MOTT MACDONALD

Comhairle Contae Chorcaí
Cork County Council

Ecological Impact Assessment

R605 Ship Pool Bends Improvement Scheme

January 2022

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Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	12th Nov 21	E Johnston	R Macnaughton	R Sexton	Draft for client review
B	28th Jan 22	E Johnston	R Macnaughton	R Sexton	Minor revision

Document reference: 229100552 | 36 | B

Information class: Standard

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1 Introduction

1.1 Background

Cork County Council is proposing the improvement of the R605 road at Ship-Pool Bends. The section of the R605 to be improved is located at a bend which curves around a vertical rock face on the eastern side of the road, with a steep ground fall on the western side to the River Bandon.

Mott MacDonald Ltd was appointed by Cork County Council to undertake Ecological Impact Assessment (EcIA) of these works at Ship-Pool Bends.

1.2 Report Aims and Objectives

The aim of this report is to provide an EcIA of the protected and/or notable habitats and species which occur or have the potential to occur on or near Ship-Pool Bends which may be impacted by the proposed works. The report follows CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine.

The objectives are to:

- Identify any designated sites for natural conservation and habitats on, near and adjacent to Ship-Pool Bends;
- Identify and map habitats at Ship-Pool Bends.
- Identify any notable and/or protected plant or animal species of conservation value, which occur at or near Ship-Pool Bends;
- Identify the presence of any invasive plant species at or adjacent to Ship-Pool Bends;
- Undertake a preliminary assessment of the potential impacts on any ecological receptors of conservation value identified at or adjacent to Ship-Pool Bends; and,

Recommend further surveys, mitigation and enhancement measures as appropriate

1.3 Zone of Influence

The works are located entirely outside of any European sites. However, the Zone of Influence of works can impact areas outside of the immediate footprint of works.

CIEEM (2018)[1] guidelines states that the "*zone of influence (ZoI) is the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities*" and that the "*zone of influence will vary for different ecological features depending on their sensitivity to an environmental change*".

1.4 Assessment of Ecological Value and Impact

An assessment of the ecological value for habitats and species within the zone of influence was made, where possible, in accordance with current guidance:

- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine.

[1] CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine.

- NRA (2008) 'Ecological surveying techniques for protected flora and fauna during the planning of National Road Schemes'

Ecological value is determined on a geographical context as follows: international, national, regional, county, district, local and ZoI only.

1.5 Legislative and Policy Framework

The construction and operational activities for the proposed works must comply with European and National nature conservation legislation, and with national and local biodiversity policies.

The EU 'Habitats Directive' (92/43/EEC) and the 'Birds Directive' (79/409/EEC) require the protection of particular species and habitats within Europe. Annex I and Annex II of the 'Habitats Directive' and Annex I of the 'Birds Directive' identify species and habitats that require protection and for which SACs and SPAs (Natura 2000 sites) should be designated. In addition, Annex IV and Annex II(b) of the Habitats Directive provides legal protection to specified species wherever they occur (both within or outside of a SAC).

The above directives are transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations 2011.

The other principal biodiversity protection legislation in Ireland is the Wildlife Act, 1976 – 2014. Under the Wildlife Act, all public bodies are required to have regard to biodiversity conservation when carrying out their functions. A list of habitats and species that are of principal importance for the conservation of biodiversity in Ireland are published under the schedules to the Act.

Plant species protected by Section 21 of the Wildlife Act are set out in the Flora (Protection) Order, 2015. Such plants cannot be wilfully cut, picked, uprooted, damaged or taken.

The County Cork Biodiversity Action Plan 2009-2014 takes into account the overall objectives of the National Biodiversity Action Plan and translates them into a local County Cork context. The Plan has six key objectives which aim to conserve and enhance biodiversity within the County, including incorporation of positive action for biodiversity into Local Authority actions.

1.5.1 Statement of Authority

Jason Lyne is an Ecologist with experience in ecological consultancy. Jason has worked on a variety of projects. He has prepared Ecological Impact Assessments, Environmental Reports and Appropriate Assessments Screening Reports. He has carried out field work and site walk overs and has worked as an ecological clerk of works on large scale projects.

Erin Johnston is a Senior Ecologist with five years of experience in ecology and environmental consultancy, and three years of experience in malacology research. Erin has worked on projects at various stages for national roads, power infrastructure, flood defence schemes, wastewater, and water treatment facilities. She has experience preparing Ecological Impact Assessments, Appropriate Assessment Screening Reports, Natura Impact Statements, and Biodiversity chapters. Erin has extensive experience carrying out field surveys for protected species, along with vegetation, extended phase 1 habitat surveys, and targeted invasive species surveys.

1.6 Limitations

For health and safety reasons, no instream surveying for aquatic habitats or species was conducted on the field survey carried out. Surveys of the stream were instead conducted from the bankside.

Field surveys were carried out outside of the optimal season for vegetative survey. Despite this, however, given the nature of the habitats within the survey area, it is considered that a robust assessment was carried out as all habitats were readily identified.

The surveys were conducted outside the bird breeding season. However potential suitable habitats for breeding birds could be determined.

2 Proposed Works

2.1 General Description

The works comprise alterations to the existing road alignment. There will be no change in traffic levels as a result of the proposed development or other operational phase impacts.

The following outlines the planned works required at Ship Pool Bends:

- The road will be closed to traffic and a diversion put in place. Following the closure of the road, the site compound will be erected. The location of the compound will be selected by the contractor. The location of this temporary compound will likely to be within the curtilage of the existing road. It will not be located within habitat of ecological value.
- Traffic management will be put in place to facilitate the works. The works are small scale in nature and will not result in a significant increase in local traffic volumes.
- Vegetation clearance will be required to facilitate the works.
- The existing arched stone culvert will be extended, and a new precast concrete headwall installed. To facilitate the placement of the culvert the existing ground on the upstream face of the culvert will require excavation. Rock armour units will be placed upstream. The culvert extension will comprise precast units placed on a bed of granular material
- The existing stone wall will be broken down to road level and new stone wall to be constructed at new location. The new wall will be comprised of pre-cast units set onto a concrete bed.
- 15m of retaining wall will be installed to support the new alignment.
- The existing telecom pole will be moved. There may be additional removal of vegetation required to facilitate required clearance levels at the new location.
- Proposed filter drain will be installed. This will likely require excavation of a trench, and placement of perforated drainpipes, and a washed gravel fill.
- The road be widened. To facilitate this, there will be a requirement for the breaking out of approximately 35m x 6.5m x. 3m of rock face and a 200mm gravel subbase will be laid on the rock before paving
- Introduction of ghost hatching between the separate lanes of traffic to allow for the safe passage of the long wheel-based vehicles over the tightest section of the bend.

A drawing outlining these works is provided in Appendix A.

2.2 Zone of Impact

Site Clearance and ground Excavation

The proposed works will require site clearance, excavation, and rock breaking to facilitate the changes in alignment. The ZoI is assessed as the direct footprint of the works.

Noise and Vibration

The R605 is a busy route for Heavy Goods Vehicles (HGV) traffic in the locality. Given the nature of the existing road infrastructure, the surrounding environment is habitually subject to a degree of disturbance. There is potential for a temporary increase in noise during the construction of the proposed works. The British Standard 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Noise guidance prescribes typical noise level data for various construction plant and activities within 10m of the various sources. The inverse square law can be applied to determine likely noise levels at

varying distances from the proposed development site. The noise levels anticipated to be associated with the proposed works are outlined below in Table 2.1.

The Zone of Impact for noise will vary dependant on the species concerned. The ZoI for particular species, and associated potential impacts are discussed in Section 4.3.

Table 2.1: Noise Levels dB(A), at Various Distances from Construction Activities

Plant Item	10m	50m	100m	150m	200m
Rock Breaking (excavator and crusher)	96	73	69	65	63
Tracked excavator	78	55	51	47	45
Earthworks (Dozer)	86	63	59	55	53
Dump truck (empty)	88	65	91	57	55
Road planer	82	59	55	51	49
Asphalt paver	77	54	50	46	44
Spreading chipping/fill (dozer)	82	59	55	51	49
Trenching	77	54	57	46	44
Vibratory roller	84	61	38	53	51
Pumping water	65	42		34	32
All Above		75	70	67	65

Dust

Breaking out of existing roadway and hard surfaces has the potential to cause dust. The proposed construction works are likely to result in the temporary generation of dust. The Institute of Air Quality Management ‘Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance’ (2014) prescribes potential dust emission risk classes to ecological receptors. The guidance specifies that the need for a detailed assessment arises “where there is an ‘ecological receptor’ within 50m of the works, or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance” and that “Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is “negligible”, and any effects will not be significant”.

