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Report in Support of Appropriate Assessment Screening

Fermoy Weir Remediation and Fish Bypass Channel, Fermoy, Co.Cork

On Behalf of

Cork County Council

May 2022

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Project	Report in Support of Appropriate Assessment Screening Fermoy Weir Remediation and Fish Bypass Channel, Fermoy, Co.Cork	
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DixonBrosnan Lios Ri Na hAoine, 1 Redemption Road, Cork.
Tel 086 851 1437| carl@dixonbrosnan.com | www.dixonbrosnan.com

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1. Introduction

1.1 Background

The information in this report has been compiled by DixonBrosnan Environmental Consultants, on behalf of the applicant. It provides information on and assesses the potential for the proposed Fermoy weir remediation works and fish bypass channel at Fermoy, Co. Cork, to impact on any Natura 2000 sites within its zone of influence.

The Birds Directive (2009/147/EC) and the Habitats Directive (92/42/EEC) put an obligation on EU Member States to establish the Natura 2000 network of sites of highest biodiversity importance for rare and threatened habitats and species across the EU. In Ireland, the Natura 2000 network of European sites comprises Special Areas of Conservation (SACs, including candidate SACs) and Special Protection Areas (SPAs, including proposed SPAs). SACs are selected for the conservation of Annex I habitats (including priority types which are in danger of disappearance) and Annex II species (other than birds). SPAs are selected for the conservation of Annex I birds and other regularly occurring migratory birds and their habitats. The annexed habitats and species for which each site is selected correspond to the qualifying interests of the sites and from these the conservation objectives of the site are derived. The Birds and Habitats Directives set out various procedures and obligations in relation to nature conservation management in Member States in general, and of the Natura 2000 sites and their habitats and species in particular. A key protection mechanism is the requirement to consider the possible nature conservation implications of any plan or project on the Natura 2000 site network before any decision is made to allow that plan or project to proceed. Not only is every new plan or project captured by this requirement but each plan or project, when being considered for approval at any stage, must take into consideration the possible effects it may have in combination with other plans and projects when going through the process known as Appropriate Assessment (AA).

The Habitats Directive (92/43/EEC) and the associated Birds Directive (2009/147/EC) are transposed into Irish legislation by Part XAB of the 2000 Act and the Birds and Natural Habitats Regulations 2011. Approval of the Appropriate Assessment is required from An Bord Pleanála (ABP) through the Part XAB planning procedure under section 177AE (relating to Appropriate Assessment) of the Planning and Development Act, 2000, as amended. Accordingly, this screening for Appropriate Assessment comprises a compilation of the information relevant to the competent authority's assessments relating to the potential significant impacts of the proposed development on European sites within the surrounding area.

1.2 Aim of Report

The purpose of this report is to inform the AA process as required under the Habitats Directive (92/43/EEC) in instances where a plan or project may give rise to significant impacts on a Natura 2000 site. This report aims to inform the Appropriate Assessment process in determining whether the development, both alone and in combination with other plans or projects, are likely to have a significant impact on the Natura 2000 sites in the study area, in the context of their conservation objectives and specifically on the habitats and species for which the sites have been designated.

This report has been prepared with regard to the following guidance documents, where relevant.

- *Managing Natura 2000 Sites: The Provision of Article 6 of the Habitats Directive 92/43/EEC* (European Commission (EC), 2018);
- *Assessment of Plans and Projects Significantly Affecting Natura 2000 sites: Methodical Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC* (European Commission (EC), 2001);
- *Guidance Document on Article 6(4) of the Habitats Directive 92/43/EEC* (European Commission, (EC) 2007);
- *Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities* (Department of Environment, Heritage and Local Government, 2010 revision);
- *Appropriate Assessment under Article 6 of the Habitats Directive; Guidance for Planning Authorities. Circular NPW 1/10 and PSSP 2/10* (Department of Environment, Heritage and Local Government, 2010);
- *Guidelines for Good Practice Appropriate Assessment of Plans under Article 6(3) Habitats Directive* (International Workshop on Assessment of Plans under the Habitats Directive, 2011);
- *Commission notice Guidance document on wind energy developments and EU nature legislation*, (EC 2020);
- *Communication from the Commission on the precautionary principle. European Commission* (2000);
- *Guidelines for Good Practice Appropriate Assessment of Plans under Article 6(3) Habitats Directive* (International Workshop on Assessment of Plans under the Habitats Directive, 2011;
- *Practice Note PN01 Appropriate Assessment Screening for Development Management Office of the Planning Regulator* (2021)
- *Assessment of plans & projects in relation to N2K sites – Methodological Guidance* (EC 2021);
- *Guidance document on the strict protection of animal species of Community interest under the Habitats Directive* (EC 2021) and
- *Communication from the Commission on the precautionary principle. European Commission* (2000).

1.3 Authors of Report

This report was prepared by Carl Dixon MSc (Ecological Monitoring) and Dr. Sorcha Sheehy PhD (Ecology/ornithology). Fieldwork was conducted by Carl Dixon MSc (Ecological Monitoring), Mark Donnelly BSc (Forestry), Ross Macklin BSc (Applied Ecology), Pascal Sweeny BSc (Zoology), Cian Gill MSc (Ecological Monitoring).

Carl Dixon MSc (Ecology) is a senior ecologist who has over 20 years' experience in ecological and water quality assessments. Carl Dixon holds an Honours Degree (BSc) in Ecology and a Masters (MSc) in Ecological Monitoring from UCC. He is a senior ecologist who has over 25 years' experience in ecological assessment. Prior to setting up DixonBrosnan Environmental Consultants in 2000, Carl set up and ran Core Environmental Services which included Rural Environmental Protection Scheme (REPS) planning for landowners and ecological assessments. Carl has particular experience in freshwater ecology including electrofishing fish stock assessments and water quality assessments. He also has considerable experience in habitat mapping and mammal ecology including survey work and reporting in relation to badgers and bats. Other competencies include surveys for invasive species and bird surveys. Carl has extensive experience with regards to EIAR and NIS mitigation and impact assessment. He has particular experience in large-scale industrial developments with extensive experience in complex assessments as part of multi-disciplinary teams. Such projects include gas pipelines, incinerators, electrical cable routes, oil refineries and quarries.

Dr. Sorcha Sheehy PhD (ecology/ornithology) is an experienced ecological consultant specialising in bird behaviour. Sorcha received a BSc in Applied Ecology from UCC and subsequently went on to receive a PhD in behavioural ornithology at UCC. During her PhD research, Sorcha studied bird-aircraft collision with a particular focus on bird behaviour, included field-based behavioural observations at airports, bird cadaver examination and collision classification and the use of radar tracking to model collision risk. Sorcha has worked for over 12 years in a professional ecology role and specialises in the coordination of ecology projects and assessments. She has coordinated and contributed to Habitats Directive Assessments (AA screenings and NIS) and Environmental Impact Assessment Reports (EIAR) for a range of small and large-scale projects with particular expertise in assessing impacts on birds. Notable projects include Arklow Bank Wind Park, Shannon Technology and Energy Park and Waste to Energy Facility Ringaskiddy.

Ross Macklin BSc (Hons) Applied Ecology HDip GIS Dip IPM MCIEEM IFM. Ross is an environmental scientist specialising in freshwater and fisheries ecology. He studied a BSc in Applied Ecology at UCC and later completed a higher diploma in Geographical Information Systems and Integrated Pest Management. He is currently completing his PhD in UCC. in the area of fisheries ecology. Ross has an in-depth knowledge of all freshwater ecosystems and riparian corridors. He has undertaken river habitat, lake habitat, wetland habitat and fisheries assessments in professional work for 16 years. His specialist freshwater experience lies in biological and physiochemical water quality analysis, fisheries ecology, riparian habitat assessments, habitat mapping, protected species, geographical information systems, ecological design and invasive species. Ross has expert experience in identifying and assessing macrophyte plant, aquatic bryophtes, fish and macro-invertebrates from a variety of aquatic habitats. He routinely undertakes Habitat Regulations Assessments, Fisheries Assessments, Protected Species Surveys, Invasive Species Surveys, Habitat & Surface Water Management Plans, CEMP, EcIA and EIAR reporting.

Pascal Sweeney of Sweeney Consultancy is a freshwater biologist, specialising in aquatic invertebrates. Following his B.Sc. degree in zoology, he was employed by UCD as a Research Assistant to monitor biological parameters in the Killarney Lakes. This led to a research MSc on nutrient enrichment impacts on lake invertebrates. He is currently the Honorary Secretary of the Irish Freshwater Sciences Association. His current work is focused mainly on biological water quality assessments (Q-value; SSRS) and protected species surveys. Every summer from 2012 to 2021, he has been engaged by EPA for the River Monitoring Programme. He has also carried out a large number of other water quality surveys for Irish Water, Inland Fisheries Ireland, Coillte, local authorities (Wexford, Kilkenny, Carlow, Kildare Waterford, Tipperary and Offaly Co. Cos.), and industries (e.g. Glanbia, Dairygold, Irish Sugar, Irish Distillers, Lisheen Mine, Carbury Mushrooms). Pascal has conducted Freshwater Pearl Mussel surveys in the catchments of the Slaney, Barrow, Nore, Suir, Munster Blackwater, Lee, Roury, Kerry Blackwater, Roughty, Flesk, Finnihy, Behy, Owennafeanna, Creagh, Colligan, Tay, Clady and Corrib. White-clawed Crayfish surveys conducted in the catchments of the Liffey, Barrow, Nore, Suir, Munster Blackwater, Lee and Shannon.

Mark Donnelly (Forestry) holds a BSc. Hons in Forestry from Bangor University, Wales, and is a member of the Institute of Chartered Foresters. He worked as an arboricultural consultant for the National Trust in Wales for 22 years and was a lecturer in Forest Ecology at Bangor University. In Ireland, he has completed landscape assessments for a range of projects including wind farms, quarries, local authorities, housing developments, roads and pipelines.

Cian Gill MSc (Ecology) is a qualified ecologist with ten years' experience working with wildlife and ecology-based NGOs and public bodies in Ireland, the UK and the US. Past projects include invasive species planning for the city of Rosemount, Minnesota, and the Under The Sea project for Essex Wildlife Trust. Recent projects include ecological reports for Cork-based housing and private developments.

1.4 Consultation

Consultations have been carried out with Inland Fisheries Ireland (IFI) and the National Parks and Wildlife Service (NPWS) Development Applications Unit (DAU) during the design stage of this project. The DAU Manager's letter dated the 28th February 2020 (Ref G Pre00324/2019) included recommendations from the Minister of Culture Heritage and the Gaeltacht on what should be considered as part of survey work for the NIS and ecological impact assessment (See **Appendix 3**).

2. Regulatory Context and Appropriate Assessment Procedure

2.1 Regulatory Context

The Habitats Directive (Council Directive 92/43/EEC on the *Conservation of Natural Habitats and of Wild Fauna and Flora*) aims to maintain or restore the favourable conservation status of habitats and species of community interest across Europe. The requirements of these directives are transposed into Irish law through the European Communities (Birds and Natural Habitats Regulations; S.I. No. 477 of 2011).

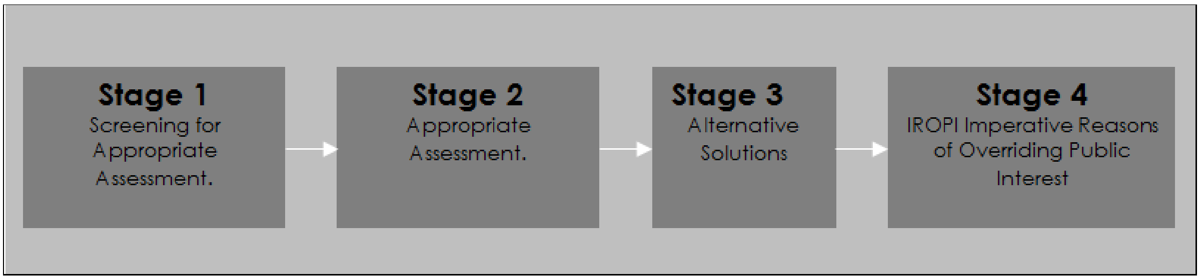
Under the Directive a network of sites of nature conservation importance have been identified by each Member State as containing specified habitats or species requiring to be maintained or returned to favourable conservation status. In Ireland the network consists of SACs and SPAs, and also candidate sites, which form the Natura 2000 network.

Article 6(3) of Council Directive 92/43/EEC of 21 May 1992 on the *Conservation of Natural Habitats and of Wild Fauna and Flora* (as amended) (hereafter 'the Habitats Directive') requires that, any plan or project not directly connected with or necessary to the management of a designated site, but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. A competent authority (e.g. the EPA or Local Authority) can only agree to a plan or project after having determined that it will not adversely affect the integrity of the site concerned.

The possibility of a significant effect on a designated or "European" site has generated the need for an appropriate assessment to be carried out by the competent authority for the purposes of Article 6(3). A Stage Two Appropriate Assessment is required if it cannot be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site. The first (Screening) Stage for appropriate assessment operates merely to determine whether a (Stage Two) Appropriate Assessment must be undertaken on the implications of the plan or project for the conservation objectives of relevant European sites.

2.2 Appropriate Assessment Procedure

The assessment requirements of Article 6(3) establish a stage-by-stage approach. This assessment follows the stages outlined in the 2001 European Commission publications "*Assessment of plans and projects significantly affecting Natura 2000 sites: methodological guidance on the provisions of Articles 6(3) and 6(4) of the Habitats Directive 92/43/EEC*" (EC 2001), *Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (Draft)* Office for Official Publications of the European Communities, Luxembourg (EC, 2015) and *Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC* (EC 2021).



The stages are as follows:

<u>Stage One</u>: Screening — the process which identifies any appreciable impacts upon a Natura 2000 site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant;

<u>Stage Two</u>: Appropriate assessment — the consideration of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives.

Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts;

Stage Three: Assessment of alternative solutions: The process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site. It is confirmed that no reliance is placed by the developer on Stage Three in the context of this application for development consent;

Stage Four: Assessment where no alternative solutions exist and where adverse impacts remain — an assessment of compensatory measures where, in the light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the project or plan should proceed (it is important to note that this guidance does not deal with the assessment of imperative reasons of overriding public interest). Again, for the avoidance of doubt, it is confirmed that no reliance is placed by the developer on Stage Four in the context of this application for development consent.

It is the responsibility of the competent authority to make a decision on whether or not the proposed development should be approved, taking into consideration any potential impact upon any Natura 2000 site within its zone of influence.

3. Description of Proposed Development

3.1 Existing site and project background

The proposed development is located in the vicinity of Fermoy Bridge on the River Blackwater in the town of Fermoy, Co Cork (**Figure**). Fermoy weir extends from the northern bank of the river on the west side of the bridge, through the second arch from the south bank and continues east of the bridge towards a tie in with the apex of Mill Island. Due to the age and the poor condition of the Mill Race Weir wall, an initial breach of the weir which occurred around 2016 has led to progressive unravelling of the masonry Mill Race weir wall and erosion of the western end of Mill Island. The OPW undertook emergency riverbed stabilisation works in the autumn of 2020 to mitigate against the excessive scour that was occurring as a result of the high velocities through the breach. The current speed of the waters flowing through the breach in the weir is too fast to facilitate upstream movement of migratory fish and is unable to meet the requirements of IFI in terms of providing fish passage for fish of all species.

