, it is recommended that the existing Cable Car and its ancillary facilities be recorded through photographic and written description prior to removal and that an exhibition that includes a history of the Cable Car, together with drawings, photographs, newspaper articles and other mementoes, be included in the proposed Visitor Centre. This mitigation measure will serve to minimise the residual impact associated with the demolition of the existing Cable Car infrastructure, by allowing its memory to be preserved. Provided this measure is implemented, it is considered that the proposed development will not give rise to significant adverse impacts on architectural heritage in the study area.

16.0 MATERIAL ASSETS AND LAND

In order to complete the proposed development, it will be necessary to acquire land on the island and mainland side of the site of the proposed development by Compulsory Purchase Order (CPO). Sixteen no. agricultural properties will be directly affected, and total land take will comprise of approx. 2.1187 ha, including approx. 1.3697 ha of agricultural land (from 16 properties) and 0.7490 ha of public road. There are 15 no. farm-holdings affected on the Beara Peninsula, and one commonage on Dursey Island. The agricultural land cover consists mainly of improved grassland on the mainland and upland grazing on the island. The area of agricultural land acquired, which may be significant on some of the individual farms, is not significant at a county level.

During the construction phase, works may result in the disturbance of existing land drainage but it is not anticipated that there will be any interruptions to utility services. Additionally, while the operation of the existing cableway will be maintained insofar as is possible throughout the duration of works, temporary interruptions to the service cannot be ruled out, and access to the island may, at times, be temporarily interrupted for farmers. These impacts are generally of a temporary to short-term duration, being limited to the extent of construction works. Among other mitigation measures, the Contractor will be required to inform Dursey Island farmers of any interruptions to the existing cableway service (1 week in advance, wherever possible). In the case of any interruptions to the service, CCC will be obliged to provide alternative access to Dursey for farmers with livestock in the island, if and as required. Any interruptions to land drainage or access will obligate the Contractor to restore drainage/access without reasonable delay.

Provided the prescribed mitigation measures set out in Chapter 16 of this EIAR – Material Assets and Land – are implemented, it is considered that the proposed development will not give rise to any significant adverse impacts on agronomy, material assets or land.

17.0 MAJOR ACCIDENTS, INTERRELATIONSHIPS AND CUMULATIVE IMPACTS

Major Accidents and Natural Disasters

There are no 'Seveso' sites (as defined in the *Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015*) in close proximity to the proposed development. The closest establishment is approx. 43km from the site of the proposed development. The design of the proposed development has taken account of the potential for flooding and it is considered that there is minimal flood risk as a result of the proposed development. In relation to accidents resulting in a spillage of polluting material, the risk of these occurring will be significantly reduced and if a spillage should occur, the proposed development incorporates drainage to allow the spilled material to be contained and treated prior to discharge.

Interrelationships

The interrelationships between the individual environmental disciplines have been considered and assessed. Table 17.1 sets out the interrelationships between these disciplines, insofar as they relate to this EIAR.

Table 17.1 Matrix of key interrelationships

Receptor Activity	Traffic and Transport	Population and Human Health	Biodiversity	Soils and Geology	Hydrogeology	Hydrology	Landscape and Visual	Noise and Vibration	Air Quality and Climate	Archaeology and Cultural Heritage	Architectural Heritage	Material Assets and Land
Traffic and Transport	■	✓	✓			✓	✓	✓	✓			✓
Population and Human Health	✓	■	✓									
Biodiversity		✓	■	✓			✓	✓				✓
Soils and Geology	✓	✓	✓	■	✓	✓	✓	✓	✓	✓		✓
Hydrogeology					■							
Hydrology		✓	✓			■	✓					✓
Landscape and Visual		✓	✓				■			✓		✓
Noise and Vibration		✓	✓				✓	■				✓
Air Quality and Climate		✓	✓						■			✓
Archaeology and Cultural Heritage		✓								■		
Architectural Heritage											■	
Material Assets and Land	✓	✓			✓	✓	✓					■

Cumulative Impacts

The potential for cumulative effects to arise as a result of the combined effects of the proposed development and other existing or proposed developments in the study area has been considered, and it can be objectively concluded, in view of best scientific knowledge, on the basis of objective information and provided effective mitigation is in place, that the proposed development, individually or in combination with other plans and projects, will not have a significant adverse effect on the receiving environment.

18.0 FURTHER INFORMATION & WHAT HAPPENS NEXT

The EIAR will be available for inspection at the following locations, as detailed in the published newspaper notices:

- Cork County Council, County Hall, Carrigrohane Road, Cork (Office Hours 9am - 5pm, Monday to Friday);
- Cork County Council Area Office, Foildarrig, Castletownbere, Co. Cork, (Office Hours: 9am – 5pm, Monday to Friday, closed 1-2pm each day); and

- Cork County Council Planning Section, Norton House, Skibbereen, Co. Cork (Office Hours 9am - 5pm, Monday to Friday).

A copy of the EIAR and/or the Natura Impact Statement (NIS) may be purchased, subject to the following fees:

Document	Title	Printed	Electronic (DVD)
EIAR Volume 1	Non-Technical Summary	€5	€5
EIAR Volume 2	EIAR Main Text	€25	
EIAR Volume 3	EIAR Figures	€50	
NIS	Natura Impact Statement	€25	

A copy of the EIAR and NIS may also be accessed free of charge on the Council's website at **www.corkcoco.ie**

Submissions may be made in writing to:

An Bord Pleanála
Strategic Infrastructure Division
64 Marlborough Street
Dublin 1
D01 V902

Submissions may be made prior to the dates specified in the published newspaper notices, in relation to:

- the likely effects on the environment as a result of the Dursey Island Cable Car and Visitor Centre;
- the implications of the Dursey Island Cable Car and Visitor Centre for proper planning and sustainable development in the area which it is proposed to situate the proposed development; and
- the likely significant effects of the Dursey Island Cable Car and Visitor Centre on a European Site.

An Oral Hearing may be held, should the statutory requirements for one be met. Written submissions, together with any representations made at any oral hearing, will be considered by An Bord Pleanála in making its decision on whether or not to approve the Dursey Island Cable Car and Visitor Centre with or without modifications. An Bord Pleanála's decision will be published in one or more newspapers circulated in the area, including, where appropriate, particulars of any modifications to the proposed development.