A discussion of potential impacts to receptors is outlined in section 4.3.

Surface Water Runoff

There is potential for run-off associated with the works. This may contain cement fines due to concrete works, hydrocarbons due to accidental spills and leaks, and sediment laden waters due to instream and bankside works.

The potential for impact to nearby sensitive species and habitats is outlined in section 4.3.

The proposed works are likely to result in the generation of construction waste. Any waste generated during the proposed works will be disposed of in accordance with waste legislation.

3 Methods

This EcIA was informed by a detailed desk and field survey as outlined below.

3.1 Desk Study

A desk based assessment of available records of protected species and habitats was carried out in advance of the field survey. Data sources included:

- Conservation Status Assessment Reports[1] (CSARs), Backing Documents and Maps prepared in accordance with Article 17 of the Habitats Directive;
- Published and unpublished NPWS reports on protected habitats and species including Irish Wildlife Manual reports, Species Action Plans and Conservation Management Plans;
- Existing relevant mapping and databases e.g. species and habitat distribution etc. (sourced from the Environmental Protection Agency - http://gis.epa.ie/, the National Biodiversity Data Centre - http://maps.biodiversityireland.ie and the National Parks and Wildlife Services - http://www.npws.ie/mapsanddata/);
- Published data from Bat Conservation Ireland including the Daubenton's Bat Survey data and the car-based bat surveys;
- Published data from BirdWatch Ireland;

3.2 Ecological Valuation and Assessment of Impacts

3.2.1 Ecological Value

The *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009) were adopted as part of this methodology for the purpose of evaluating the importance of ecological features within the survey area. The site evaluation criteria from this assessment methodology is reproduced in Table 3.1 below.

In accordance with NRA guidelines (2009) and CIEEM (2018), impact assessment is only undertaken of Key Ecological Receptors (KERs). These are features within the zone of influence of the proposed scheme which are "both of sufficient value to be material in decision making and likely to be affected significantly". According to NRA guidelines (NRA, 2009), KERs are of local importance (higher value) or higher as per NRA value criteria. Features of local importance (lower value) are not considered in the guidance to be KERs and are therefore excluded from impact assessment.

Table 3.1: Site Evaluation Criteria (NRA, 2009).

Ecological Value	Description
Internationally Important	Sites designated (or qualifying for designation) as a SAC or SPA under the EU Habitats or Birds Directives
	Undesignated sites that fulfil criteria for designation as a European Site
	Features essential to maintaining the coherence of the Natura 2000 network
	Sites containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive
	Resident or regularly occurring populations of birds listed in Annex I of the Birds Directive and species listed in Annex II and/or Annex IV of the Habitats Directive
	Ramsar Sites
	World Heritage Sites
	Biosphere Reserves
	Sites hosting significant species populations under the Bonn Convention
	Sites hosting significant populations under the Berne Convention

Ecological Value	Description
	Biogenetic Reserves European Diploma Sites Salmonid waters
Nationally Important	Sites or waters designated or proposed as an NHA Statutory Nature Reserves Refuge for fauna and flora protected under the Wildlife Acts National Parks Undesignated sites fulfilling criteria for designation as a NHA; Statutory Nature Reserves; Refuge for Fauna and Flora protected under the Wildlife Act and/or a National Park; Resident or regularly occurring populations (assessed to be important at the national level) of species protected under the Wildlife Acts and/or species listed on the relevant Red Data list) Sites containing viable areas of the habitat types listed in Annex I of the Habitats Directive
County Importance	Areas of Special Amenity Areas subject to a Tree Preservation Order Areas of High Amenity, or equivalent, designated under the County Development Plan Resident or regularly occurring populations (assessed to be important at the County level) of species of birds listed in Annex I of the Birds Directive, species listed in Annex II and/or IV of the Habitats Directive, species protected under the Wildlife Acts and/or species listed on the relevant Red Data list Site containing area(s) of the habitat types listed in Annex I of the Habitats Directive that do not fulfil criteria for valuation as of International or National Importance County important populations of species, or viable area of semi-natural habitats or natural heritage features identified in the National or local Biodiversity Action Plan Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level
Local Importance (higher value)	Locally important populations of priority species or habitats or natural heritage features identified in the Local Biodiversity Action Plan Resident or regularly occurring populations (assessed to be important at the Local level) of species of birds listed in Annex I of the Birds Directive, species listed in Annex II and/or IV of the Habitats Directive, species protected under the Wildlife Acts and/or species listed in the relevant Red Data list Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value
Local Importance (lower value)	Sites containing small areas of semi-natural habitat that are of some local importance for wildlife Sites of features containing non-native species that are of some importance in maintaining habitat links

Source: NRA, 2009

3.2.2 Assessment of Impact

Impacts were assessed and characterised in accordance with the '*Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*' EPA (2017) as reproduced in Table 3.2 below.

Table 3.2: Impact Magnitude and Duration Criteria (EPA, 2017).

Impact Magnitude	Definition
Quality of Effects	**Positive Effects** A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
	Neutral Effects No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
	Negative/adverse Effects

Impact Magnitude	Definition
	A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).
Significance of Effects	**Imperceptible** An effect capable of measurement but without significant consequences.
	Not significant An effect which causes noticeable changes in the character of the environment but without significant consequences.
	Slight Effects An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate Effects An effect that alters the character of the 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 alters a sensitive aspect of the environment
	Very Significant An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
	Profound Effects An effect which obliterates sensitive characteristics
Duration and Frequency of Effects	**Momentary Effects** Effects lasting from seconds to minutes
	Brief Effects Effects lasting 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 Once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually

Source: EPA, 2017

3.3 Field survey

Ecological field assessments were undertaken at Ship-Pool Bends on the 19th of February 2021 and the 28th October 2021 by Mott MacDonald Ecologists.

Equipment used for survey included base maps and template target notes, digital camera, binoculars, and vegetative keys.

3.3.1 Survey Methods

3.3.1.1 Flora/ Habitats

Habitat survey was carried out with regard to 'Best Practice Guidance for Habitat Survey and Mapping' (Heritage Council, 2011). Habitats were classified in accordance with 'A Guide to Habitats in Ireland' (Fossitt, 2000).

The area was searched for evidence of invasive plant species listed in Part 1 of the Third Schedule of S.I No. 477 of 2011, European Communities (Birds and Natural Habitats) Regulations 2011.

Species protected under Flora (Protection) Order, 2015 (S.I. No. 356 of 2015) were also searched for.

3.3.1.2 Mammals

An assessment of the likely presence or absence of protected and notable animal species, listed on Annexes II, IV and V of the Habitats Directive was undertaken. This was based on the known distribution of species, habitat suitability and/or direct evidence such as field signs or observations.

Otter

The methodologies and assessment criteria used were based on current published guidance. Otter survey followed *Monitoring the Otter Lutra lutra* (Chanin, 2003). The extent of survey area was defined with regard to *Guidelines for the Treatment of Otters during the Construction of National Road Schemes* (NRA, 2008) and therefore included survey of the riparian habitat 200m upstream and downstream of the tributary point of the River Bandon and the onsite culvert. Signs of Otter were searched for including:

- Individual otters;
- Holts;
- Couches/resting sites;
- Spraints (categorised as dried fragmented, dried intact; not fully dry) and gland secretions;
- Footprints and paths;
- Slides; and,
- Feeding remains.

Badger

Badger survey followed *Surveying Badgers* (Harris et al.1989). The extent of survey area was defined with regard to *Guidelines for the Treatment of Badgers during the Construction of National Road Schemes* (NRA, 2005).

- Latrines & dung pits
- Hair
- Paths and footprints
- Scrapes
- Snuffle holes
- Setts (including a description of the sett location: hedgerows, earth banks, woodland or scrub habitat. Type of sett and level of usage: main, maternity, ancillary, abandoned etc. Signs of activity: discarded bedding, spoil heaps etc.)

Bat

A daytime bat survey of the road culvert and trees was carried out in accordance with *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn) (Collins, 2016).* The visual assessment was carried out in line with *Bat Tree Habitat Key (Andrews, H et al., 2013)* to determine potential roost features. Trees which might be affected by the works were examined for potential roost features which included

- Horizontal / vertical cracks along tree limbs / trunk
- Knot holes and cankers in trees
- Voids in trees
- Crevices including lifting bark or thick ivy growth (where stems are a minimum of 50mm diameter)

Similarly, the culvert was assessed for potential access points, gaps, cracks, voids, and crevices. The suitability of habitat features for bats, within the survey area, were assessed in accordance with Collins (2016) as described in Table 3.1 below.