Cork County Council (CCC) is obliged to protect the weir against further deterioration. Despite the presence of a fish ladder in the weir, and the existing breach, the weir acts as a barrier to the passage of certain fish species. The breach in the weir means that there is no flow through the existing fish ladder in most flow conditions. The project requires a solution that will enable CCC to fulfil their obligations to maintain and repair the weir (as its owner) at Fermoy, a Protected Structure under Section IV of the Planning & Development Act 2000 and comply with the conservation and fisheries obligations to provide for the free passage of fish within the River Blackwater arising under the Water Framework Directive, Habitats Directive and Inland Fisheries Act 2010 and related legislation.

In order to comply with the above legislative requirements, it is proposed to construct a new fish bypass channel on the northern bank of the river on the western side of Fermoy Bridge.

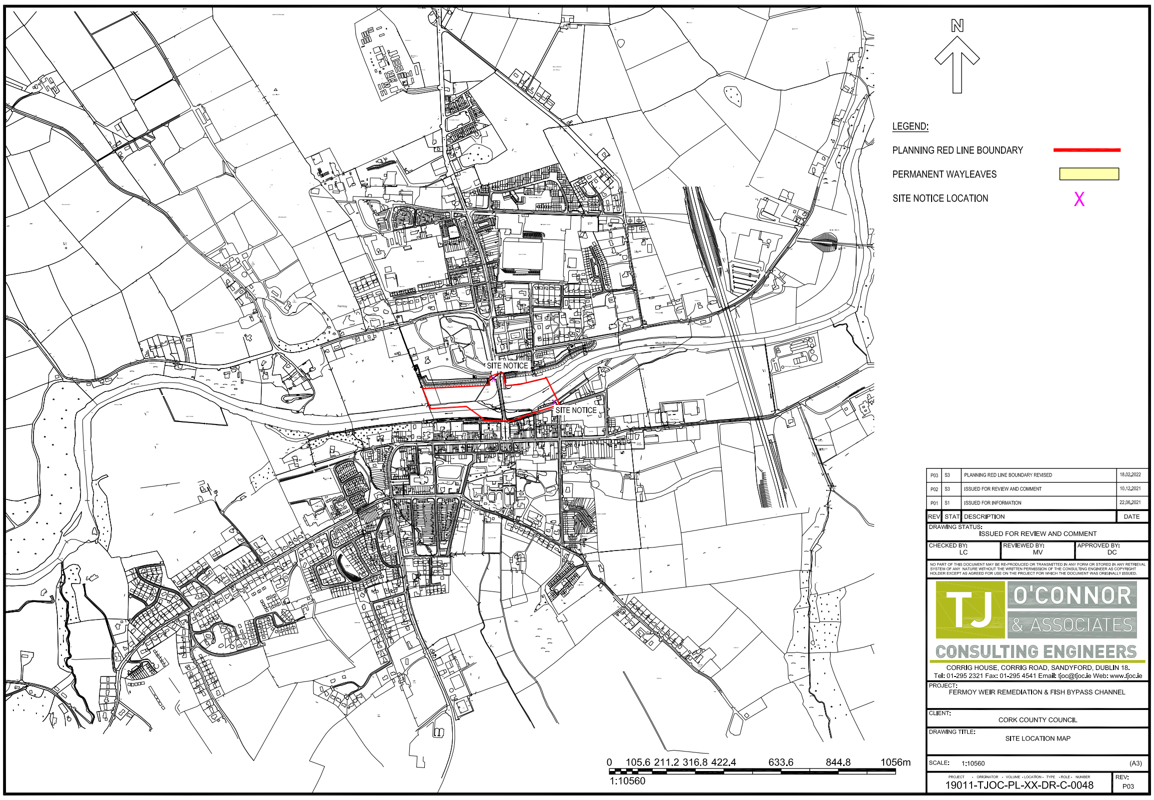


Figure 1. Site location | Source TJ O'Connor

3.2 Proposed Development

3.2.1 Works Proposal

The proposed project comprises the remediation of the existing weir, including reconstruction of breached sections of the weir, and the construction of a rough channel pool bypass to provide for fish passage around the weir (**Figure 2**). Further detail on the channel design and construction works are included in **Appendix 2 Drawings**. Further details on the options considered before choosing the final design chosen for the fish bypass channel and weir remediation works are included in the Natura Impact Statement (NIS) which accompanies this application.

The weir remediation works can be divided into two different elements which comprise the remediation of the section of the weir, upstream of Fermoy Bridge, including the existing fish ladder incorporated in the weir, and the section of the weir downstream of the bridge. The weir is categorised as a rubble embankment (or Crump) type weir upstream of the bridge and extending for a distance of 37m east of Fermoy Bridge. The remaining section of the weir, extending eastwards, is a gravity wall type weir (referred to as the Mill Race weir wall section). It is this section of the weir that has been breached in the approx. locations as shown on the Existing Site Layout Plan drawing 19011-TJOC-PL-XX-DR-C-0051 included in the planning drawings and reproduced at **Appendix 2**.

The locations of the different sections of the weir are indicated on Drawing No. 19011-TJOC-PL-XX-DR-C-0058 in **Appendix 2.** A section of the gravity wall type weir has collapsed resulting in a breach in the weir.

The locations of cross-section through the existing weir, as well as proposed remedial works to each of these sections, are shown on drawings 19011-TJOC-PL-XX-DR-C-0059 and 19011-TJOC-PL-XX-DR-C-0060 (**Appendix 2**) and are described below. Proposed remedial details to the existing fish pass are included on Drawing No. 19011-TJOC-PL-XX-DR-C-0081 (See **Appendix 2**).

3.2.2 Weir remediation - Embankment Section

The remediation of the embankment (crump) section of the weir will involve the removal of the existing concrete apron and resetting of the limestone setts with the addition of random rubble fill (similar to the existing) where required. A high tensile geotextile will be incorporated to assist in reducing wash out of the fill in the embankment. At both the upstream heel and downstream toe of the crump weir section, the undercut / missing stonework will be reset on concrete heel and toe footings along with the addition of rock armour on both the upstream and downstream sides to prevent undercurrents undermining the embankment, in particular on the downstream section in the future.

The crest of the crump weir will be reinstated to a level corresponding to the historic level of the weir as evident from the historic photographs of the weir. A level of 21.45mOD is proposed for this section on the remediated weir.

Cross-sections through the embankment section of the weir, showing the proposed remediation works, are shown at Drawing No.'s 19011-TJOC-PL-XX-DR-C-0061 and 19011-TJOC-PL-XX-DR-C-0062 included in the planning drawings and reproduced at **Appendix 2**.

3.2.3 Weir Remediation – Mill Race Weir Wall

The remediation of the Mill Race section of the weir, east of the Bridge, will involve reconstructing the breached sections with existing and new stonework to closely resemble Fermoy Weir Remediation and Fish Bypass Channel Outline Construction Management Plan the existing masonry. Given the nature of this section of the weir, it is proposed to inject natural cement (also referred to as Prompt) into the fill sections and place mass concrete in the core of the new section of the weir. The stonework facing will then be pointed in natural cement and the downstream face of the weir protected by adding rock armour. The capping of the Mill Race wall will be removed, the wall raised and the capping reset to a remediated level of 21.55mOD.

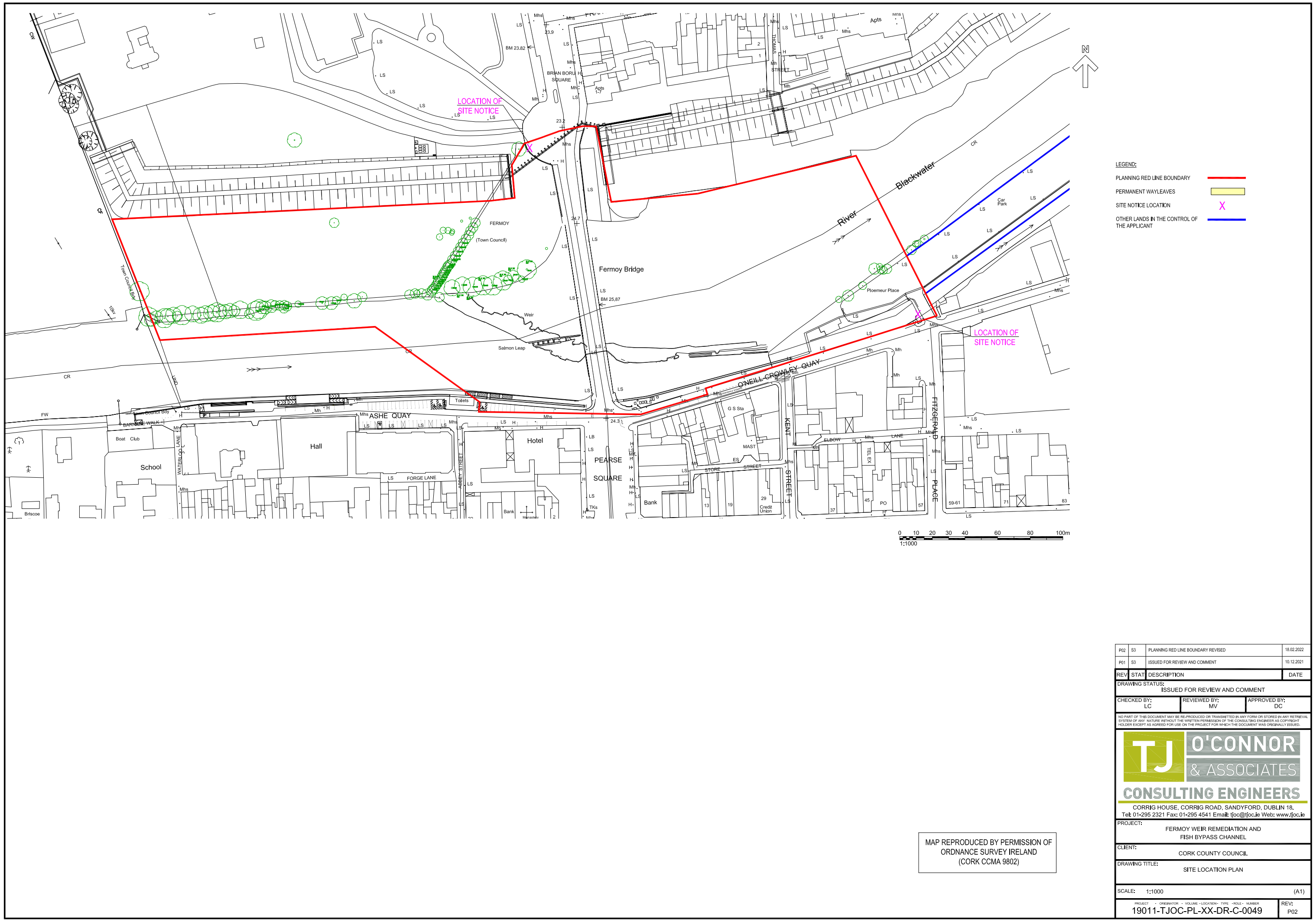


Figure 2. Proposed development site boundary | Source TJ O'Connor

3.2.4 Proposed Fish Bypass

The proposed bypass consists of constructing a curved rock (rough channel pool) ramp type of bypass in the northern bank of the river Blackwater, west of Fermoy Bridge. The rock ramp will provide a ladder for fish migrating upstream and resting pools would be created by the varying levels of rock weir walls.

The Bypass Channel will have sheet piled masonry faced side walls, The bed of the channel will comprise a gravel bed on rockfill. Armourstone pitched vertically will create the intermediate pools (12 No in total) and steps in the bypass channel.

The construction of the Bypass channel will require the removal of a number of riverbank trees. Planting of willow into the embankment of the fish pass will screen views of the development. A riparian enhancement planting scheme and wildflower meadow is proposed for the riverbank area to the north of the fish pass site.

A drawing of the proposed fish bypass channel is presented on Drawing No. 19011-TJOC-PL-XX-DR-C-0053.

5.2.5 Principal Characteristics

The principal characteristics of the proposed development are as follows:

Bypass Channel

- Felling of approximately 30 No trees for Bypass channel and demolition (by lowering) of approximately 110m of existing masonry river wall;
- Excavation of ~14,500m^3 of spoil for construction of Bypass;
- Installation of ~2,050m^2 of sheet piles and ~250m length of concrete capping beams for side walls of Bypass Channel;
- Construction of ~250m^2 of masonry facing to bypass channel walls;
- Placement of ~3,750m^3 of Gravel and rockfill for base of bypass channel;
- Placement of ~95m^3 of Armourstone pitched vertically to create steps/ intermediate weirs in the Bypass channel;
- Installation of ~70m^3 of concrete and ~500m^2 of sheet piles for inlet weir wall to bypass channel;
- Profiling and landscaping ~175m^2 of banks with 1:2 to 1:4 side slopes with landscaping as per Landscape Architect's proposals;
- Restoration of existing Salmon leap including replacement of damaged and missing limestone from side walls and base;
- Riverbed profiling between outlet from Fish Bypass Channel and Fermoy Bridge ~425m^3.

Weir Remediation

- Demolition of ~176m^3 of concrete apron on face of embankment;
- Placement of ~2,800m^2 of geotextile fabric and resetting of 2,800m^2 of limestone sets;
- Excavation of ~315m length of trenches in river bed for toe and heel protection to embankment;
- Placement of ~395m^3 of concrete in toe and heel trenches;
- Placement of ~833m^3 of rock armour to toe and heel of embankment;
- Construction of ~95m^3 of concrete core for reconstructed Mill Race wall where the wall has been breached
- Removal of capping stone from existing Mill Race Wall
- Natural cement injection to both faces existing masonry weir wall (91.2m^2);
- Grout injection of ~92m^2 of masonry in existing Mill Race Weir wall;
- Pointing of ~260m^2 of Masonry in existing Mill Race Weir wall
- Raising of ~15m of existing weir wall with masonry and *in situ* concrete.
- Reinstatement of capping stones to Weir wall at adjusted level.

All ancillary works including tree felling, temporary diversion and control of flows, tie into existing structures and riverbanks, provision of access causeways and haul routes, disposal of surplus material, ecological monitoring, silt fences and curtains.

3.3 Construction Methodology

The construction of the project will involve conventional construction methodologies and so will require the use of typical construction plant and vehicles. The anticipated phasing of construction will generally be as follows.

3.3.1 Site setup

- Establish site hoarding, signage on north bank of river:
- Establish site offices, welfare facilities and construction deliveries set-down area adjacent the site as shown at Drawing 19011-TJOC- PL-XX-DR-C-0085 (see **Figure 3** below)
- The main compound will be located on the north bank of the Blackwater and a satellite compound will be located in the council carpark at Mill Island.
- All site accommodation and welfare facilities at the main compound will be located above the 1% AEP flood level at this location, based on the OPW's flood maps of the area.