Table 3.3: Guidelines for Assessing potential Bat Roosts

Suitability	Description/Roosting Habitats	Commuting and Foraging Habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions, and/or suitable surrounding habitat likely to be used on a regular basis by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain potential roost features but with none seen from the ground or with features seen only with very limited roost potential.	Habitats, that could be used by small numbers of commuting bats such as gappy hedgerows or unvegetated streams, but are isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions, and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland, or water.
High	A structure with one or more potential roost sites that could be used that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions, and surrounding habitat.	Continuous high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edges. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses, and grazed parkland. Site is close to and connected to known roosts.

Source: Collins 2016

Trees and buildings / structures which were assessed as having a Moderate or High suitability for bats were examined further for evidence of bat activity using an endoscope. Evidence of bat activity includes:

- Bat droppings
- Signs of bat use, such as polishing / smoothing of potential roost features and oily marks (from fur) around possible access points and roost areas
- Feeding remains such as moth wings or other insect parts

- Urine stains (staining / blackening of entrance to potential roost feature and below the feature)
- Direct evidence including dead bats and squeaking noises

4 Results

4.1 Desk Study

4.1.1 Statutory Designated Sites for Nature Conservation - Natura 2000 Sites

Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive) is European Community legislation regarding nature conservation. The intention of the Directive is to ensure biodiversity through the conservation of natural habitats and wild fauna and flora in Europe.

The EU Birds Directive (79/409/EEC) requires the protection, management and control of naturally occurring birds in the wild.

The Habitats Directive and the Birds Directive are transposed into Irish law by the European Communities (Natural Habitats) Regulations, 1997 (S.I. No. 94/1997) which has subsequently been revoked and replaced by the European Communities (Birds and Natural Habitats) Regulations 2011.

A network of sites of conservation importance, hosting habitats and/or species identified Annex I and Annex II of the 'Habitats Directive' and Annex I of the 'Birds Directive' as requiring protection, have been identified by each Member State. These sites are known as the Natura 2000 network. In Ireland, these European sites comprise areas designated as Special Areas of Conservation (SACs), and Special Protection Areas (SPAs).

Screening for Appropriate Assessment under Article 6(3) of the Habitats Directive has been carried out for the proposed road alignment works. European sites which have connectivity to the works area are presented below in Table 4.1. The assessments did not determine any potential for significant effects.

Table 4.1: European Sites in proximity to Ship-Pool Bends

European Site	Distance and connectivity to Ship-Pool Bends	Qualifying Interests/ Features
Courtmacsherry Estuary SAC (001230)	This SAC is located 8.5km from Ship-Pool Bends with shared hydrological connectivity via the River Bandon located approximately 50m to the west of the proposed works area.	• 1130 Estuaries • 1140 Mudflats and sandflats not covered by seawater at low tide • 1210 Annual vegetation of drift lines • 1220 Perennial vegetation of stony banks • 1310 *Salicornia* and other annuals colonising mud and sand • 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) • 1410 Mediterranean salt meadows (*Juncetalia maritimi*) • 2110 Embryonic shifting dunes • 2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) • 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)*
River Bandon SAC (002171)	This SAC is located 30km from Ship-Pool Bends with shared hydrological	• Water courses of plain to montane levels with the *Ranunculion fluitantis*

European Site	Distance and connectivity to Ship-Pool Bends	Qualifying Interests/ Features
	connectivity via the River Bandon located approximately 50m to the west of the proposed works area.	and *Callitricho-Batrachion* vegetation [3260] • Alluvial forests *with Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] • *Margaritifera margaritifera* (freshwater pearl mussel) [1029] • *Lampetra planeri* (brook lamprey) [1096]
Courtmacsherry Bay SPA (004219)	This SPA is located 9km from Ship-Pool Bends with shared hydrological connectivity via the River Bandon located approximately 50m to the west of the proposed works area.	• A156 Black-tailed godwit (*Limosa limosa*) • A149 Dunlin (*Calidris alpina*) • A142 Lapwing (*Vanellus vanellus*) • A179 Black-headed gull (*Chroicocephalus ridibundus*) • A140 Golden plover (*Pluvialis apricaria*) • A182 Common gull (*Larus canus*) • A069 Red-breasted merganser (*Mergus serrator*) • A157 Bar-tailed godwit (*Limosa lapponica*) • A160 Curlew (*Numenius arquata*) • A050 Wigeon (*Anas penelope*) • A048 Shelduck (*Tadorna tadorna*) • A003 Great northern diver (*Gavia immer*) • Wetlands
Sovereign Islands SPA (004124)	This SPA is located 13.8km from Ship-Pool Bends with shared hydrological connectivity via the River Bandon located approximately 50m to the west of the proposed works area.	• A017 Cormorant (*Phalacrocorax carbo*)
Old Head of Kinsale SPA (004021)	This SPA is located 9km from Ship-Pool Bends with shared hydrological connectivity via the River Bandon located approximately 50m to the west of the proposed works area.	• A188 Kittiwake (*Rissa tridactyla*) • A199 Guillemot (*Uria aalge*)

4.1.2 Other Sites of Nature Conservation

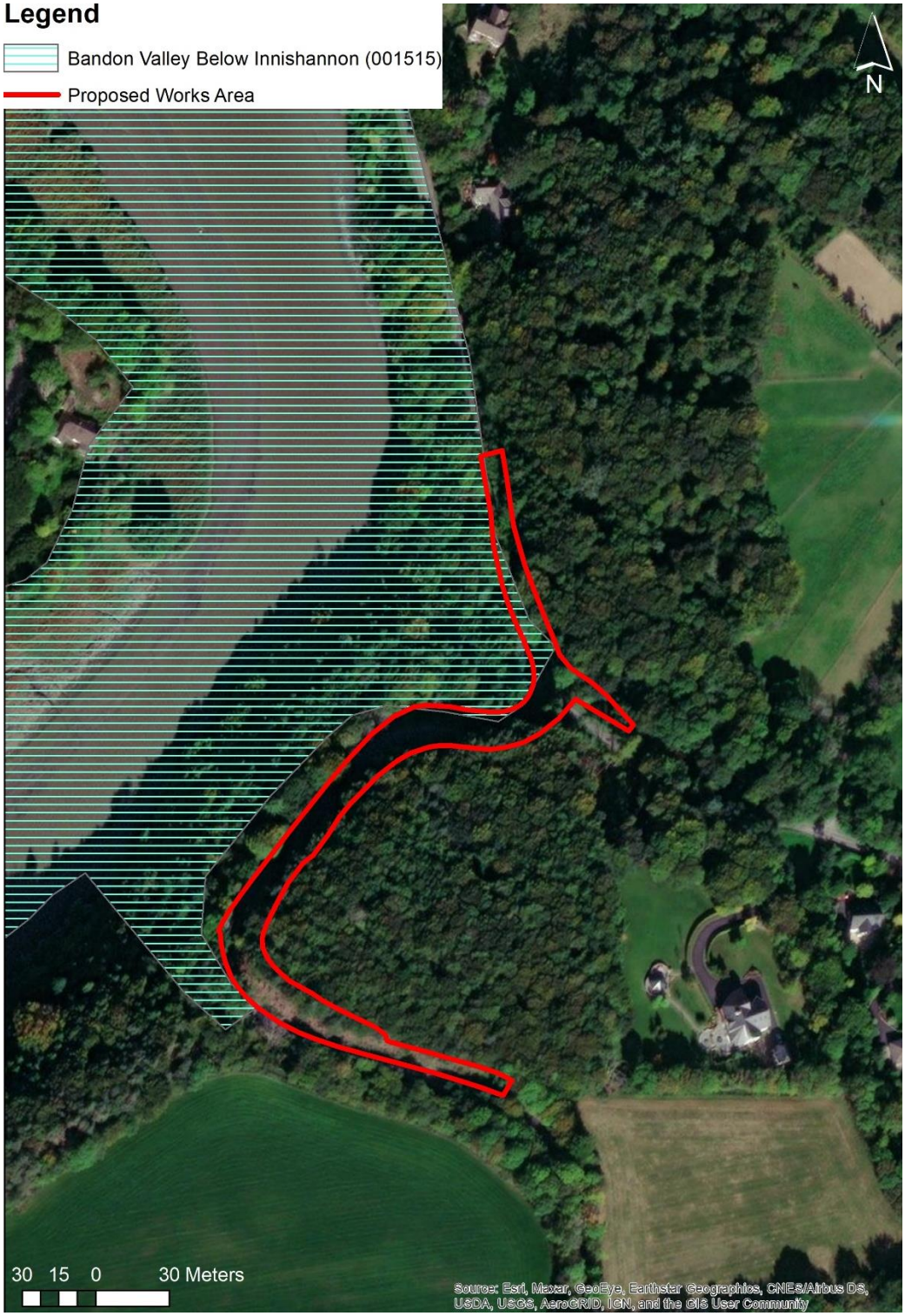
Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) - designated under the Wildlife Acts, 1976-2014 as they are considered important habitats which support animals or vegetation of importance. The pNHA Bandon Valley Below Innishannon (Site code 001515) is located in close proximity to the works area. The mature woodland to the

The area of woodland at Shippool is noted specifically in the site synopsis for the pNHA.

"*Shippool wood is a former separate area of scientific interest which is now joined to the Bandon Valley site. This wood is reported in 1972 in the An Forbas Forbartha report to be a deciduous woodland on the banks of the Bandon River with some Oak (Querus sp.) and Birch (Betula sp.) and other decidious species. The woodland has been underplanted with coniferous trees. In 1981 An Foras Forbartha reports the wood in some parts are semi-natural in character and have an ecologically interesting flora and fauna. A recent survey of this woodland found it to be predominantly conifer trees*."

The location of the pNHA in relation to the works is provided below in figure 4.1.

Figure 4.1: Bandon Valley Below Innishannon pNHA (Site code 001515) Location



Source: Mott MacDonald

4.1.3 Records of protected Species and Habitats

Published records of plants and animals protected under law, and invasive species listed in the Third Schedule of the Birds and Habitats Regulations were searched for relative to Ship-Pool Bends. Data sources included National Biodiversity Data Centre (NBDC) species records per 1km square grids, National Parks and Wildlife Services datasets and Inland Fisheries Ireland Data.

Annex IV and Annex II(b) of the Habitats Directive provides legal protection to specified species (whether they occur within or outside of a SAC). Similarly, the Wildlife Act provides protection to animals of National importance. It is an offence to intentionally or deliberately kill, injure, disturb or capture such animals or damage, destroy or obstruct access to their breeding or resting habitat.

All wild birds, their nests and eggs are protected under the Birds Directive. It is an offence to take, damage or destroy the nest of any wild bird while it is in use or being built.

It is an offence to willfully cut, pick, uproot, damage or take plant species set out in the Flora (Protection) Order, 2015.

Works which would cause an offence under the Wildlife Act / Birds or Habitat Directives is a notifiable action under the Wildlife Acts 1976 – 2014 and a derogation licence is required to be obtained from the Department of Arts, Heritage and Gaeltacht for the purpose carrying out such works

Records of protected flora and fauna that have been previously recorded within 2km (Grid number W5654) of Ship-Pool Bends are presented below in Table 4.2.

Table 4.2: Records of protected flora and fauna

Species	Date Recorded	Designation
Birds		
Common kingfisher (*Alcedo atthis*)	2016	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Moss		
Large white-moss (*Leucobryum glaucum*)	2009	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Threatened Species: Least concern
Terrestrial Mammal		
Eurasian red squirrel (*Sciurus vulgaris*)	2015	Protected Species: Wildlife Acts

Source: National Biodiversity Data Centre

Fisheries Data

Inland Fisheries Ireland (IFI) holds responsibility for monitoring fish species and populations in Irelands' rivers, estuaries and lakes in order to determine waterbody status in accordance with the requirements of the Water Framework Directive. Data is presented on their website: http://www.ifigis.ie/WFDFishMap/. The River Bandon by Ship-Pool Bends is divided into two sections, The Lower Bandon Estuary (TW code SW_080_0100) classified as a transitional water, and the Upper Bandon Estuary (TW codeSW_080_0300). A summary of data available relevant to Ship-Pool Bends is presented below.

Lower Bandon Estuary

- Bib (*Trisopterus luscus*)

- Cod (*Gadus morhua*)
- Dab (*Limanda limanda*)
- Deep-snouted pipefish (*Syngnathus typhle*)
- Dragonet sp (*Callionymus spp*)
- European eel (*Anguilla anguilla*)
- Fifteen-spined stickleback (*Spinachia spinachia*)
- Five-bearded rockling (*Ciliata Mustela*)
- Flounder (*Platichthys flesus*)
- Gadoid
- Greater pipefish (*Syngnathus acus*)
- Gunnel (Butterfish) (*Pholis gunnellus*)
- Lesser sandeel (*Ammodytes marinus*)
- Long-spined sea scorpion (*Taurulus bubalis*)
- Painted goby (*Pomatoschistus pictus*)
- Plaice (*Pleuronectes platessa*)
- Pogge (*Agonus cataphractus*)
- Red gurnard (*Chelidonichthys cuculus*)
- Rock goby (*Gobius paganellus*)
- Salmon (*Salmo salar*)
- Sand goby (*Pomatoschistus minutus*)
- Sand smelt (*Atherina presbyter*)
- Short-spined sea scorpion (*Myoxocephalus Scorpius*)
- Snake pipefish (*Entelurus aequoreus*)
- Sprat (*Sprattus sprattus*)
- Thick-lipped grey mullet (*Chelon labrosus*)
- Three-spined stickleback (*Pungitius pungitius*)
- Two-spotted goby (*Gobiusculus flavescens*)
- Whiting (*Merlangius merlangus*)

Upper Bandon Estuary

- Brown trout (*Salmo trutta*)
- European eel (*Anguilla anguilla*)
- Flounder (*Platichthys flesus*)
- Sand goby (*Pomatoschistus minutus*)
- Three-spined stickleback (*Pungitius pungitius*)

4.2 Ecological Field Assessment

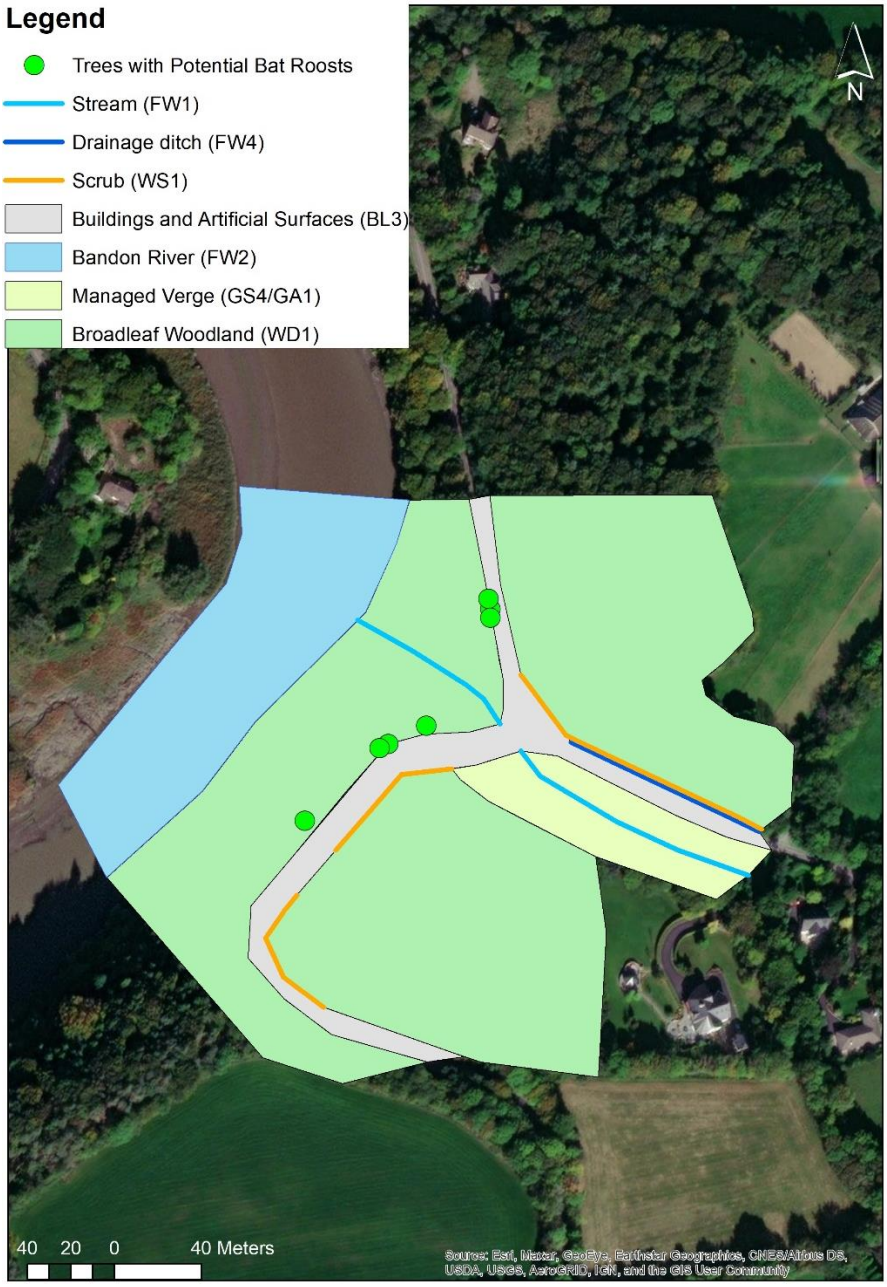
Survey methods for protected and notable flora and fauna are presented in Section 3 of this report. Field survey results are presented hereunder.