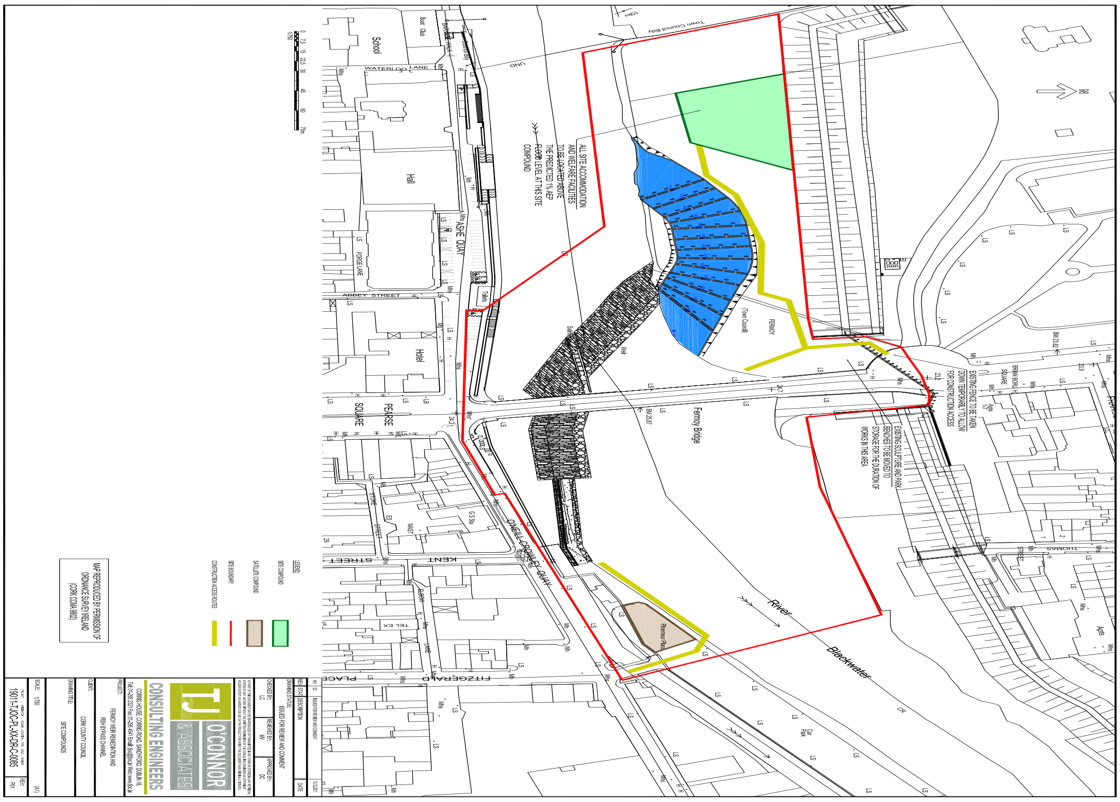


Figure 3. Site setup identifying site compound and satellite compound | Source TJOC

3.3.2 Construction Work Sequence

Construction Works Sequence

The anticipated sequence of construction works will entail:

1. The remediation of the weir upstream (west) of Fermoy Bridge initially;
2. Followed by (or possibly concurrent with) the construction of the fish bypass channel on the north bank of the river.
3. On completion of the bypass channel works, flow from the river will be directed through the bypass channel, at which stage the flow to the Mill Race will be dammed at the southernmost pair of arches of Fermoy Bridge facilitating the remediation and reinstatement of the weir downstream (east) of the bridge.

These stages are shown at Drawing 19011-TJOC- PL-XX-DR-C-0086 (**Figure 4**). Construction works during Stages 1 and 2 will be accessed and serviced from the compound at the north side of the river. Works for Stage 3 will be accessed and serviced from a satellite compound at the Mill Island carpark.

Figure 4. Phasing of instream works | Source TJOC

Stage 1

There are constraints in respect of when in stream works can be carried out within the river Blackwater in accordance with the “Guidelines on the Protection of Fisheries during Construction Works in or Adjacent to Waters”, IFI,2016.

The construction methods used within the River Blackwater will take into account the preservation of stream flows for movement of fish by ensuring a minimum depth of water shall be maintained within the river.

A temporary sheet piled dam will be erected upstream of the works to facilitate the weir remediation works, comprising removal of the existing concrete apron, the excavation of the trench for placement of the new toe protection material and to allow the placement of geotextile fabric and resetting of limestone setts to the embankment section of the weir.

Downstream of the embankment section of the weir, a trench will be excavated for the placement of heel protection materials and, in order to undertake this excavation, a bund will be placed in the river bed to divert the flow away from the area of works. The location of the upstream sheet piled dam and the downstream bund, on either side of the weir, will be located so as to accommodate access routes alongside the embankment.

Bed levels between the end of the bypass channel and the northernmost arches of Fermoy Bridge will be excavated to the levels proposed for the project.

The existing salmon leap will be reinstated and infilled as per the drawings.

Stage 2

Depending on the contractor's programme, in parallel with or following on from Stage 1 activities, the contractor will undertake the following activities for the construction of the Fish Bypass channel.

The bypass channel will be constructed offline without the excavated channel being extended into the river channel until the majority of the bypass works are completed. Therefore, the upstream and down steam ends of the bypass channel will be closed off with temporary sheet piles which will be cut back or extracted when the flow is to be directed into the bypass channel.

The activities required for this stage will include:

- Tree felling;
- Topsoil stripping, stockpiling and disposal of excess;
- Sheet piling for side walls and temporary end walls;
- Bulk excavation, stockpiling of gravels for re use and off-site disposal of excess materials associated;
- Concrete placement for walls and capping beams;
- Construction of masonry faced walls
- Placement of rock fill to bed of channel
- Placement of armourstone and perturbation stones
- Placement of gravels
- Profiling of banks, topsoiling and landscaping;
- Removal of temporary end walls and diversion of flow into channel

Stage 3

Stage 3 construction activities cannot commence until the fish bypass channel is completed in Stage 2 and flows are diverted from the river Blackwater to the Bypass channel. The activities required for this stage will include:

- Erection of temporary dam across southernmost arches of Fermoy Bridge to stop flow to Mill Race Channel;
- Provision of construction access from Mill Island carpark;
- Erection of temporary bund downstream of Mill Race weir wall;
- Excavation and filling of toe and heel protection trenches alongside embankment section weir;

- Placement of geotextile layer and limestone setts for surface of embankment section of weir;
- Removal of capping stone from Weir wall:
- Recovery of stonework from collapsed sections of weir wall:
- Natural cement and grout injection to both faces existing masonry weir:
- Construction of concrete core for replacement section of weir wall:
- Masonry facing to replacement sections of weir wall and pointing of masonry to remaining sections of weir wall
- Raising of sections of weir wall to uniform level and placement/replacement of capping stones to Mill Race weir wall
- Dressing of rock armour at Mill Island to reinstated weir wall and associated profiling of river bed;
- Removal of access and associated bund;
- Removal of temporary dam upstream of bridge;
- Removal of site compounds and demobilisation.

The listed sequence of works is indicative only. In practice, the actual approach taken by the Contractor will be subject to a range of factors, including the following;

Conditions of planning;

- Contractors proposed works methodology;
- Weather;
- Seasonal constraints;
- Ecological constraints (crayfish relocation, fish relocation, turbidity monitoring, etc.;
- Resources;
- Subcontractors;
- Lead in times.

Options for methods of construction will be further explored with the contractor appointed to undertake the work prior to commencement on site.

3.4 Landscape Plan

A proposed landscape plan has been included with this planning application. This includes areas grass meadow, locally sourced willow and an areas of native species riparian enhancements along the boundary of the fish bypass channel including the following:

- 15% Alder - 8-10 cms Trees / 80-100cms Transplants
- 15% Salix 8-10 cms Trees / 80-100cms Transplants
- 10% Wild Cherry 8-10cms Trees / 80-100cms Transplants
- 10% Bird Cherry 8.10cms Trees / 80-100cms Transplants
- 10% Native Black Poplar 80-100cms Transplants.
- 15% Holly 40-60Cms Transplants
- 15% Blackthorn 90-120 Cms Transplants
- 2.5% Bramble - 40-60cms Transplants
- 2.5% Hazel - 60-90Cms Transplants
- 2.5% Dog Rose - 60-90Cms Transplants
- 2.5% Spindle - 90-120 Cms Transplants

4. Screening

4.1 Introduction

This section contains the information required for the competent authority to undertake screening for AA for the proposed development.

The aims of this section are to:

- Determine whether the proposed development is directly connected with, or necessary to, the conservation management of any Natura 2000 sites
- Provide information on, and assess the potential for the proposed development to significantly effect on Natura 2000 Sites (also known as European sites) and
- Determine whether the proposed development, alone or in combination with other projects, is likely to have significant effects on Natura 2000 sites in view of their conservation objectives.

The proposed development is not directly connected with, or necessary to the conservation management of any Natura 2000 sites.

4.2 Study Area and Scope of Appraisal

Natura 2000 sites (European sites) are only at risk from significant effects where a source-pathway-receptor link exists between a proposed development and a Natura 2000 site(s). This can take the form of a direct impact (e.g. where the proposed development and/or associated construction works are located within the boundary of the Natura 2000 site(s) or an indirect impact where impacts outside of the Natura 2000 site(s) affect ecological receptors within (e.g. impacts to water quality which can affect riparian habitats at a distance from the impact source).

The Zone of Influence (ZoI) comprises the area within which the proposed development may potentially affect the conservation objectives (or qualifying interests) of a Natura 2000 site. There is no recommended zone of influence, and guidance from the National Parks and Wildlife Service (NPWS) recommends that the distance should be evaluated on a case-by-case basis with reference to the nature, size and location of the project, the sensitivities of the ecological receptors, and the potential for in-combination effects (cumulative).

In ecological and environmental impact assessment, for an effect to occur there must be a risk enabled by having a source (e.g. construction works at a proposed development site), a 'receptor' (e.g. SAC or other ecologically sensitive feature), and a pathway between the source and the receptor (e.g. a watercourse which connects the proposed development site to the SAC, *ex situ* foraging habitat for SCI birds). A 'receptor' is defined as the Special Conservation Interest (SCI) of SPAs or Qualifying Interest (QI) of SACs for which conservation objectives have been set for the European sites being screened.

Consideration is therefore given to the source-pathway-receptor linkage and associated risks between the proposed development and Natura 2000 sites. For a significant effect to occur there needs to be an identified risk whereby a source (e.g. contaminant or pollutant arising from construction activities) affects a particular receptor (i.e. Natura 2000 site) through a particular pathway (e.g. a watercourse which connects the proposed development with the Natura 2000 site).

The identification of risk does not automatically mean that an effect will occur, nor that it will be significant. The identification of these risks means that there is a possibility of environmental or ecological damage occurring. The level and significance of the effect depends upon the nature of the consequence, likelihood of the risk and characteristics of the receptor.

The precautionary principle is applied for the purposes of screening to ensure that consideration and pre-emptive action is undertaken where there is a lack of scientific evidence. It is noted that mitigation measures are not taken into account in the AA screening assessment process.

4.3 Field Study

Site surveys were carried out to identify the habitats, flora and fauna present at the site. The surveys assessed the potential for all Qualifying Interests (QIs)/ Special Conservation Interests (SCIs) of European sites and third schedule invasive species to occur within the proposed site.

4.4 Source-Pathway-Receptor Model

The likely effects of the proposed development on any European site has been assessed using a source-pathway-receptor model, where:

- A 'source' is defined as the individual element of the proposed works that has the potential to impact on a European site, its qualifying features and its conservation objectives.
- A 'pathway' is defined as the means or route by which a source can affect the ecological receptor.

- A ‘receptor’ is defined as the SCI of SPAs or QI of SACs for which conservation objectives have been set for the European sites being screened.

A source-pathway-receptor model is a standard tool used in environmental assessment. In order for an effect to be likely, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism results in no likelihood for the effect to occur. The source-pathway-receptor model was used to identify a list of European sites, and their QIs/SCIs, with potential links to European sites. These are termed as ‘relevant’ European sites/QIs/SCIs throughout this report.

4.5 Likely Significant Effect

The threshold for a Likely Significant Effect (LSE) is treated in the screening exercise as being above a de minimis level. The opinion of the Advocate General in CJEU case C-258/11 outlines:

“the requirement that the effect in question be ‘significant’ exists in order to lay down a de minimis threshold. Plans or projects that have no appreciable effect on a European site are thereby excluded.

If all plans or projects capable of having any effect whatsoever on the site were to be caught by Article 6(3), activities on or near the site would risk being impossible by reason of legislative overkill.”

In this report, therefore, ‘relevant’ European sites are those within the potential ZoI of activities associated with the construction and operation of the proposed development, where LSE pathways to European sites were identified through the source-pathway-receptor model.

4.6 Screening Process

The Screening for Appropriate Assessment will incorporate the following steps:

Definition of the zone of influence for the proposed works;

- Identification of the European sites that are situated (in their entirety or partially or downstream) within the zone of influence of the proposed works;
- Identification of the most up-to-date QIs and SCIs for each European site within the zone of influence;
- Identification of the environmental conditions that maintain the QIs/SCIs at the desired target of Favourable Conservation Status;
- Identification of the threats/impacts – actual or potential that could negatively impact the environmental conditions of the QIs/SCIs within the European sites;
- Highlighting the activities of the proposed works that could give rise to significant negative impacts; and
- Identification of other plans or projects, for which in-combination impacts would likely have significant effects.