4.2.1 Habitat Survey

The habitats within the footprint of the works were comprised primarily of the existing road and associated walls (BL3). The existing road was bordered by broadleaf woodland (WD1) to the east and west of the existing road, with drainage ditches (FW4) recorded along the road. The woodland was fringed with scrub (WS1) immediately adjacent to the road. A stream (FW1) bisects the footprint of the works, flowing into the River Bandon (FW2) to the west of the works area. An area of managed grassland (GS4/GA1) was recorded adjacent to the existing road in the eastern leg of the works area, along with an area of recolonising bare ground (ED3).

A habitat map of the area is provided below in Figure 4.1.

Figure 4.2: Habitat Map of Ship Pool Bends



Source: Mott MacDonald

Building and Artificial Surfaces (BL3)

As previously noted, the majority of the works area is comprised of the existing road, the culvert over the stream, and roadside walls (Photo 4.1).

These hardstanding, and artificial surfaces are assigned a value of **Local Importance (lower Value).**

Photo 4.1: Existing R605 Road Layout

Source: Mott MacDonald

Broadleaf Woodland (WD1)

The broadleaf woodland was heavily dominated by large mature beech trees (*Fagus sylvatica*) Other tree species recorded within the woodland included ash (*Fraxinus excelsior*), birch (*Betula pendula*), Scott's pine (*Pinus sylvestris*), Douglas fir (*Pseudotsuga menziesii*), sessile oak (*Quercus petraea*), sycamore (*Acer pseudoplatanus*), hazel (*Corylus avellana*), laurel (*Prunus laurocerasus*) and holly (*Ilex aquifolium*). Ground flora was dominated by ivy (*Hedera helix*), likely due to shading from the canopy. Other species recorded within the ground flora included *Dryopteris spp.*, bramble (*Rubus fruticosus*), creeping buttercup (*Ranunculus repens*), woodrush (*Luzula sylvatica*), herb-Robert (*Geranium robertianum*), Hart's-tongue fern (*Asplenium scolopendrium*), bracken (*Pteridium aquilinum*), and honeysuckle (*Lonicera periclymenum*). No evidence of the protected moss species - Large white-moss (*Leucobryum glaucum*) was recorded.

To the west of the existing road the woodland was sloped steeply down towards the Bandon River (Photo 4.2). To the east of the road the woodland was more level but contained exposed earth banks where earth slippage had occurred (Photo 4.3). In places the woodland was perched above the existing road level with the banks interfacing with the road. The woodland forms part of the greater Ship-Pool woodland, which is used recreationally for walking. It also provides connectivity to wooded areas along the Bandon River to the north and south of the works area.

Photo 4.2: Mature Broadleaf Woodland

Source: Mott MacDonald

Photo 4.3: Exposed Earth Banks Within Woodland

Source: Mott MacDonald

The woodland was well established and contained large mature trees, albeit largely non-native species. The woodland provides an important ecological corridor for species in the wider landscape. Further, it potentially acts as supporting habitat for protected species (See section 4.2.2) albeit likely not in nationally important numbers.

Given the importance of mature woodland in the context of the local landscape, the substantial area of habitat it is part of, and the designation of the western section of woodland, the broadleaf woodland is assessed as being of **County Importance.**

Scrub (WS1)

In small sections scrub was present fringing the road (Photo 4.4). This thin line of scrub was likely the result of maintenance along the road. The scrub was typically dominated by hazel, but generally contained a similar species composition to the woodland. Other species recorded within the scrub included sessile oak, ash, birch, laurel, bramble, nettle (*Urtica dioica*), yellow archangel (*Lamiastrum galeobdolon*), meadowsweet (*Filipendula ulmaria*), and woodrush.

Photo 4.4: Scrub Fringing Road with Mature Woodland Behind

Source: Mott MacDonald

The scrub is less well established than the woodland, and appears to be managed on an on-going basis, but likely still provides supporting habitat for breeding birds in the locality. As such it is assigned a value of **Local Importance (Higher Value).**

Managed Verge (GA1/GS4)

In the eastern section of the works area, the lands to the south of the existing road have historically been cleared and managed to create an area of green verge (Photo 4.5). The area was likely re-seeded as amenity grassland (GA1) however, at the time of survey it showed an affinity towards wet grassland (GS4) but contained a number of species more readily associated with woodland habitats. Fallen branches which had become overgrown were noted within the area. Several mature trees were retained within the grassland, with young alder (*Alnus glutinosa*) trees also planted.

Photo 4.5: Managed Verge

Source: Mott MacDonald

Species recorded within the grassland included Yorkshire fog grass (*Holcus lanatus*), creeping bent grass (*Agrostis stolonifera*), rushes (*Juncus effuses*) creeping buttercup, daisy (*Bellis perrenis*), greater plantain (*Plantago major*), ragwort (*Jacobaea vulgaris*), spear thistle (*Cirsium vulgare*), broad dock (*Rumex obtusifolius*), foxglove (*Digitalis purpurea*), and self-heal (*Prunella vulgaris*). Very young willow saplings (*Salix spp.*) and cut remnants of woodrush were noted emerging from the verge. It is likely in time that this verge will re-generate into scrub.

Given the managed nature of the habitat currently, it is currently assessed as being of **Local Importance (Lower Value)**.

Recolonising Bare Ground (ED3)

Some areas of land on the southern bank of the stream, within managed verge habitat, had also recently been cleared and vegetation is recolonising. This area sloped steeply down towards the stream and contained a large proportion of exposed soil (Photo 4.6). The majority of the land had been cleared, with mature tree retained. Species recorded within this habitat included foxglove, bramble, woodrush, willowherb (*Epilobium spp*), laurel, beech, and sycamore.

This habitat is assessed as being of **Local Importance (Lower Value).**

Photo 4.6: Cleared Land on Southern Stream Bank

Source: Mott MacDonald

Watercourses (FW1, and FW4)

As previously noted, a stream (FW1) bisects the site, flowing to the west into the River Bandon. The gradient of the stream upstream of the existing culvert is relatively flat. As previously noted, the lands surrounding the stream upstream of the culvert had been cleared and so little in terms of bankside vegetation was recorded, with areas of bare earth banks recorded (Photo 4.7).

Photo 4.7: Riverbank Upstream of Culvert

Source: Mott MacDonald

The stream crosses a stone weir directly upstream of the culvert, with a steep drop into the stone culvert beneath the road (Photo 4.8 and Photo 4.9).

Photo 4.8: Stream and Top of Weir (Circled)

Source: Mott MacDonald

Photo 4.9: Culvert face and Stream Immediately Downstream of Weir

Source: Mott MacDonald

Downstream of the culvert the gradient of the stream was steep, with a high velocity in terms of flow. The substrate was comprised of large cobbles and stone slabs. As the gradient was steep these slabs had become exposed creating steps in the stream (Photo 4.10). Given these features, the gradient of the stream and the presence of the weir upstream of the culvert, fish passage is not likely to take place moving upstream of the Bandon River. Likely as a result of the velocity of the water within the stream, no instream vegetation was recorded.

Photo 4.10: View of Stream Downstream of the Culvert

Source: Mott MacDonald

Highly managed drainage ditches were recorded adjacent to the existing road. These provide surface drainage along the edge of the road and appeared to outfall into the previously mentioned stream. The drainage ditches were shallow and had in places become blocked with debris from felled trees.

The stream and drainage ditches provide hydrological connectivity to a more sensitive site downstream. Further, the stream may act as an ecological corridor for species like otter, at least on occasion. On this basis the stream and drainage ditches are assigned a value of **Local Importance (Higher Value)**.

4.2.2 Birds

No specific breeding bird surveys were carried out as part of this assessment. However, it is likely that the woodland and scrub habitat within the footprint of the works are used by breeding birds. All wild birds and their nests and eggs are protected under the Wildlife Acts.

Potential nesting habitat for kingfisher was identified in the vicinity of the works in terms of the stream bank upstream of the culvert. These banks were muddy in places which may provide nesting opportunities. These locations were likely sub optimal as they were exposed, and the slope of the ground above the bank would allow access to nesting sites by predators. Previous records of the species were also identified for the 1km grid square which contains the works area.

There is potential also for species such as dipper (*Cinclus cinclus*) and Grey wagtail (*Motacilla cinerea*) to make use of the stream and riparian habitat for nesting and foraging.

Breeding birds, including riverine species are assigned a value of **Local Importance (Higher Value).**

The site is wooded and not of importance for wintering waterfowl and waders.

4.2.3 Mammal Survey

Otter

No signs of otter were recorded during the site walkover. There is potential that otter may occur along the banks of the River Bandon, and the stream, at least on occasion.

Given that no signs of otter were recorded within the works area to indicate a significant population in the locality, otter are assigned a value of **Local Importance (Higher Value).**

Badger

No signs of badger were recorded during the site walkover. Given that there are records of the species in the wider landscape, there is potential that they may occur within the ZoI of the works at least on occasion.

Given that no signs of badger were recorded within the works area to indicate a significant population in the locality, they are assigned a value of **Local Importance (Higher Value).**

Bats

A number of trees were identified with moderate bat roost potential as follows:

- Three mature beech trees with moderate bat roost potential
- Mature oak tree
- Two standing dead wood trees

The location of these trees is presented in the habitat map Figure 4.1. Features identified with potential included ivy cover, knotholes, cracks and crevices within the branches and tree trunks, and flaps of bark.

The existing culvert was identified as having low suitability to contain bat roosts.

Additionally, the woodland itself offers high potential for foraging and commuting habitat for bats in the wider landscape.

Potential bat roost features as identified are assessed as being of **Local Importance (Higher Value)**.

Red Squirrel

No red squirrels (or dreys of any squirrel species) were recorded during surveys. However, the woodland comprises suitable habitat for the species and there are records of squirrels in the woodland. As such, red squirrel is presumed to feed, and potentially breed within this habitat (although no dreys were recorded). The species is protected under the Wildlife Acts and is Least concern in the Irish Red List (Marnell et al., 2019).

As such, red squirrel is assessed as being of **Local Importance (Higher Value)**

4.2.4 Fisheries

The steep gradient and stepped nature of the stream, and the presence of the weir upstream of the culvert impedes fish passage upstream.

Consultation with IFI was held in relation to the works at the culvert. IFI confirmed that given the steep gradient of the stream, fish passage upstream was unlikely to occur.

The larger River Bandon supports habitats for fish and other aquatic species.

4.2.5 Invasive Species

No invasive species Invasive plant species scheduled to the Birds and Habitats Regulations were identified.

4.2.6 Summary of Ecological valuation

The key ecological receptors within the Zone of Influence of the proposed development are evaluated in accordance with the evaluation criteria set out in Section 3.2. The existing baseline condition / population stability, conservation status, rarity and legal protection of the key ecological receptors was considered as part of this evaluation. A summary of the ecological valuation and identification of Key Ecological Receptors is provided below in Table 4.3.

Table 4.3: Ecological valuation and identification of Key Ecological Receptors (KER)

Habitats/Species	Ecological Value (as per NRA guideline)	Potential to occur within the zone of influence (ZoI)	Key Ecological Receptors
Designated sites			
Courtmacsherry Estuary SAC (001230)	**International Importance**	No – no viable source pathway receptor links identified	No
River Bandon SAC (002171)		No – no viable source pathway receptor links identified	No
Courtmacsherry Bay SPA (004219)		No – no viable source pathway receptor links identified	No
Sovereign Islands SPA (004124)		No – no viable source pathway receptor links identified	No
Old Head of Kinsale SPA (004021)		No – no viable source pathway receptor links identified	No
Bandon Valley Below Innishannon pNHA (001515)	**National Importance**	Yes – Habitat occurs immediately west of the works location.	**Yes**
Habitats and Flora			
Building and Artificial Surfaces (BL3)	Local Importance (Lower Value)	Yes - This habitat falls within the footprint of the proposed development	No
Broadleaf Woodland (WD1)	County Importance	Yes - This habitat falls within the footprint of the proposed development	**Yes**
Scrub (WS1)	Local Importance (Higher Value)	Yes - This habitat falls within the footprint of the proposed development	**Yes**
Managed Verge (GA1/GS4)	Local Importance (Lower Value)	Yes - This habitat falls within the footprint of the proposed development	No
Recolonising Bare Ground (ED3)	Local Importance (Lower Value)	Yes - This habitat falls within the footprint of the proposed development	No
Watercourses (FW1, and FW4)	Local Importance (Higher Value)	Yes - This habitat falls within the footprint of the proposed development	**Yes**
Fauna			
Otter	Local Importance (Higher Value)	No signs of breeding or resting places recorded within ZoI of the works. Potentially may occur on occasion.	**Yes**
Badger	Local Importance (Higher Value)	No signs of breeding or resting places recorded within ZoI of the works. Potentially may occur on occasion.	**Yes**
Bats	Local Importance (Higher Value)	Potential roost features, and foraging habitat identified within the ZoI of the works.	**Yes**
Squirrel	Local Importance (Higher Value)	No signs of breeding or resting places recorded within ZoI of the works. Potentially may occur on occasion.	**Yes**

Habitats/Species	Ecological Value (as per NRA guideline)	Potential to occur within the zone of influence (ZoI)	Key Ecological Receptors
Breeding birds	Local Importance (Higher Value)	Suitable breeding habitat identified within scrub habitat, and stream banks	**Yes**

5 Impact Assessment

This Ecological Impact Assessment (EcIA) has assessed the determined the presence of ecological features of conservation value associated with Ship-Pool Bends which is due for road improvement works. The potential impacts to features of conservation value which may be caused by the progression of proposed repair works are discussed hereunder.

5.1 Do Nothing

In the Do-Nothing scenario, the existing road and surrounding habitats will remain as it is at present, subject to natural re-generation in the absence of management in the case of the vegetated verge. There would be no effect on biodiversity.

5.2 Construction Phase

5.2.1 Designated Sites

European Designated Sites

An Appropriate Assessment was carried out for the proposed scheme to investigate the potential for significant effects associated with the works. The assessment investigated the potential for significant effects on the conservation objectives of European Sites arising from the proposed improvement works at Ship-pool Bends. The assessment considered whether the proposed works, either alone or in combination with other projects or plans, had potential to cause a significant effect on European sites.

The assessment did not identify the potential for significant effects on any European sites.

Nationally Designated Sites

The works to regrade the existing road extend into the boundary of the pNHA by 435m^2. The area within the pNHA incorporates the largely the existing roadway, a strip of broadleaf woodland, and the downstream section of the stream.

This will result in a loss of a strip of woodland containing mature trees (1374m^2), and an area of scrub (130m) along the roadside.

As the works extent is along the existing road, the widening of the existing carriageway will not cause fragmentation or significant loss of habitat within the woodland. The areas in which the works area protrudes are generally disturbed and already subject to roadside maintenance.

In the context of the pNHA and wider extent of this woodland type in the immediate locality (c.a. 26HA contiguous block including works area); the loss of this area (0.14HA) of woodland will cause a **permanent slight negative effect** to the pNHA and wider non-designated woodland block.

Part of the pNHA is comprised of the River Bandon. The potential for impacts to surface-water is assessed below in Table 5.1.

5.2.2 Habitats

The following habitats were identified as being Key Ecological Receptors:

- Broadleaf woodland including small area (435m^2) within River Bandon pNHA and additional (939m2) outside the pNHA).

- Scrub
- Watercourses

Table 5.1 below outlines the extent of impacts associated with the works.