4.7 Desktop Review

A desktop review facilitates the identification of the baseline ecological conditions and key ecological issues relating to Natura 2000 sites and facilitates an evaluation assessment of potential in-combination impacts. Sources of information used for this report include reports prepared for the Fermoy area and information from statutory and non-statutory bodies. The following sources of information and relevant documentation were utilised:

- National Parks & Wildlife Service (NPWS) - www.npws.ie
- Environmental Protection Agency (EPA) – www.epa.ie
- National Biodiversity Data Centre (NDBC)– www.biodiversityireland.ie
- *County Cork Biodiversity Action Plan 2009-2014*
- NPWS (2012) *Blackwater River (Cork/Waterford) SAC (site code 2170) Conservation objectives supporting document -coastal habitats*
- NPWS (2012) *River Blackwater (Cork/Waterford) SAC (site code 2170) Conservation objectives supporting document- woodland habitats*
- King J. J. and Linnane S. M. (2004) *The status and distribution of lamprey and shad in the Slaney and Munster Blackwater SACs. Irish Wildlife Manuals, No. 14.* National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland and
- NS 2 (2010) *Freshwater Pearl Mussel. Second Draft. Munster Blackwater Sub-basin management plan.*
- Sweeney, N. and Sweeney, P. (2017) *Expansion of the White-clawed Crayfish (Austropotamobius pallipes (Lereboullet)) population in the Munster Blackwater. Irish Naturalists'* Journal 35: 94-98.
- DixonBrosnan (2020). *Natura Impact Statement (NIS) Emergency Maintenance Works Fermoy, Co. Cork*
- Sweeney (2012). *Ecological Assessment of Likely Significant Impacts of Proposed Repairs to the Fermoy Weir Fish Pass*
- Sweeney (2014). *Likely Significant Impacts of a Proposed Fish Bypass Channel at Fermoy Weir – Screening Statement and NIS,*
- Sweeney (2017). *Ecological Assessment of Likely Significant Impacts of Proposed Rehabilitation Works to the Fermoy Weir.*
- *Fermoy flood relief scheme – additional bat and Otter surveys 2007* (DixonBrosnan 2007)
- *Flood Relief Scheme Fermoy, Co. Cork* (Punch & Partners, 2005)
- Bat Conservation Ireland – http://www.batconservationireland.org
- Birdwatch Ireland - http://www.birdwatchireland.ie/
- Amber Barrier Atlas - https://amber.international/european-barrier-atlas/

- Invasive Species Ireland - http://www.invasivespeciesireland.com/
- *Best Practice Guidance for Habitat Survey and Mapping* (Heritage Council, 2011)
- *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (National Roads Authority, 2009)
- *Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU)* European Union, 2017
- *Assessment of plans & projects in relation to N2K sites – Methodological Guidance* (EC 2021).
- *Guidance document on the strict protection of animal species of Community interest under the Habitats Directive* (EC 2021) and
- *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessmen*t (DoHLGH 2018).

5. Natura 2000 Sites

5.1 Designated sites within a Zone of Influence

In accordance with the European Commission Methodological Guidance (EC 2018), a list of Natura 2000 sites that can be potentially affected by the proposed development has been compiled. All candidate SAC's (cSAC) and SPAs sites within the zone of influence of the proposed development have been identified in **Table 1** and shown in **Figure 5 and Figure 6**.

Table 1. Natura 2000 sites and their location relative to the proposed development site

Natura 2000 Sites	Site Code	Distance at closest point and potential source-pathway-receptor link
Special Area of Conservation (SAC)		
Blackwater River (Cork/Waterford) SAC	002170	0km (within SAC). A source-pathway-receptor link has been identified between the source (proposed development site) and the receptor (Blackwater River (Cork/Waterford) SAC) via a potential pathway (habitat loss, direct and indirect injury or mortality to qualifying species, impacts on water quality, noise and disturbance, spread of invasive species and biosecurity risk during construction, barriers to movement during construction or operational phase, changes in hydrological regimes during operation).
Special Protection Area		
Blackwater Callows SPA	004094	1.4km northwest (1.6km downstream). A source-pathway-receptor link has been identified between the source (proposed development site) and the receptor (Blackwater Callows SPA) via a potential pathway (disturbance and loss of *ex situ* foraging habitat and impacts on water quality during construction).

The proposed development site is located within the Blackwater River (Cork/Waterford) SAC and therefore there is potential for habitat loss within the SAC boundary. The following pathways have been identified which could impact on the conservation objectives of the Natura 2000 sites:

- Potential impacts from loss of habitat during construction and operation
- Potential impacts from direct and indirect injury/mortality effects to qualifying species during construction
- Potential impacts on water quality during construction
- Potential impacts from noise and disturbance during construction and lighting during operation
- Potential impacts from the spread of invasive species and biosecurity risks during construction
- Potential impacts on fish migration and spawning i.e., barrier to movement during construction and operation
- Potential impacts from changes in hydrological regimes during operation, and
- In-combination effects.

Instream works during construction could potentially result in contamination of local waters and lead to a reduction in water quality within the River Blackwater. Instream works could also create a barrier to Otter and fish/aquatic invertebrates including qualifying species for the Blackwater River (Cork//Waterford) SAC. Noise and disturbance during the construction phase could potentially impact on terrestrial qualifying species i.e., Otter, for the Blackwater River (Cork/Waterford) SAC. Piling works adjacent to the river could potentially impact on aquatic qualifying species, via disturbance and injury or mortality though vibration impacts i.e., migratory fish. During operation, changes in hydrological regimes and water levels could potentially impact on qualifying habitats upstream and downstream of the proposed development site e.g., 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) and 3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation.

The Blackwater Callows SPA is located 1.4km northeast of the proposed development site. SCIs from the SPA e.g. Teal, Whooper Swan, could potentially forage within the River Blackwater at or adjacent to the proposed works. Therefore SCIs could be impacted by disturbance to *ex situ* foraging habitats during the construction or operational phase. Changes in water quality during construction could potentially impact on the qualifying interests for the SPA.

Therefore, a source-pathway-receptor link has been identified between the source (proposed development) and the receptor (Blackwater River (Cork/Waterford) SAC and Blackwater Callows SPA) via a potential pathway (habitat loss, direct and indirect injury or mortality to qualifying species, impacts on water quality, noise and disturbance, spread of invasive species and biosecurity risk during construction, barriers to movement during construction or operational phase, changes in hydrological regimes during operation). Further information on these Natura 2000 sites is provided below and full site synopses are included **Appendix 1**.

Given the distances involved, the lack of hydrological or other connection, no pathway for impact on any other Natura 2000 site has been identified.

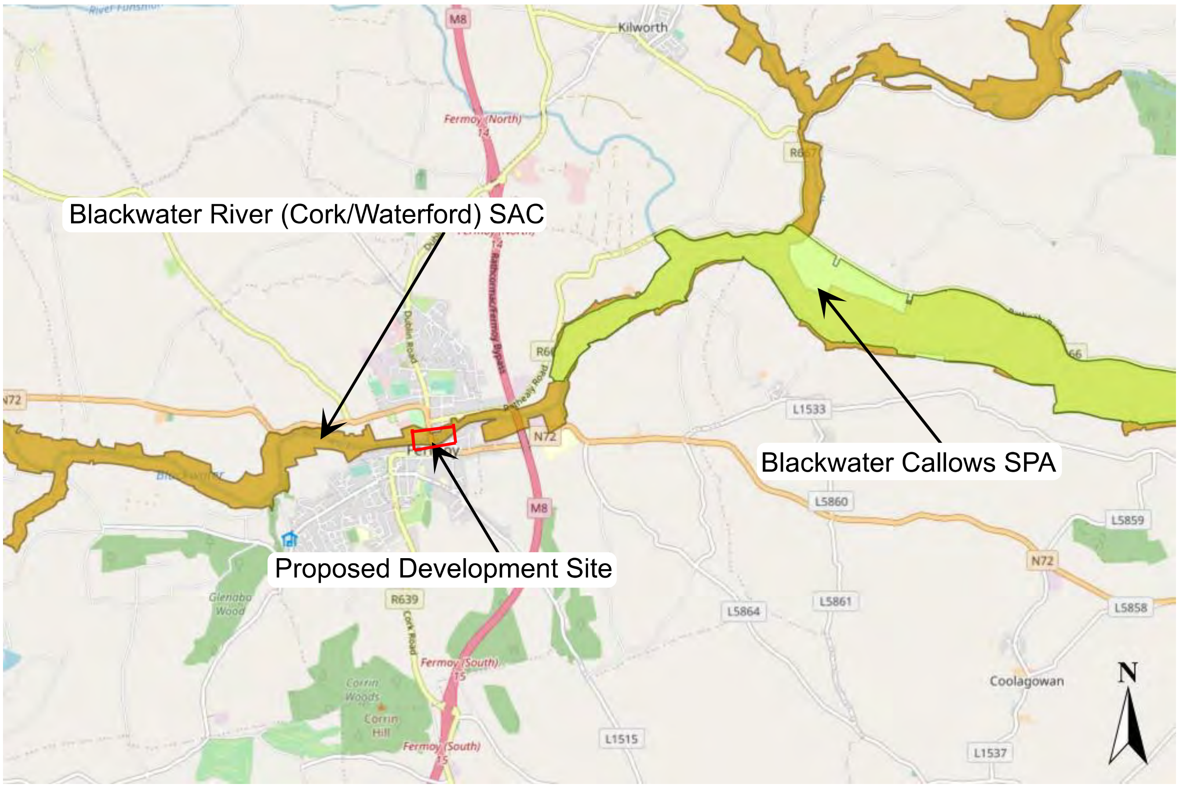


Figure 5. Natura 2000 sites within zone of influence of the proposed development site (approximate red line boundary) | Source EPA Envision Mapping | Not to scale

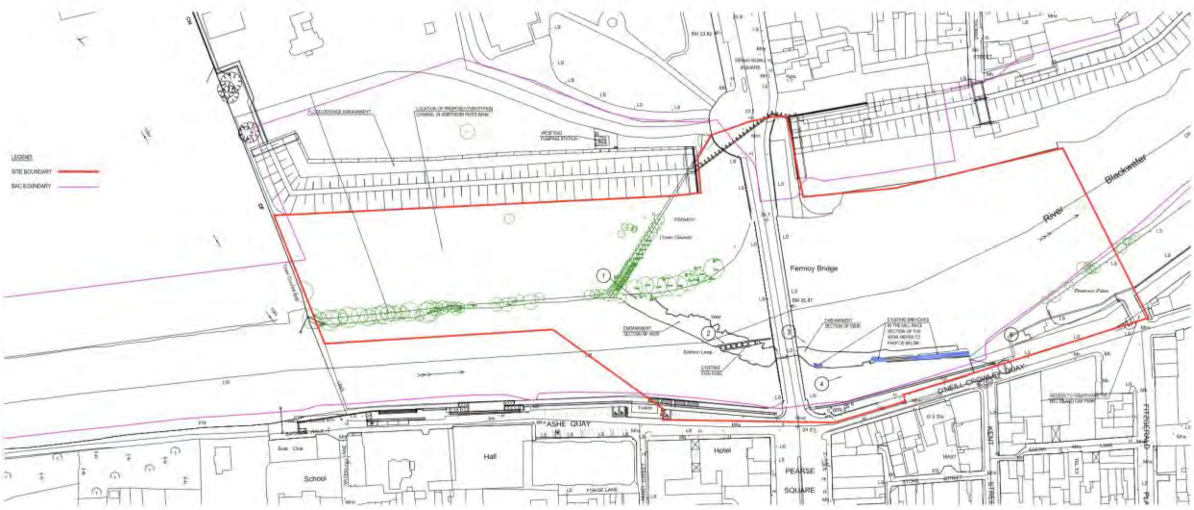


Figure 6. Proposed Development site boundary (red line) and Blackwater River (Cork/Waterford) SAC (pink line)

5.2 Blackwater River (Cork/Waterford) SAC (Site code 002170)

The River Blackwater is one of the largest rivers in Ireland, draining a major part of Co. Cork and parts of Cos. Kerry, Limerick, Tipperary and Waterford. The site consists of most of the freshwater stretches of the system as well as the estuarine component at Youghal. Tidal influence extends almost to Cappoquin. The Blackwater rises in the east Kerry uplands where Namurian grits and shales build the low heather-covered plateaux. In the lowlands in the Mallow district it passes over limestone and later cuts through ridges of Old Red Sandstone to the south of Cappoquin. Main tributaries include the Rivers Lickey, Bride, Allow and Awbeg. A wide range of habitats associated with the rivers are included within the site, including substantial areas of woodland (deciduous, mixed), scrub, wet grassland, swamp and marsh vegetation, bog, salt marshes and intertidal sand and mud flats. Areas of improved grassland, arable land and coniferous plantations are included in the site for water quality reasons.

The site supports important examples of a range of Annex I habitats, notably estuaries, intertidal mudflats and sandflats, perennial vegetation of stony banks, salt meadows, floating river vegetation, alluvial forests and oak woodlands. Most of these are of good quality and extensive in area. The Blackwater system is an important salmonid fishery and is of high conservation value for *Salmo salar*. Also supports important populations of *Lampetra planeri, L. fluviatilis, Petromyzon marinus* and *Alosa fallax fallax*. Substantial populations of *Margaritifera margaritifera* occur, while *Austropotamobius pallipes* is found in the Awbeg River. *Lutra lutra* is widespread throughout the site and has been subject to detailed surveys. *Trichomanes speciosum* occurs at one location. Annex I bird species present in the site include breeding *Egretta garzetta, Alcedo atthis* and *Falco peregrinus* and wintering *Cygnus cygnus* and *Pluvialis apricari*a. A good diversity of other winter waterfowl species also occurs.

A full site synopsis for the Blackwater River (Cork/Waterford) SAC is included as **Appendix 1** of this report.

5.3 Blackwater Callows SPA

The Blackwater Callows SPA comprises the stretch of the River Blackwater that runs in a west to east direction between Fermoy and Lismore in Counties Cork and Waterford, a distance of almost 25km. The site includes the river channel and strips of seasonally-flooded grassland within the flood plain. Sandstone ridges, which run parallel to the river, confine the area of flooding to a relatively narrow corridor.

The Blackwater Callows SPA is of importance for its populations of wintering waterfowl, including an internationally important population of Whooper Swan and nationally important populations of Wigeon, Teal and Black-tailed Godwit. The presence of Whooper Swan, as well as Little Egret, is of particular note as these species are listed on Annex I of the E.U. Birds Directive. Part of the Blackwater Callows SPA is a Wildfowl Sanctuary.

A full site synopsis for the Blackwater Callows SPA is included as **Appendix 1** of this report.

5.4 Natura 2000 sites – Features of interests and conservation objectives.

The EU Habitats Directive contains a list of habitats (Annex I) and species (Annex II) for which SACs must be established by Member States. Similarly, the EU Birds Directive contains lists of important bird species (Annex I) and other migratory bird species for which SPAs must be established. Those that are known to occur at a site are referred to as ‘qualifying interests’ and are listed in the Natura 2000 forms which are lodged with the EU Commission by each Member State. A ‘qualifying interest’ is one of the factors (such as the species or habitat that is present) for which the site merits designation. The National Parks and Wildlife Service (NPWS) are responsible for the designation of SACs and SPAs in Ireland.

The conservation objectives for the sites are detailed in the following publications:

NPWS (2012) *Conservation Objectives: Blackwater River (Cork/Waterford) SAC 002170, Version 1.* NPWS, Department of Arts, Heritage & the Gaeltacht.

NPWS (2022) *Conservation objectives for Blackwater Callows SPA [004094]. Generic Version 9.0.* Department of Housing, Local Government and Heritage.

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network. European and national legislation places a collective obligation on Ireland and its citizens to maintain at favourable conservation status sites designated as Special Areas of Conservation and Special Protection Areas. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level. Favourable conservation status of a habitat is achieved when its natural range, and area it covers within that range, is stable or increasing, and the ecological factors that are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when population data on the species concerned indicate that it is maintaining itself, and the natural range of the species is neither being reduced or likely to be reduced for the foreseeable future, and there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis. The species and/or habitats listed as qualifying interests for Blackwater River (Cork/Waterford) SAC and Blackwater Callows SPA and specific conservation objectives are included in **Tables 2-4.**

Table 2. Qualifying Species for the Blackwater River (Cork/Waterford) SAC

Species code	Species		*Conservation objective*
1029	Freshwater Pearl Mussel	*Margaritifera margaritifera*	Restore
1092	White-clawed crayfish	*Austropotamobius pallipes*	Maintain
1095	Sea Lamprey	*Petromyzon marinus*	Restore
1096	Brook Lamprey	*Lampetra planeri*	Maintain
1099	River Lamprey	*Lampetra fluviatilis*	Maintain
1103	Twaite shad	*Alosa fallax*	Restore
1106	Atlantic Salmon	*Salmo salar*	Maintain
1355	Otter	*Lutra lutra*	Restore
1421	Killarney Fern	*Trichomanes speciosum*	Maintain

Restore = Restore favourable conservation condition, Maintain = Maintain favourable conservation condition

Table 3. Qualifying Habitats for the Blackwater River (Cork/Waterford) SAC

Habitat Code	Habitat	Conservation objective
1130	Estuaries	Maintain
1220	Perennial vegetation of stony banks	Maintain
1140	Mudflats and sandflats not covered by seawater at low tide	Maintain
1310	Salicornia and other annuals colonizing mud and sand	Maintain
1330	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	Restore
1410	Mediterranean salt meadows (*Juncetalia maritimi*)	Maintain
3260	Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation	Maintain
91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnion incanae, Salicion albae*)	Restore
91J0	*Taxus baccata woods of the British Isles	Under Review

Habitat Code	Habitat	Conservation objective
91A0	Old sessile oak woods with Ilex and Blechnum in British Isles	Restore

Restore = Restore favourable conservation condition, Maintain = Maintain favourable conservation condition

Table 4. Qualifying Species for the Blackwater Callows SPA

Species code	Species		*Conservation objective*
A038	Whooper Swan	*Cygnus cygnus*	Maintain/Restore
A052	Teal	*Anas crecca*	Maintain/Restore
A050	Wigeon	*Anas penelope*	Maintain/Restore
A056	Shoveler	*Anas clypeata*	Maintain/Restore
A156	Black-tailed Godwit	*Limosa limosa*	Maintain/Restore

Restore = Restore favourable conservation condition, Maintain = Maintain favourable conservation condition

6. Ecological surveys

The terrestrial and aquatic habitats within and adjacent to the proposed development site were classified using the classification scheme outlined in the Heritage council publication. *A Guide to Habitats in Ireland* (Fossitt, 2000) and cross referenced with Annex I Habitats where required.

The habitat of highest ecological value within the works area is the River Blackwater. The River Blackwater is one of Munster's largest rivers and is a Class A River of International Importance. The section of the Blackwater which may be affected is within the Blackwater River (Cork/Waterford) SAC. The River Blackwater is typical of many Munster rivers in that for most of its length it runs along a west-east axis through a Carboniferous limestone valley, draining much of Kerry, Cork and Waterford, before turning abruptly southwards and discharging to the sea through an Old Red Sandstone fold on the Cork-Waterford border. The Blackwater catchment includes the area drained by the River Blackwater and all streams entering tidal water between East Point and Knockaverry, Youghal, Co. Cork. The catchment drains a total area of 3,310km^2. In total, the Blackwater is 120km long. The largest urban centre in the catchment is Mallow, other main urban centres include Fermoy, Mitchelstown, Youghal, Kanturk and Millstreet. The total population of the catchment is approximately 109,030 with a population density of 33 people per km^2.

The River Blackwater main channel is a designated salmonid fishery under the EC (Quality of Salmonid Waters) Regulations of 1988 (SI 84 of 1988), implementing the Freshwater Fish Directive (78/659/EEC). The River Blackwater is known to contain populations of Brown Trout (*Salmo trutta*), Lamprey (Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*) and River lamprey (*Lampetra fluviatilis*), Freshwater Pearl Mussel (*Margaritifera margaritifera*) and European Eel (*Anguilla anguilla*). The River Blackwater is notable for being one of the best Atlantic Salmon (*Salmo salar*) fishing rivers in the country.

6.1 Terrestrial Habitats

None of the terrestrial habitats recorded within the proposed works area correspond to terrestrial qualifying habitats for the Blackwater River (Cork/Waterford) SAC. Terrestrial habitats noted within the proposed works area, or in their immediate vicinity, largely consist of common habitats i.e., BL3 Buildings & artificial surfaces, WL2 Treelines and GA2 Amenity grassland/GS4 Dry Meadows and grassy verges (**Figure 7**). The vegetation on sections of the gravel islands/banks within the channel (Tall-herb swamps FS2) have links with the Annex I habitat 'hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]', however this is a small, fragmented area which is not a high value example of this habitat type. This habitat (6430) is not a qualifying habitat for the Blackwater River (Cork/Waterford) SAC.

Investigation of the treelines and woodland habitat in the vicinity of the proposed development site indicate that the trees earmarked for removal are dominated non-native species i.e., Norway Maple *Acer platanoides*, Lime *Citrus × aurantiifolia*, Lawson's Cypress *Chamaecyparis lawsoniana* and Black Poplar *Populus nigra*. This planted treeline does not correspond to a qualifying habitat for Blackwater River (Cork/Waterford) SAC.

The habitat *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] does not occur in proximity to the proposed works area. However, a small area woodland which was recorded approximately 700m upstream of the works area has some characteristics of Alluvial woodland.

Himalayan Balsam *Impatiens glandulifera* and Japanese Knotweed *Fallopia japonica* was recorded growing within and in close proximity to the proposed development site.

6.2 Aquatic Surveys

The section of the River Blackwater which includes the proposed development site, was surveyed as part of the ecological assessment of the Fermoy Weir Remediation Project (**Appendix 4** *Aquatic baseline report for Fermoy Weir, Fermoy, Co. Cork* Triturus, 2020). In general, the high-water velocities upstream of Kent Bridge proposed works area make it unsuitable for the qualifying habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]. However, examples of this habitat were recorded at the proposed development site. Macrophyte communities representative of the Annex I habitat ''Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and Callitricho-Batrachion or aquatic mosses [3260]' ('floating river vegetation', FRV) were present within the River Blackwater survey area. Sections C and D, downstream of Fermoy Weir, supported frequent Ranunculus subspecies Batrachion agg. in addition to other indicator species (EC, 2013) including Callitriche sp., Myriophyllum spicatum and the moss Fontinalis antipyretica. The better-quality areas of FRV habitat could be considered as those featuring an overall higher percentage cover, i.e. survey Section C downstream of Kent Bridge, along the north bank. Given the paucity of macrophytes, no good examples of this Annex I habitat were present upstream of the weir (survey sections A and most of B).

An ecological evaluation of the survey area was based on the results of the aquatic surveys. The aquatic habitats within the proposed development site i.e., River Blackwater were considered of International importance given they formed part of the Blackwater River

(Cork/Waterford) SAC (002170). These survey sections were also considered of high value given the presence of qualifying interest *Lampetra* sp. ammocoetes, Atlantic salmon, White-clawed Crayfish and Otter in addition to the Annex I habitats 'Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and Callitricho-Batrachion or aquatic mosses [3260]'.

6.3 Otter survey

An Otter (*Lutra lutra*) survey was undertaken for the River Blackwater in the vicinity of the proposed works area as part of the assessment for the Fermoy Weir Remediation Project (*Aquatic baseline report for Fermoy Weir, Fermoy, Co. Cork* Triturus, 2020). Otter records were widespread throughout the respective grid squares, on the River Blackwater and several tributaries (NBDC data; NPWS data). Although no records overlapped the survey area, Otter are known locally in the vicinity of Fermoy Weir (Ross Macklin pers. obs.).

A total of eleven Otter signs were recorded within the survey area in the vicinity of Fermoy Weir. The majority of signs were spraints although three couch sites and a holt were also recorded. The existing weir structure was evidently an important resting/feeding area for Otter, with very regular spraint sites present in addition to couch areas.

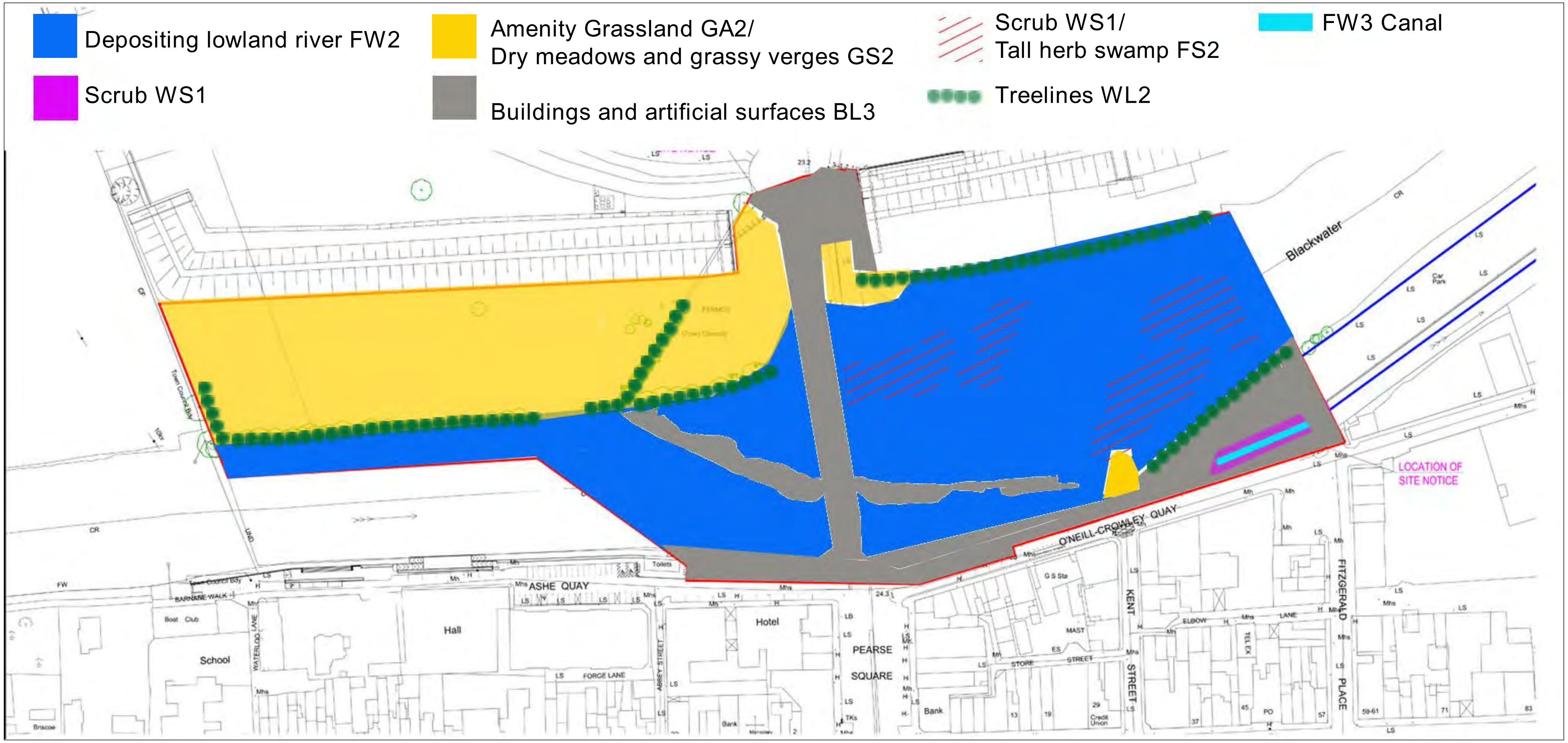


Figure 7. Habitats within proposed development site boundary (Fossitt 2000)

7. Potential Impacts

Potential impacts relate to habitat loss, changes to water quality, the spread of invasive species and biosecurity risk, barriers to movement, increased predation, changes in hydrological regimes and disturbance effects during the construction and operational phase. Based on the *Managing Natura 2000 Sites: The Provision of Article 6 of the Habitats Directive 92/43/EEC* (European Commission (EC), 2018 and CIEEM guidelines '*Guidelines for Ecological Impact Assessment*' (CIEEM, 2019) impacts are listed as significant using a combination of professional judgement and criteria or standards where available, if impacts have the potential to have a significant impact on the ecological integrity on the habitats and species for which the site is designated.

The potential impacts associated with the proposed development are discussed in the following sections with respect to their likelihood to have significant impacts on European sites.

As part of the assessment direct, indirect and in-combination impacts were considered. Direct impacts refer to habitat loss or fragmentation arising from land-take requirements for development. Indirect and secondary impacts do not have a straight-line route between cause and effect, and it is potentially more challenging to ensure that all the possible indirect impacts of the project/plan - in combination with other plans and projects have been established.

Potential impacts were identified as follows:

- Potential impacts from loss of habitat during construction and operation
- Potential impacts from direct and indirect injury/mortality effects to qualifying species during construction
- Potential impacts on water quality during construction
- Potential impacts from noise and disturbance during construction and lighting during operation
- Potential impacts from spread of invasive species and biosecurity risks during construction
- Potential impacts on fish migration and spawning i.e., barrier to movement, increased predation or injury during construction and operation
- Potential impacts from changes in hydrological regimes during operation
- In-combination effects.

7.1 Loss of Habitat

7.1.1 Blackwater River (Cork/Waterford) SAC

The proposed works will take place within and adjacent to the Blackwater River (Cork/Waterford) SAC. The Annex I habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion [3260] vegetation was recorded within the proposed development site boundary. Construction works could lead to the loss of aquatic habitats, included areas of this Annex I habitat. Changes in flow patterns during operation could impact on the distribution this habitat. Loss of aquatic habitat during construction and operation could potentially impact on aquatic qualifying species for the Blackwater River (Cork/Waterford) SAC and reduce the area of foraging and breeding habitat within the SAC boundary.

Significant changes in flow patterns during operation could impact on the distribution of habitats listed as QIs for the Blackwater River (Cork/Waterford) SAC such as *Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]*. Investigation of the treelines and woodland habitat in the vicinity of the proposed development site indicate that the trees earmarked for removal do not correspond to a qualifying habitat for Blackwater River (Cork/Waterford) SAC. However, a small area of woodland habitat approximately 700m upstream of the works area has some characteristics of Alluvial woodland. Applying the precautionary principle, the impact of changes in flow patterns and hydromorphology on the habitat 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] will be screened in for further assessment.

Perennial vegetation of stony banks [1230], Salicornia and other annuals colonizing mud and sand [1310], Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1140] and Mediterranean salt meadows (*Juncetalia maritimi*) [1410] are estuarine habitats which are located over 50km downstream of the proposed development site. The closest point of the qualifying habitat Estuaries [1130], is located approximately 29km downstream of the proposed works area and the closest point of the habitat Mudflats and sandflats not covered by seawater at low tide [1140] is located approximately 46km downstream of the proposed development site. These are robust habitats which are naturally adapted to the extreme fluctuations in silt levels that occur in the estuarine environment and given the high levels of dilution provided in the estuarine environment no impacts from any minor spills of hydrocarbons will occur. No potential effect on these qualifying habitats have been identified.

Therefore, potential impacts on Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation [3260] and Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] from habitat loss during construction and operation will be screened in for further assessment.