Table 5.1: Impacts on Habitat KERs

Habitat	Area Within the Project Boundary	Impacts	Assessment of Effects in the Absence of Mitigation
Broadleaf woodland	1374m^2	As previously noted, the works to re-grade the existing road will result in a loss of mature trees associated with the broadleaf woodland directly adjacent to the existing roadway. There will be no fragmentation of this habitat as a result of the proposed works. The loss of trees will be within an area of woodland largely already subject to road-side management, and will not cause a significant loss in terms of the overall woodland.	Permanent slight negative effect
Scrub	130m	The footprint of the works area will require permanent removal of 130m of this habitat.	Permanent slight negative effect
Watercourses	4m	The proposed works will require an extension to the existing culvert as part of the road realignment. These works will cause impacts during the construction phase as the culvert extension will need to be placed instream, and the stream bed levelled at this location. There is potential for additional impacts due to surface-water emissions during the project entering into the stream. The instream features associated with the watercourse (e.g., the existing weir) will be reinstated following the culvert installation. There will be no alteration to the hydrology of the stream, and no change to the stream profile downstream of the culvert. No direct impacts are proposed to the downstream River Bandon.	Moderate temporary effect

5.2.3 Species

The following species were identified as Key Ecological Receptors. It is noted that no breeding or rest areas of Otter, Badger, Bats or Red squirrel were recorded:

- Otter
- Badgers
- Bats
- Red Squirrel
- Breeding birds

Table 5.2 below outlines the extent of impacts associated with the works.

Table 5.2: Impacts on Species KERs

Habitat	Impacts	Assessment of Effects in the Absence of Mitigation
Otter	No signs of otter were identified within the footprint, or the ZoI of the works. Historical records of the species in the wider environment indicate that they may occur within the ZoI at least on occasion. Holts and couches may become established prior to the commencement of construction. Should this occur, then loss of holts, and associated injuries to otter therein may occur. As such, the potential for impact is assessed on a precautionary basis.	Short-term slight negative effect
Badgers	No signs of badger were identified within the footprint, or the ZoI of the works. Historical records of the species in the wider environment indicate that they may occur within the ZoI at least on occasion. Setts may become established prior to the commencement of construction. Should this occur, then loss of setts, and associated injuries to badger therein may occur. As such, the potential for impact is assessed on a precautionary basis. As such, the potential for impact is assessed on a precautionary basis.	Short-term slight negative effect
Bats	Potential bat roosts were identified during the ecological surveys of the works area. There is also the potential for additional potential roost features to develop in trees (e.g following storm damage) between completed surveys and the construction phase of the proposed development. The works will require the removal and lopping of trees which may contain bat roosts. As such there is the potential for a permanent loss of roosting habitat for bat species.	Permanent moderate negative effect
Red squirrel	There is potential for a permanent loss of supporting habitat where woodland and scrub is removed. As previously noted, the existing road bisects the woodland in its entirety, and the trees on either side of the woodland are subject to management. The works will result in a widening impact of an existing gap in the woodland. No dreys were identified in during field surveys, however there is potential for dreys to become established between the surveys and construction phase of the development. The overall impact on red squirrels is therefore considered to be a **short term slight negative effect** at a local geographic scale.	Short term slight negative effect
Breeding birds	Vegetation clearance has potential to result in a loss of nesting habitat for these species. In addition, should clearance be carried out during the nesting season (1st March-31st August) there is potential for direct impact to nesting birds within the scrub, along the stream and within woodland habitats.	Permanent slight negative effect

5.3 Operational Phase

The Proposed Development comprises widening to the existing roadway. It is not anticipated that there will be any changes in traffic intensity as a result of this. There are no alterations to existing lighting schemes, and surface water drainage will discharge to the stream also.

Any future repair works, or maintenance along the road will be subject to environmental assessment in their own right. As such, no operational phase effects are anticipated.

6 Mitigation

Recommendations relating to road design and approaches to the improvement works are made to mitigate against identified impacts on habitats, and species.

Mitigation measures were designed having regard to the Mitigation Hierarchy. This is a sequential order of mitigation actions whereby the preference for mitigation measures are as outlined below:

- Avoidance: Steps to avoid harm to biodiversity.
- Minimisation: Where adverse impacts cannot be avoided, action is taken to minimise these impacts.
- Compensation: Only considered after all possibilities for avoidance and minimisation of impacts have been implemented.

6.1 Clearance of Woodland

Vegetation clearance within the woodland habitat will be kept to the absolute minimum required to facilitate the works.

Areas of woodland to be felled will be replanted locally such that there is no permanent net loss of woodland.

Prior to the commencement of the works an Arborist shall be commissioned to undertake assessments of the works areas. These assessments will include the following at a minimum:

- A tree survey to be completed in accordance with BS: 5837:2012 Trees in relation to design, demolition and construction, and recommendations.
- An arboricultural impact assessment, which shall identify
  - The number of trees which will need to be removed to facilitate the construction and excavation works
  - Potential for windthrow on any retained trees, and mitigation measures where appropriate to prevent same
  - Direct and indirect impact of works to trees to be assessed for the whole project
  - Opportunities for re-planting if the tree survey/plans identify trees to be removed which have a minimum girth of 14cm
- A tree constraints plan which accurately establishes the location of each tree with unique identifiers for each tree relating to the tree survey, denotes the tree canopy and root protection area of each tree.
- A tree protection plan which will include details on any construction exclusion zones, protective fencing requirements, and ground protection requirements. This plan will be used to inform where construction compounds or storage of material is prohibited.
- An arboricultural method statement which will give comprehensive detail about the methods of protection to be adopted and address issues such as removal of existing hard standing; installation of tree protection fencing and temporary ground protection; excavations and specialised requirements to be used close to trees. To be divided into three phases Site Preparation, Construction and Post Construction and Aftercare. This document will also include a provision for arboricultural site monitoring and supervision of specific site operations.

6.2 Watercourse Protection

At a minimum, all pollution control measures will be designed, installed, and maintained in accordance with measures outlined below and under the supervision of the Contractor's Environmental Clerk of Works (EnCoW).

6.2.1 Sediment

- Prior to the works commencing, the measures prescribed in this section shall be installed to prevent the downstream transportation of surface water run off associated with vegetation clearance. This may be through the use of features like hay bales or silt booms. Monitoring of these measures to ensure their continued effectiveness will take place on an on-going basis while the works are proceeding.
- The clearance of riparian vegetation will be kept to the minimum required for the facilitation of the works such that no unnecessary exposure of riverbanks occurs.
- Works to clear vegetation to facilitate the culvert shall take place from the bank with vegetation pulled back towards the land. The vegetation removed shall be transported off site and disposed of appropriately.
- Following the vegetation clearance, a dry works area to allow for the culvert placement shall be established. The measures required to achieve this must be appropriate for the size and flow associated with the watercourse, and take into account the potential for increased flow due to rainfall events.
- The dry works area may be achieved by isolating the entire watercourse and over pumping the flow.
- Should pumping out of the isolated area be required to maintain the dry works area, it shall be ensured that any discharge is treated appropriately prior to entering the watercourse. This may be achieved by discharging to a treatment system such as a silt buster or similar, discharge to a silt bag, or discharging to an area of the watercourse that is protected by a silt boom. These measures shall be used in combination where ground conditions are such that just one measure is not achieving sufficient protection. The success of these measures shall be monitored regularly by the Contractor's EnCoW as works proceed.
- Where the implementation of these measures fails, or are found to be inadequate, the Contractor will implement adapted measures (for example replacement sediment treatment system) in agreement with the Contractor's EnCoW and the Employers Representative Team.
- Any diversion or over pumping of watercourses shall be sized such that they will accommodate a 1% AEP flood event over the period in question, so as to prevent the overtopping of work areas.
- Silt fences will be placed along the banks of the stream to prevent surface-water run off from entering the watercourse

6.2.2 Concrete

The pouring of concrete will be required during the construction phase. To prevent the runoff of concrete into nearby watercourses and drains, the following will be implemented.

- No on-site batching will be permitted at the proposed works areas. Concrete will instead be transported to the site within a concrete truck.
- Quick setting concrete mixes will be used to reduce the risk of contaminated run-off to the watercourse.
- Concrete trucks will only be washed down in a sealed mortar bin / skip which has been examined in advance for any defects. This requirement will be communicated to each concrete truck driver prior to entering into the works area.

- Where concrete pours are to take place instream (e.g. for blinding for the culvert) they will only take place within an isolated, dry, works area.
- Where the isolated working area requires constant pumping to maintain a dry works area, pumps shall be turned off during the pour, and remain off until concrete has hardening negating a run-off risk; and such that the discharge will not result in a change in pH of +/-0.5 units. This can only take place where it is confirmed that there is no flow of water through the location of the pour, and out into the watercourse downstream
- Where concrete pours are required within the watercourse, the EnCoW will regularly monitor the pH of the watercourse during concrete works. Should any change in pH +/-0.5 be detected concrete works shall immediately be ceased (handheld monitors will have maximum variance of +/- 0.1). The entry point to the watercourse will then be identified and implement appropriate measures to prevent further escape to the environment.
- It will be ensured that covers are available for freshly poured concrete to avoid wash off in the event of rain.
- Waste concrete slurry will be allowed to dry and taken to a licensed waste depot for disposal.
- Concrete works will be scheduled during dry weather conditions to reduce the elevated risk of runoff.
- NPWS and IFI will be notified immediately of any concrete spills into watercourses.

6.2.3 Hydrocarbons

- Where mobile equipment is required e.g. generators, these will be housed in a suitably sized bund / plant nappy such that any leaks / spills are intercepted. All mobile equipment used will be stored within a plant nappy. Operators will regularly inspect the plant nappy, at a minimum on a daily basis, and replace it where it has become contaminated.
- Fuelling and lubrication of plant and equipment will be restricted to the construction compound sites, or laydown areas. No refuelling will be permitted to occur within 50m of any watercourse or drainage ditch.
- All waste fuels, oils, and other hazardous wastes will be disposed of in accordance with the requirements of waste legislation.
- Spill-kits and hydrocarbon absorbent packs will be stored in the cabin of each vehicle and operators will be fully trained during induction to site by the EnCoW in the use of this equipment.
- Should use of a spill-kit be required it shall be immediately re-stocked.
- All spill-kits shall be inspected on a weekly basis by the SHEQ officer to ensure they are maintained as fit for purpose. Records relating to these inspections shall be kept.
- Welfare / hygiene facilities will be located within the construction compounds.

Reinstatement of Bankside Vegetation

Vegetation regrowth on banksides will be monitored for at least three years post works to ensure appropriate development of native semi natural riparian plant growth. Where required replanting or control of non-native species such as laurel will be carried out.

6.3 Mitigation for Protection of Otter

A confirmatory otter survey will be undertaken in advance of the commencement of any works. This will incorporate an area within 150m of the works areas as per "*Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes*". This will allow for the identification of any holts have been established prior to commencement of works.

The confirmatory pre-construction survey will be conducted no more than 10-12 months prior to construction commencing.

Should holts be identified within 150m of the proposed development the following will, at a minimum, be employed, unless otherwise agreed with the NPWS:

- No works will be undertaken within 150m of holts where breeding females or cubs are present.
- Works within 150m of such a holt can only take place following consultation and in agreement with the NPWS
- No wheeled or tracked vehicles of any kind will be used within 20m of active but nonbreeding holts
- No light work such as digging by hand or scrub will take place within 15m of such holts except under license from NPWS
- The identified exclusion zones will be fenced and clearly marked on site prior to any invasive works.
- All contractors on site will be made fully aware or the procedures in relation to the holts by the EncoW

6.4 Mitigation for Protection of Badger

- Prior to any works commencing a confirmatory preconstruction badger survey will be carried out. Surveys will be conducted having regard to Surveying Badgers (Harris et al.1989) and record signs of badgers including tracks, hair, latrines and setts. The extent of survey area will be defined with regard to Guidelines for the Treatment of Badgers during the Construction of National Road Schemes (NRA, 2006) as 150m beyond all works areas within suitable habitat.
- Prior to works commencing, sett activity at any identified setts within 150m will be confirmed. This may be confirmed through the use of camera monitoring, setting of footprint traps, soft blocking of the sett entrance or similar. Any risk of disturbance to badger will be subject to disturbance license requirements.
- A description of the setts i.e. main sett, annex sett, or outlier sett will be provided by the EcoW along with the level of activity at the sett. This will allow for an understanding of the importance of the setts in the wider context of the local population.
- As per the Guidelines for the Treatment of Badgers during the Construction of National Road Schemes (NRA, 2006), where setts have been confirmed, no heavy machinery will be used within 30m of badger setts (unless carried out under licence from the NPWS). Lighter machinery (generally wheeled vehicles) will not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance will not take place within 10m of sett entrances.
- Unless otherwise agreed, and under license from the NPWS, during the breeding season (December to June inclusive), none of the above works will be undertaken within 50m of active setts nor blasting or pile driving within 150m of active setts. An assumption that the sett is active will apply unless proven otherwise during the course of investigation.
- All identified exclusion zones as outlined above will be clearly marked out on site and communicated to all site staff prior to works commencing.

6.5 Mitigation for Protection of Bats

The Design and Construction of bat mitigation measures will comply with licensing requirements, having regard for relevant guidance including the NRA's "Guidelines for the Treatment of Bats During the Construction of National Road Schemes", and the NPWS Bat Mitigation Guidelines for Ireland. At a minimum the following will be undertaken:

- Prior to felling of any trees, an initial bat survey of trees to be felled will be undertaken, by a licensed qualified specialist, to assess the suitability of the tree to contain bat roosts as per Bat Surveys for Professional Ecologists: Good Practice Guidelines.
- Trees with suitability for roosting bats will not be felled in advance of surveying for bats, unless in agreement with the ECoW, and NPWS as relevant. Trees identified with potential roost features of a Moderate to High value will be thoroughly examined, under licence from the NPWS, to ascertain the presence or absence of roosting bats.

  This will be conducted by an experienced bat expert. The trees will be examined for the presence or absence of bats / bat roosts immediately prior to felling. Where timing facilitates it (i.e. when felling is being undertaken during the active season for bats), emergence surveys may be carried out to confirm presence or absence of roosting bats. Where felling does not occur within one day of the examination, the trees will be re-assessed.
- Where evidence of a roost, or roosting bats has been determined, a license for destruction of a roost and/or exclusion of bats will be required from the NPWS. The procedures for the exclusion of bats and destruction of roost as detailed in the license document will be obeyed, at all times, by the Contractor.
- Where bat exclusions are required, they will be undertaken in accordance with the requirements of the bat specialist. They will not be carried out unless under license from the NPWS. Where the felling of trees found to be suitable as bat roosts cannot be avoided, appropriate mitigation will be agreed with the NPWS and put in place at least one month in advance of any felling or disturbance.
- The Design and Construction of bat mitigation measures will comply with the requirements of the bat specialist, the Standards, the TII's "Guidelines for the Treatment of Bats During the Construction of National Road Schemes", the National Parks and Wildlife Services Bat Mitigation Guidelines for Ireland, the National Parks and Wildlife Service Circular 2/07 Guidance on Compliance with Regulation 23 of the Habitats Regulations 1997.
- It is proposed to install 4 bat boxes at suitable tree locations within the wider woodland. The bat boxes should be of a long-lasting material such as woodcrete and placed at least 3 – 6 m up a tree in a relatively sunny position.

6.6 Mitigation for Protection of Red Squirrel

Prior to works commencing in areas of suitable habitat (woodland and scrub habitat) a targeted survey for the species will be carried out prior to any works taking place. Surveys may include observation surveys, drey counts and feeding remain searches.

Any dreys not confirmed or likely (given sightings) to be those of grey squirrel will be removed under license from NPWS. These dreys will be replaced using artificial dreys. Any additional measures outlined by the NPWS under the terms of their license will also be incorporated.

6.7 Mitigation for Protection of Breeding Birds

In accordance with Section 40 of the Wildlife Acts, the removal of scrubs and trees, which may be used as nesting sites by breeding birds, will be cleared outside of the birds nesting season (1st March to 31st August inclusive).

Pre-construction confirmatory surveys will be carried out for kingfisher and other riparian breeding bird species including dipper and yellow wagtail. These will incorporate a survey area of approximately 100m upstream and downstream of the works where suitable habitat exists, which is an extensive enough survey area to include the possible zone of influence of the project. Features likely to be of note to kingfisher and other breeding riparian bird species will be recorded and watches of suitable nest areas undertaken. If actual nest sites (i.e. confirmed or presumed) are present at the culvert, the NPWS will be consulted regarding the potential requirement to stop works.

The loss of any potentially suitable nesting sites will be compensated through the addition of artificial nesting sites or suitable nest features suitable for potential riparian bird species e.g. Kingfisher, Grey Wagtail and Dipper within the reinstated river bank.

6.8 Residual Effects

Following the implementation of mitigation measures, the residual effect on biodiversity, including all potentially Key Ecological Receptors outlined, is assessed as slight.

7 References

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