7.1.2 Blackwater Callows SPA

The Blackwater Callows SPA is located 1.4km from the proposed development site. Given the distance involved no potential effect on the Blackwater Callows SPA via habitat loss has been identified.

7.2 Mortality and Injury

7.2.1 Blackwater River (Cork/Waterford) SAC

Construction plant within the river during instream works could potentially cause direct injury or mortality to qualifying species which use this section of the River Blackwater. Noise and vibration associated with piling works adjacent to the river could also potentially cause vibrations within the water column which could impact fish species moving through the works area. The possible effects of sound upon behaviour include communication between conspecifics and detection of predators and prey. Such effects may have consequences at the population-level and may affect the viability of the species (Hastings and Popper 2005). A range of responses has been observed when the behaviour of wild fish has been studied in the presence of man-made sounds. Some fish have shown changes in swimming behaviour and orientation, including startle reactions (Pearson *et al.* 1992).

Therefore, potential impacts on Freshwater Pearl Mussel [1029], White-clawed crayfish [1092], Brook Lamprey [1096], River Lamprey [1099], Sea Lamprey [1095], Twaite shad [1103], Atlantic Salmon [1106] and Otter [1355] from injury and mortality during construction will be screened in for further assessment.

7.2.2 Blackwater Callows SPA

The habitats within the works area do not provide regular foraging habitats for SCI birds. No pathway for impact via injury or mortality due to instream works has been identified.

7.3 Water quality

7.3.1 Blackwater River (Cork/Waterford) SAC

Construction works, including instream works, have the potential to generate elevated silt levels which could have potential effects on the aquatic qualifying species and habitats for the Blackwater River (Cork/Waterford) SAC i.e. Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation [3260], Freshwater Pearl Mussel [1029], White-clawed crayfish [1092], Brook Lamprey [1096], River Lamprey [1099], Sea Lamprey [1095], Twaite shad [1103], Atlantic Salmon [1106] and Otter [1355]. Significant impacts on fish stocks could also impact on prey availability for Otter. Minor spills of hydrocarbons during works could also impact on water quality. Therefore, potential impacts on these qualifying interests from changes in water quality during construction will be screened in for further assessment.

7.3.2 Blackwater Callows SPA

The Blackwater Callows SPA is located 1.4km east (1.6km downstream) of the proposed development site and is potentially hydrologically connected via the River Blackwater. While wetlands are designated as a SCI for the site, there are no sensitive aquatic receptors within the SPA. Given the distance from the proposed development site and the dilution capacity within the River Blackwater over this distance, no significant impacts on the conservation objectives of the Blackwater Callows SPA are predicted to occur.

7.4 Noise and Disturbance

7.4.1 Blackwater River (Cork/Waterford) SAC

Potentially increased noise and disturbance, as well as increased lighting, associated with the site works could cause disturbance/displacement of fauna. If of sufficient severity, there could be impacts on reproductive success. The proposed development is located adjacent to Blackwater River (Cork/Waterford) SAC and QI species may forage or breed within the proposed development site i.e., Brook Lamprey [1096], River Lamprey [1099], Sea Lamprey [1095], Twaite shad [1103], Atlantic Salmon [1106] and Otter [1355]. The conservation objectives of the Blackwater River (Cork/Waterford) SAC may be impacted by increased noise and disturbance during the construction phase of the proposed development. Therefore, potential impacts on these qualifying species from noise and disturbance during construction will be screened in for further assessment.

7.4.2 Blackwater Callows SPA

SCI species for the Blackwater Callows SPA could potentially forage in the vicinity of the proposed development site. Teal have been recorded within 2km of the proposed development site, however there are no records of the other SCI species within the 2km grid square which overlaps with the proposed development site (W89E) (NBDC 2021). Furthermore, no signs of these species were recorded during site visits.

The SCI species for the Blackwater Callows SPA could potentially forage within the amenity grassland areas in Fermoy town. While there are small areas of the amenity grassland in the vicinity of the works area, these will not be impacted by the proposed development and are too small in size to provide critical foraging habitat for SCI species. Furthermore, if SCI birds were to use habitats in the vicinity of the proposed development site, these birds would already be habituated to existing noise and disturbance of Fermoy town centre and would be unlikely to change their foraging patterns during or following construction. No significant impacts from visual or noise disturbances to SCIs or the conservation objectives for the Blackwater Callows SPA will occur.

7.5 Invasive Species and Biosecurity Risk

7.5.1 Blackwater River (Cork/Waterford) SAC

There is potential during the construction phases of the proposed development for invasive species to be spread outside the site boundary. Disturbance of invasive species within the proposed development site could lead to the dispersal of invasive species either via machinery, materials, clothing or wild animals. Two invasive species, Himalayan Balsam *Impatiens glandulifera* and Japanese Knotweed *Fallopia japonica* were recorded in the vicinity of the proposed development site. The Birds and Natural Habitats Regulations 2011 (SI 477 of 2011), Section 49(2) prohibits the introduction and dispersal of species listed in the Third Schedule, which includes Japanese Knotweed and Himalayan Balsam, as follows: "*any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow [….] shall be guilty of an offence.*"

White-clawed Crayfish occur within the Blackwater catchment and establishment of the disease crayfish plague can have highly detrimental impacts on this species. During construction, instream works could lead to further spread of Crayfish plague within the River Blackwater, potentially impacting on White Clawed Crayfish which is a qualifying species for the Blackwater River (Cork/Waterford) SAC.

Therefore, potential impacts from the spread of invasive species and biosecurity risk will be screened in for further assessment.

7.5.2 Blackwater Callows SPA

Given the distance involved and in the absence of a significant pathway by which SCI bird species could be adversely affected by the spread of invasive species, no potential effect on the Blackwater Callows SPA has been identified.

7.6 Barrier to Movement (Fish Migration and Spawning)

7.6.1 Blackwater River (Cork/Waterford) SAC

In-stream works can act as barriers to migration and can also lead to other impacts, such as increases in suspended solids, removal of pools and disturbance to individuals in the intra-gravel life stage. Anthropogenic barriers to migration are one of the most significant threats to the long-term viability of Atlantic Salmon populations in many river catchments (Hendry and Cragg-Hine, 2003) and, consequently, the function of the European network with regard to the conservation of this species. Such barriers can be either physical, e.g., weirs or bridge aprons, or chemical, e.g., pollution. The magnitude of effects can be highly dependent on timing.

Migration of fish species such as Sea and River Lamprey and Atlantic Salmon could potentially be impacted if the construction works create a barrier to migration. Delays to migration and increased lighting can make these species more susceptible to predation or poaching.

Therefore, potential impacts from barriers to movement on fish migration and spawning on Brook Lamprey [1096], River Lamprey [1099], Sea Lamprey [1095], Twaite shad [1103], Atlantic Salmon [1106] will be screened in for further assessment.

7.6.2 Blackwater Callows SPA

There are no qualifying fish species for the Blackwater Callows SPA. Furthermore, the SCI species for the SPA are no piscivorous birds which could potentially be indirectly impacted by a reduction in prey availability.

7.7 Hydrological regime

7.7.1 Blackwater River (Cork/Waterford) SAC

During operation of the weir, changes in the hydrological regime within the River Blackwater would impact on the distribution of the Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho- Batrachion vegetation [3260]. Stream flow, water temperature and streambed composition could impact on the distribution of fish and invertebrate qualifying interests i.e. Freshwater Pearl Mussel [1029], White-clawed crayfish [1092], Brook Lamprey [1096], River Lamprey [1099], Sea Lamprey [1095], Twaite shad [1103] and Atlantic Salmon [1106]. Therefore, potential impacts of changes in hydrological regimes during operation on these QIs will be screened in for further assessment.

7.7.2 Blackwater Callows SPA

There are no sensitive aquatic receptors within the SPA and no pathway for impact from changes in hydrological regime.

7.8 In-combination Impacts

In-combination impacts refer to a series of individual impacts that may, in combination, produce a significant effect. The underlying intention of this in combination provision is to take account of in-combination impacts from existing or proposed plans and projects and these will often only occur over time.

7.8.1 Blackwater River (Cork/Waterford) SAC

High negative pressures, threats and activities identified for the Blackwater River (Cork/Waterford) SAC include grazing, fertilisation, mowing and cutting of grassland. The area surrounding Fermoy town is heavily agriculturalized. Intensive agriculture in particular can have significant impacts on aquatic ecology by increasing nutrients and sediment loads. Wastewater is also discharged from settlements such as Mallow, Kanturk and Fermoy. Surface water run-off during the construction phase could potentially be contaminated with silt, hydrocarbons or other chemicals. This could potentially lead to in-combination impacts within the Blackwater River (Cork/Waterford) SAC. Further investigation is also required to determine if increased noise and disturbance will have in-combination impact on QIs within the Blackwater River (Cork/Waterford) SAC.

Therefore potential in-combination impacts on qualifying habitats and species within the Blackwater River (Cork/Waterford) SAC will be screened in for further assessment.

7.8.2 Blackwater Callows SPA

Given the distance from the works area, the lack of significant impacts identified in this assessment (**sections 7.1 to 7.7**) and following the review of other developments in the vicinity (**Table 5**) no significant in-combination impacts have been identified on the Blackwater Callows SPA.

Table 5. Other developments near site and potential in-combination impacts

Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the European Network	
River Basin Management Plan 2018-2021 (Noted that the Draft River Basin Management Plan for Ireland 2022-2027 is currently at public consultation stage)	The project should comply with the environmental objectives of the Irish RBMP which are to be achieved generally by 2021. Ensure full compliance with relevant EU legislation Prevent deterioration Meeting the objectives for designated protected areas Protect high status waters Implement targeted actions and pilot schemes in focus sub-catchments aimed at: targeting water bodies close to meeting their objective and addressing more complex issues which will build knowledge for the third cycle.	The implementation and compliance with key environmental policies, issues and objectives of this management plan will result in positive in-combination effects to European sites. The implementation of this plan will have a positive impact for the biodiversity. It will not contribute to in-combination or cumulative impacts with the proposed development.
Inland Fisheries Ireland Corporate Plan 2021-2025	To ensure that Ireland's fish populations are managed and protected to ensure their conservation status remains favourable. That they provide a basis for a sustainable world class recreational angling product, and those pristine	The implementation and compliance with key environmental issues and objectives of this corporate plan will result in positive on-combination effects to European sites. The implementation of this

Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the European Network	
The Inland Fisheries Act 2010.	aquatic habitats are also enjoyed for other recreational uses. To develop and improve fish habitats and ensure that the conditions required for fish populations to thrive are sustained and protected. To grow the number of anglers and ensure the needs of IFI's other key stakeholders are being met in a sustainable conservation focused manner. EU (Quality of Salmonid Waters) Regulations 1988. All works during development and operation of the project must aim to conserve fish and other species of fauna and flora habitat; biodiversity of inland fisheries and ecosystems and protect spawning Salmon and trout.	corporate plan will have a positive impact for biodiversity of inland fisheries and ecosystems. It will not contribute to in-combination or cumulative impacts with the proposed works.
Irish Water Capital Investment Plan 2020-2024	Proposals to upgrade and secure water services and water treatment services countrywide.	Likely net positive impact due to water conservation and more effective treatment of water.
Water Services Strategic Plan (WSSP, 2015)	Irish Water has prepared a Water Services Strategic Plan (WSSP, 2015), under Section 33 of the Water Service No. 2 Act of 2013 to address the delivery of strategic objectives which will contribute towards improved water quality and biodiversity requirements through reducing: Habitat loss and disturbance from new / upgraded infrastructure; Species disturbance; Changes to water quality or quantity; and Nutrient enrichment /eutrophication.	The WSSP forms the highest tier of asset management plans (Tier 1) which Irish Water prepare and it sets the overarching framework for subsequent detailed implementation plans (Tier 2) and water services projects (Tier 3). The WSSP sets out the challenges we face as a country in relation to the provision of water services and identifies strategic national priorities. It includes Irish Water's short, medium and long-term objectives and identifies strategies to achieve these objectives. As such, the plan provides the context for subsequent detailed implementation plans (Tier 2) which will document the approach to be used for key water service areas such as water resource management, wastewater compliance and sludge management. The WSSP also sets out the strategic objectives against which the Irish Water Capital Investment Programme is developed. The current version of the CAP outlines the proposals for capital expenditure in terms of upgrades and new builds within the Irish Water owned assets.

Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the European Network	
		The overarching strategy was subject to AA and highlighted the need for additional plan/project environmental assessments to be carried out at the tier 2 and tier 3 level. Therefore, no likely significant in-combination effects are envisaged.
WWTP discharges	Ballyclough, Ballydesmond, Ballyduff WWTP, Ballyhooley, Banteer WWTP, Boherbue WWTP, Bweeng, Castlemagner, Cecilstown, Clondulane, Cullen, Dromahane WWTP, Fermoy WWTP, Freemount, Kanturk WWTP, Kilbrin, Killavullen WWTP, Kilworth, Kiskeam, Knocknagree, Lismore WWTP, Lombardstown, Mallow WWTP, Meelin, Millstreet WWTP, Nad, Newmarket, Rathcool, Rathmore WWTP	Discharges from municipal WWTPs are required to meet water quality standards. Irish Water Capital Investment Plan 2014-2016 and 2017 – 2021 proposes to upgrade water treatment services countrywide. The long-term cumulative impact is predicted to be negligible.
IPPC Programme	There are six IPPC Licence holders discharging directly to the Blackwater River (Cork/Waterford) SAC i.e. Dairygold, Micam, Road Binders, ALPS Electric Ireland, Newmarket Creameries Co-op, Micro-Bio Limited.	Discharges from these facilities are governed by strict limits to to ensure compliance with quality standards. The long-term cumulative impact is predicted to be negligible.
Quarries	Twelve registered quarries occur on the River Blackwater (NS2, 2010).	Extractive site that discharges process water into a watercourse requires a discharge licence under Section 4 of the Local Government (Water Pollution) Act 1977. Uncontrolled discharges of polluting matter to such media are an offence under the Act's Section 3. The long-term cumulative impact is predicted to be negligible
Applications under consideration	The Fermoy Local Area Plan had outlined that within the Fermoy Municipal District the County Development Plan provides for growth in population of 4,678 persons. The number of households is expected to grow by 4,381 leading to a net requirement for 4,874 new houses within the Municipal District. The County Development Plan indicates that 149ha of land are required to meet this level of housing provision in the main towns, in addition to housing opportunities in the villages and rural areas. Therefore, there is likely to be significant housing development in the area is the short to medium term.	Future developments will only be granted permission where discharges from same meet with relevant water quality standards. The long-term cumulative impact is predicted to be negligible.

Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the European Network	
	Fermoy's location on the M8 corridor means it is well positioned to attract employment investment and is well suited to distribution type uses. This plan makes provision of a strong supply of employment land, with good access to the M8, within the town, zoning approximately 61 hectares of land for employment uses. Land has been zoned for business use to the north of the town, while to the south of the town lands are available for industrial use. Land is also zoned to the east of the M8 to facilitate expansion of an existing enterprise.	
Barriers to migration along River Blackwater	Clondulane Weir is located approximately 5km downstream of Fermoy Weir. An application for the removal of a 50m section of Clondulane Weir was submitted to CCC(Ref 194958). Assessment reports are currently being prepared for a new application to decommission part of the weir.	Both Fermoy Weir and Clondulane Weir have been identified as barriers to movement for QI species within the Blackwater River (Cork/Waterford) SAC. During operation the proposed development will allow free passage of fish through this area of the River Blackwater. Both Fermoy Weir and Clondulane Weir (located approximately 5km downstream of Fermoy Weir), have been identified as barriers to fish passage along the River Blackwater (AMBER barrier database, accessed 10/04/22). Clondulane Weir is a significant barrier to free movement of fish through the River Blackwater and its removal will improve fish passage. An application for the removal of a 50m section of Clondulane Weir was submitted to Cork County Council (Ref 194958). It is an assumption that this barrier will be removed in the near future and there is currently a High Court removal order on Clondulane Weir. The removal of the Clondulane Weir is likely to have net positive impact on the conservation interests of the Blackwater River (Cork/Waterford) SAC

8. Stage One Appropriate Assessment Conclusions

8.1 Screening of Relevant Natura 2000 Sites and Qualifying Interests/Special Conservation Interests

Potential impacts have been identified for the Blackwater River (Cork/Waterford) SAC. Screening conclusions with regard to the qualifying species and habitats for these Natura 2000 sites is provided in **Table 6**. No significant effects on the conservation objectives for the Blackwater Callows SPA will occur.

Table 6. Identification of relevant Natura 2000 sites. All Natura 2000 sites and QI's screened in for AA are highlighted (in bold).

Natura 2000 site	Qualifying Interest/Special Conservation Interest* (*Screened in QI's/SCI's In Bold)	Potential Impacts	Screened In/Out
Blackwater River (Cork/Waterford) SAC	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	These habitats are located a significant distance from the proposed development site. Given that there are no significant aqueous discharges associated with the proposed development, the robust nature of these habitats and the dilution available within the River Blackwater, no impact on these qualifying habitats is predicted to occur.	Screened Out
	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	Part of the proposed development site is located within the Blackwater River (Cork/Waterford) SAC. Habitat loss, deterioration in water quality (and sedimentation) and invasive species impacts during construction as well as changes in hydrological regime during operation have the potential to adversely affect the Conservation Objectives for this Qualifying Interest	Screened in

Natura 2000 site	Qualifying Interest/Special Conservation Interest* (*Screened in QI's/SCI's In Bold)	Potential Impacts	Screened In/Out
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]	A small area of woodland which corresponds loosely to 91A0 habitat was recorded 700m upstream of the proposed development site. Changes in hydrological regimes and flows during operation could potentially impact on this habitat.	Screened in
	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] *Taxus baccata woods of the British Isles Under Review [91J0]	There are no Old sessile oak woods with Ilex and Blechnum in British Isles habitat, or *Taxa baccata* woods within or in proximity to the proposed development site.	Screened out
	***Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029]** ***Austropotamobius pallipes* (White-clawed Crayfish) [1092]** ***Petromyzon marinus* (Sea Lamprey) [1095]** ***Lampetra planeri* (Brook Lamprey) [1096]** ***Lampetra fluviatilis* (River Lamprey) [1099]** ***Salmo salar* (Salmon) [1106]** ***Alosa fallax fallax* (Twaite Shad) [1103]**	These species inhabit and/or migrate through the River Blackwater/proposed development site and thus could be affected by habitat loss, impacts on water quality, direct/indirect injury and mortality during construction, increased predation during operation and barriers to movement during construction and operation. Impacts on prey availability along with noise and disturbance (including lighting) could impact on Otter. Lighting disturbance and increased predation risk during passage through the fish bypass channel may impact on qualifying fish species.	Screened In

Natura 2000 site	Qualifying Interest/Special Conservation Interest* (*Screened in QI's/SCI's In Bold)	Potential Impacts	Screened In/Out
	***Lutra lutra* (Otter) [1355]**		
	Trichomanes speciosum (Killarney Fern) [1421]	Killarney fern generally requires specific habitat requirements which are found in dripping caves, cliffs, crevices and gullies by waterfalls, crevices in woodland, and occasionally on the floor of damp woodland - all deeply shaded humid habitats. Based on the habitats present within the proposed development area this species will not occur.	Screened Out
Blackwater Callows SPA	Whooper Swan *Cygnus cygnus* A038 Teal *Anas crecca* A052 Wigeon *Anas Penelope* A050 Shoveler *Anas clypeata* A056 Black-tailed Godwit *Limosa limosa* A156	SCI waterbirds and wildfowl could occur in the vicinity of the proposed development site. However given the small area of the proposed development site, the availability of large areas of similar habitat nearby and existing levels of disturbance at the site no impacts on SCI species are predicted to occur.	Screened out

8.2 Screening conclusion

The aims of this screening section of this report were as follows:

- Determine whether the proposed development, alone or in combination with other projects, is likely to have significant effects on Natura 2000 sites in view of their conservation objectives.
- Provide information on and assess the potential for the proposed development to significantly impact on Natura 2000 Sites (also known as European sites).
- Determine whether the proposed development is directly connected with, or necessary to the conservation management of any Natura 2000 sites.

It has been objectively concluded that:

- The proposed development is not directly connected with, or necessary to the conservation management of any Natura 2000 sites.
- On the basis of objective information, the possibility of significant effects from the proposed development on European sites cannot be ruled out. There is potential for the proposed development to significantly impact the Blackwater River (Cork/Waterford) SAC.
- The proposed development, alone or in combination with other projects could potentially impact on the qualifying interests for the Blackwater River (Cork/Waterford) SAC
- No significant impacts on the Blackwater Callows SPA, or any other Natura 2000 site are predicted to occur.

On the basis of objective information and in view of best scientific knowledge, the possibility of significant effects from the proposed project on a European site, the Blackwater River (Cork/Waterford) SAC, cannot be ruled out and therefore an Appropriate Assessment is required.

Therefore a NIS will be prepared to inform and assist the competent authority to assess, in view of best scientific knowledge, if the proposed development, individually or in combination with another plan or project is likely to have a significant effect on the Blackwater River (Cork/Waterford) SAC .

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Appendices

Appendix 1 Site synopses

Appendix 1 - Blackwater River (Cork/Waterford) SAC (Site Code 2170) Site Synopsis

The River Blackwater is one of the largest rivers in Ireland, draining a major part of Co. Cork and five ranges of mountains. In times of heavy rainfall the levels can fluctuate widely by more than 12 feet on the gauge at Careysville. The peaty nature of the terrain in the upper reaches and of some of the tributaries gives the water a pronounced dark colour. The site consists of the freshwater stretches of the River Blackwater as far upstream as Ballydesmond, the tidal stretches as far as Youghal Harbour and many tributaries, the larger of which include the Licky, Bride, Flesk, Chimneyfield, Finisk, Araglin, Awbeg (Buttevant), Clyda, Glen, Allow, Dalua, Brogeen, Rathcool, Finnow, Owentaraglin and Awnaskirtaun. The portions of the Blackwater and its tributaries that fall within this SAC flow through the counties of Kerry, Cork, Limerick, Tipperary and Waterford. Nearby towns include Rathmore, Millstreet, Kanturk, Banteer, Mallow, Buttevant, Doneraile, Castletownroche, Fermoy, Ballyduff, Rathcormac, Tallow, Lismore, Cappoquin and Youghal.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

- [1130] Estuaries
- [1140] Tidal Mudflats and Sandflats
- [1220] Perennial Vegetation of Stony Banks
- [1310] Salicornia Mud
- [1330] Atlantic Salt Meadows
- [1410] Mediterranean Salt Meadows
- [3260] Floating River Vegetation
- [91A0] Old Oak Woodlands
- [91E0] Alluvial Forests*
- [1029] Freshwater Pearl Mussel (Margaritifera margaritifera)
- [1092] White-clawed Crayfish (Austropotamobius pallipes)
- [1095] Sea Lamprey (Petromyzon marinus)
- [1096] Brook Lamprey (Lampetra planeri)
- [1099] River Lamprey (Lampetra fluviatilis)
- [1103] Twaite Shad (Alosa fallax)
- [1106] Atlantic Salmon (Salmo salar)
- [1355] Otter (Lutra lutra)
- [1421] Killarney Fern (Trichomanes speciosum)

The conservation objectives for the site are detailed in: NPWS (2012) Conservation Objectives: Blackwater River (Cork/Waterford) SAC 002170, Version 1. NPWS, Department of Arts, Heritage & the Gaeltacht(dated 31 July 2012). The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest.

The Blackwater rises in boggy land in east Kerry, where Namurian grits and shales build the low heather-covered plateaux. Near Kanturk the plateaux enclose a basin of productive Coal Measures. On leaving the Namurian rocks the Blackwater turns eastwards along the northern slopes of the Boggeragh Mountains before entering the narrow limestone strike vale at Mallow. The valley deepens as first the Nagles Mountains and then the Knockmealdowns impinge upon it. Interesting geological features along this stretch of the Blackwater Valley include limestone cliffs and caves near the villages and small towns of Killavullen and Ballyhooly; the Killavullen caves contain fossil material from the end of the glacial period. The associated basic soils in this area support the growth of plant communities which are rare in Cork because in general the county's rocks are acidic. At Cappoquin the river suddenly turns south and cuts through high ridges of Old Red Sandstone. The Araglin valley is predominantly underlain by sandstone, with limestone occurring in the lower reaches near Fermoy.

Wet woodlands are found where river embankments have broken down and channel edges are subject to daily inundation. This is particularly evident in the steep-sided valley of the River Bride, between Cappoquin and Youghal. The river side of the embankments was often used for willow growing in the past (most recently at Cappoquin) so that the channel is lined by narrow woods of White and Almondleaved Willow (Salix alba and S. triandra), with isolated Crack Willow (S. fragilis) and Osier (S. viminalis). Rusty Willow (S. cinerea subsp. oleifolia) spreads naturally into the sites and occasionally, as at Villierstown on the Blackwater and Sapperton on the Bride, forms woods with a distinctive mix of woodland and marsh plants, including Gypsywort (Lycopus europaeus), Guelder-rose (Viburnum opulus), Bittersweet (Solanum dulcamara) and various mosses and algae. These wet woodlands form one of the most extensive tracts of the wet woodland habitat in the country.

A small stand of Yew (Taxus baccata) woodland occurs within the site. This is on a limestone ridge at Dromana, near Villierstown. While there are some patches of the wood with a canopy of Yew and some very old trees, the quality is generally poor due to the dominance of non-native and invasive species such as Sycamore (Acer pseudoplatanus), Beech (Fagus sylvatica) and Douglas Fir (Pseudotsuga menzsisii). However, it does have the potential to develop into a Yew dominated stand in the long term and the site should continue to be monitored.

Marshes and reedbeds cover most of the flat areas beside the rivers and often occur in mosaic with the wet woodland. Common Reed (Phragmites australis) is ubiquitous and is harvested for thatching. There is also much Marsh-marigold (Caltha palustris) and, at the edges of the reeds, the Greater and Lesser Pond-sedge (Carex riparia and C. acutiformis). Hemlock Water-dropwort (Oenanthe crocata), Wild Angelica (Angelica sylvestris), Reed Canary-grass (Phalaris arundinacea), Meadowsweet (Filipendula ulmaria), Common Nettle (Urtica dioica), Purple Loosestrife (Lythrum salicaria), Common Valerian (Valeriana officinalis), Water Mint (Mentha aquatica) and Water Forget-me-not (Myosotis scorpioides) are all also found.

At Banteer there are a number of hollows in the sediments of the floodplain where subsidence and subterranean drainage have created isolated wetlands, sunk below the level of the surrounding fields. The water rises and falls in these holes depending on the water table and several different communities have developed on the acidic or neutral sediments. Many of the ponds are ringed with Rusty Willow, rooted in the mineral soils but sometimes collapsed into the water. Beneath the densest stands are woodland herbs like Yellow Pimpernel (Lysimachia nemorum), with locally abundant Common Water-starwort (Callitriche stagnalis) and Marsh Ragwort (Senecio aquaticus). One of the depressions has Silver Birch (Betula pendula), Ash (Fraxinus excelsior), Crab Apple (Malus sylvestris) and a little Pedunculate Oak (Quercus robur) in addition to the willows.

Floating river vegetation is found along much of the freshwater stretches within the site. The species list is quite extensive, with species such as water-crowfoots, including Pond Water-crowfoot (Ranunculus peltatus), Canadian Pondweed (Elodea canadensis), pondweed species, including Broad-leaved Pondweed (Potamogeton natans), water-milfoil species (Myriophyllum spp.), Common Club-rush (Scirpus lacustris), water-starwort species (Callitriche spp.), Lesser Water-parsnip (Berula erecta) particularly on the Awbeg, Water-cress (Nasturtium officinale), Hemlock Waterdropwort, Fine-leaved Water-dropwort (O. aquatica), Common Duckweed (Lemna minor), Yellow Water-lily (Nuphar lutea), Unbranched Bur-reed (Sparganium emersum) and the moss Fontinalis antipyretica all occurring.

The grasslands adjacent to the rivers of the site are generally heavily improved, although liable to flooding in many places. However, fields of more species-rich wet grassland with species such as Yellow Iris (Iris pseudacorus), Meadowsweet, Meadow Buttercup (Ranunculus acris) and rushes (Juncus spp.) occur occasionally. Extensive fields of wet grassland also occur at Annagh Bog on the Awbeg. These fields are dominated by Tufted Hair-grass (Deschampsia cespitosa) and rushes.

The Blackwater Valley has a number of dry woodlands; these have mostly been managed by the estates in which they occur, frequently with the introduction of Beech and a few conifers, and sometimes of the invasive species Rhododendron (Rhododendron ponticum) and Cherry Laurel (Prunus laurocerasus). Oak woodland is well developed on sandstone about Ballinatray, with the acid oak woodland community of Holly (Ilex aquifolium), Bilberry (Vaccinium myrtillus), Great Wood-rush (Luzula sylvatica) and the ferns Dryopteris affinis and D. aemula occurring in one place. Irish Spurge (Euphorbia hyberna) continues eastwards on acid rocks from its headquarters to the west, but there are also many plants of richer soils, for example Wood Violet (Viola reichenbachiana), Goldilocks Buttercup (Ranunculus auricomus), Broad-leaved Helleborine (Epipactis helleborine) and Red Campion (Silene dioica). Oak woodland is also found in Rincrew, Carrigane, Glendine, Newport and Dromana. The spread of Rhododendron is locally a problem, as is over-grazing. A few limestone rocks stand over the river in places showing traces of a less acidic woodland type with Ash, False Brome (Brachypodium sylvaticum) and Early-purple Orchid (Orchis mascula).

In the vicinity of Lismore, two deep valleys cut in Old Red Sandstone join to form the Owenashad River before flowing into the Blackwater at Lismore. These valleys retain something close to their original cover of oak with Downy Birch (Betula pubescens), Holly and Hazel (Corylus avellana) also occurring. There has been much planting of Beech (as well as some of coniferous species) among the oak on the shallower slopes and here both Rhododendron and Cherry Laurel have invaded the woodland.

The oak wood community in the Lismore and Glenmore valleys is of the classic upland type, in which some Rowan (Sorbus aucuparia) and Downy Birch occur. Honeysuckle (Lonicera periclymenum) and Ivy (Hedera helix) cover many of the trees while Great Wood-rush, Bluebell (Hyacinthoides non-scripta), Wood-sorrel (Oxalis acetosella) and, locally, Bilberry dominate the ground flora. Ferns present on the site include Hard Fern (Blechnum spicant), Male Fern (Dryopteris filix-mas), the bucklerferns D. dilatata and D. aemula, and Lady Fern (Athyrium felix-femina). There are many mosses present and large species such as Rhytidiadelphus spp., Polytrichum formosum, Mnium hornum and Dicranum spp. are noticeable. The lichen flora is important and includes 'old forest' species which imply a continuity of woodland here since ancient times. Tree Lungwort (Lobaria spp.) is the most conspicuous and is widespread.

The Araglin valley consists predominantly of broadleaved woodland. Oak and Beech are joined by Hazel, Wild Cherry (Prunus avium) and Goat Willow (Salix caprea). The ground flora is relatively rich, with Pignut (Conopodium majus), Ramsons (Allium ursinum), Garlic Mustard (Alliaria petiolata) and Wild Strawberry (Fragaria vesca). The presence of Ivy Broomrape (Orobanche hederae), a local species within Ireland, suggests that the woodland, along with its attendant Ivy, is long established.

Along the lower reaches of the Awbeg River, the valley sides are generally cloaked with mixed deciduous woodland of estate origin. The dominant species is Beech, although a range of other species are also present, e.g. Sycamore, Ash and Horsechestnut (Aesculus hippocastanum).

In places the alien invasive species Cherry Laurel dominates the understorey. Parts of the woodlands are more semi-natural in composition, being dominated by Ash, with Hawthorn (Crataegus monogyna) and Spindle (Euonymus europaea) also present. However, the most natural areas of woodland appear to be the wet areas dominated by Alder and willows (Salix spp.). The ground flora of the dry woodland areas features species such as Pignut, Wood Avens (Geum urbanum), Ivy and Soft Shield-fern (Polystichum setiferum), while the ground flora of the wet woodland areas contains characteristic species such as Remote Sedge (Carex remota) and Opposite-leaved Golden-saxifrage (Chrysosplenium oppositifolium). In places along the upper Bride, scrubby, semi-natural deciduous woodland of willow, oak and Rowan occurs, with abundant Great Wood-rush in the ground flora.

The Bunaglanna River passes down a very steep valley, flowing in a north-south direction to meet the Bride River. It flows through blanket bog to heath and then scattered woodland. The higher levels of moisture here enable a vigorous moss and fern community to flourish, along with a well-developed epiphyte community on the tree trunks and branches.

At Banteer a type of wetland occurs near the railway line which offers a complete contrast to the others. Old turf banks are colonised by Royal Fern (Osmunda regalis) and Eared Willow (Salix aurita), and between them there is a sheet of Bottle Sedge (Carex rostrata), Marsh Cinquefoil (Potentilla palustris), Bogbean (Menyanthes trifoliata), Marsh St. John's-wort (Hypericum elodes) and the mosses Sphagnum auriculatum and Aulacomnium palustre. The cover is a scraw (i.e. floating vegetation) with characteristic species like Marsh Willowherb (Epilobium palustre) and Early Marshorchid (Dactylorhiza incarnata).

The soil high up the Lismore valleys and in rocky places is poor in nutrients but it becomes richer where streams enter and also along the valley bottoms. In such sites Wood Speedwell (Veronica montana), Wood Anemone (Anemone nemorosa), Enchanter's-nightshade (Circaea lutetiana), Barren Strawberry (Potentilla sterilis) and shield-fern (Polystichum sp.) occur. There is some Ramsons, Three-nerved Sandwort (Moehringia trinervia) and Early-purple Orchid (Orchis mascula) locally, with Opposite-leaved Golden-saxifrage, Meadowsweet and Bugle (Ajuga reptans) in wet places. A stand of Hazel woodland at the base of the Glenakeeffe valley shows this community well.

The area has been subject to much tree felling in the recent past and re-sprouting stumps have given rise to areas of bushy Hazel, Holly, Rusty Willow and Downy Birch. The ground in the clearings is heathy with Heather (Calluna vulgaris), Slender St John's-wort (Hypericum pulchrum) and the occasional Broom (Cytisus scoparius) occurring.

The estuary and the habitats within and associated with it form a large component of the site. Very extensive areas of intertidal flats, comprised of substrates ranging from fine, silty mud to coarse sand with pebbles/stones are present. The main expanses occur at the southern end of the site, with the best examples at Kinsalebeg in Co. Waterford, and between Youghal and the main bridge north of it across the river in Co. Cork. Other areas occur along the tributaries of the Licky in east Co. Waterford, and Glendine, Newport, Bride and Killahaly Rivers in Waterford west of the Blackwater. There are also large tracts along the Tourig River in Co. Cork. There are narrow bands of intertidal flats along the main river as far north as Camphire Island. Patches of green filamentous algae (Ulva sp. and Enteromorpha sp.) occur in places, while fucoid algae are common on the more stony flats, even as high upstream as Glenassy or Coneen.

The area of saltmarsh within the site is small. The best examples occur at the mouths of the tributaries and in the townlands of Foxhole and Blackbog. Those found are generally characteristic of Atlantic salt meadows. The species list at Foxhole consists of Common Saltmarsh-grass (Puccinellia maritima), small amounts of Greater Seaspurrey (Spergularia media), glasswort (Salicornia sp.), Sea Arrowgrass (Triglochin maritima), Annual Sea-blite (Suaeda maritima) and Sea Purslane (Halimione portulacoides) - the latter a very recent coloniser. Some Sea Aster (Aster tripolium) occurs, generally with Creeping Bent (Agrostis stolonifera). Sea Couch (Elymus pycnanthus) and small isolated clumps of Sea Club-rush (Scirpus maritimus) are also seen. On the Tourig River additional saltmarsh species found include sea-lavenders (Limoniun spp.), Thrift (Armeria maritima), Red Fescue (Festuca rubra), Common Scurvygrass (Cochlearia officinalis) and Sea Plantain (Plantago maritima). Oraches (Atriplex spp.) are found on channel edges. Species such as Saltmarsh Rush (Juncus gerardi) and Sea Rush (J. maritimus) are found in places in this site also, and are indicative of Mediterranean salt meadows. Areas of Salicornia mud are found at the eastern side of the townland of Foxbole above Youghal, at Blackbog, along the Tourig and Kinsalebeg esturaies.

The shingle spit at Ferrypoint supports a good example of perennial vegetation of stony banks. The spit is composed of small stones and cobbles and has a well-developed and diverse flora. At the lowest part, Sea Beet (Beta vulgaris subsp. maritima), Curled Dock (Rumex crispus) and Yellow Horned-poppy (Glaucium flavum) occur, while at a slightly higher level Sea Mayweed (Matricaria maritima), Cleavers (Galium aparine), Rock Samphire (Crithmum maritimum), Sea Sandwort (Honkenya peploides), Spear-leaved Orache (Atriplex prostrata) and Babington’s Orache (A. glabriuscula). Other species present include Sea Rocket (Cakile maritima), Herb-Robert (Geranium robertianum), Red Fescue and Kidney Vetch (Anthyllis vulneraria). The top of the spit is more vegetated and supports lichens and bryophytes, including Tortula ruraliformis and Rhytidiadelphus squarrosus.

The site supports several Red Data Book plant species, i.e. Starved Wood-sedge (Carex depauperata), Killarney Fern (Trichomanes speciosum), Pennyroyal (Mentha pulegium), Bird’s-nest Orchid (Neottia nidus-avis), Golden

Dock (Rumex maritimus) and Bird Cherry (Prunus padus). The first three of these are also protected under the Flora (Protection) Order, 2015, while the Killarney Fern is also listed on Annex II of the E.U. Habitats Directive. The following plants, relatively rare nationally, are also found within the site: Toothwort (Lathraea squamaria) - associated with woodlands on the Awbeg and Blackwater; Summer Snowflake (Leucojum aestivum) and Flowering Rush (Butomus umbellatus) on the Blackwater; Common Calamint (Calamintha ascendens), Red Campion, Sand Leek (Allium scorodoprasum) and Wood Club-rush (Scirpus sylvaticus) on the Awbeg.

The site is also important for the presence of several E.U. Habitats Directive Annex II animal species, including Sea Lamprey (Petromyzon marinus), Brook Lamprey (Lampetra planeri), River Lamprey (L. fluviatilis), Twaite Shad (Alosa fallax fallax), Freshwater Pearl Mussel (Margaritifera margaritifera), Otter (Lutra lutra) and Salmon (Salmo salar). The Awbeg supports a population of White-clawed Crayfish (Austropotamobius pallipes). This threatened species has been recorded from a number of locations and its remains are also frequently found in Otter spraints, particularly in the lower reaches of the river. The freshwater stretches of the Blackwater and Bride Rivers are designated salmonid rivers. The Blackwater is noted for its enormous run of salmon over the years. The river is characterised by significant pools, streams, glides, and generally, a good push of water coming through except in very low water. Spring salmon fishing can be carried out as far upstream as Fermoy and is highly regarded especially at Careysville. The Bride, main Blackwater upstream of Fermoy, and some of the tributaries are more associated with grilse fishing.

The site supports many of the mammal species occurring in Ireland. Those which are listed in the Irish Red Data Book include Pine Marten, Badger and Irish Hare. The bat species Natterer's Bat, Daubenton's Bat, Whiskered Bat, Brown Long-eared Bat and Pipistrelle, can be seen feeding along the river, roosting under the old bridges and in old buildings.

Common Frog, a Red Data Book species that is also legally protected (Wildlife Act, 1976), occurs throughout the site. The rare bush cricket Metrioptera roselii (Order Orthoptera) has been recorded in the reed/willow vegetation of the river embankment on the Lower Blackwater River. The Swan Mussel (Anodonta cygnea), a scarce species nationally, occurs at a few sites along the freshwater stretches of the Blackwater.

Several bird species listed on Annex I of the E.U. Birds Directive are found on the site. Some use it as a staging area, others are vagrants, while others use it more regularly. Internationally important numbers of Whooper Swan (average peak 174, 1994/95-95/96) and nationally important numbers Bewick's Swan (average peak 5, 1996/97-2000/01) use the Blackwater Callows. Golden Plover occur in regionally important numbers on the Blackwater estuary (average peak 885, 1984/85-86/87) and on the River Bride (absolute maximum 2,141, 1994/95). Staging Terns visit the site annually, with >300 Sandwich Tern and >200 Arctic/Common Tern (average peak 1974-1994). The site also supports populations of the following: Red Throated Diver, Great Northern Diver, Barnacle Goose, Ruff, Wood Sandpiper and Greenland Whitefronted Goose. Three breeding territories for Peregrine Falcon are known along the Blackwater Valley. This, the Awbeg and the Bride River are also thought to support at least 30 pairs of Kingfisher. Little Egret breed at the site (12 pairs in 1997, 19 pairs in 1998).

The site holds important numbers of wintering waterfowl. Both the Blackwater Callows and the Blackwater Estuary Special Protection Areas (SPAs) hold internationally important numbers of Black-tailed Godwit (average peak 847, 1994/95-95/96 on the callows, average peak 845, 1974/75-93/94 in the estuary). The Blackwater Callows also hold Wigeon (average peak 2,752), Teal (average peak 1,316), Mallard (average peak 427), Shoveler (average peak 28), Lapwing (average peak 880), Curlew (average peak 416) and Black-headed Gull (average peak 396) (counts from 1994/95-95/96). Numbers of birds using the Blackwater Estuary, given as the mean of the highest monthly maxima over 20 years (1974-94), are Shelduck (137 +10 breeding pairs), Wigeon (780), Teal (280), Mallard (320 + 10 breeding pairs), Goldeneye (11-97), Oystercatcher (340), Ringed Plover (50 + 4 breeding pairs), Grey Plover (36), Lapwing (1,680), Knot (150), Dunlin (2,293), Snipe (272), Black-tailed Godwit (845), Bar-tailed Godwit (130), Curlew (920), Redshank (340), Turnstone (130), Black-headed Gull (4,000) and Lesser Black-backed Gull (172). The greatest numbers (75%) of the wintering waterfowl of the estuary are located in the Kinsalebeg area on the east of the estuary in Co. Waterford. The remainder are concentrated along the Tourig estuary on the Co. Cork side.

The river and river margins also support many Heron, non-breeding Cormorant and Mute Swan (average peak 53, 1994/95-95/96 in the Blackwater Callows). Heron occurs all along the Bride and Blackwater Rivers: 2 or 3 pairs at Dromana Rock; approximately 25 pairs in the woodland opposite; 8 pairs at Ardsallagh Wood and around 20 pairs at Rincrew Wood have been recorded. Some of these are quite large and significant heronries. Significant numbers of Cormorant are found north of the bridge at Youghal and there are some important roosts present at Ardsallagh Wood, downstream of Strancally Castle and at the mouth of the Newport River. Of note are the high numbers of wintering Pochard (e.g. 275 individuals in 1997) found at Ballyhay quarry on the Awbeg, the best site for Pochard in Co. Cork.

Other important species found within the site include Long-eared Owl, which occurs all along the Blackwater River, and Barn Owl, a Red Data Book species, which is found in some old buildings and in Castlehyde, west of Fermoy. Reed Warbler, a scarce breeding species in Ireland, was found for the first time in the site in 1998 at two locations. It is not known whether or not this species breeds on the site, although it breeds nearby to the south of Youghal. Dipper occurs on the rivers.

Land use at the site is mainly centred on agricultural activities. The banks of much of the site and the callows, which extend almost from Fermoy to Cappoquin, are dominated by improved grasslands which are drained and heavily fertilised. These areas are grazed and used for silage production. Slurry is spread over much of this area. Arable crops are also grown. The spreading of slurry and fertiliser poses a threat to the water quality of this salmonid river and to the populations of E.U. Habitats Directive Annex II animal species within it. Many of the woodlands along the rivers belong to old estates and support many non-native species. Little active woodland management occurs. Fishing is a main tourist attraction along stretches of the Blackwater and its tributaries, and there are a number of angler associations, some with a number of beats. Fishing stands and styles have been erected in places. Both commercial and leisure fishing takes place on the rivers. Other recreational activities such as boating, golfing and walking are also popular. Water skiing is carried out at Villierstown. Parts of Doneraile Park and Anne's Grove are included in the site: both areas are primarily managed for amenity purposes. There is some hunting of game birds and Mink within the site. Ballyhay quarry is still actively quarried for sand and gravel. Several industrial developments, which discharge into the river, border the site.

The main threats to the site and current damaging activities include high inputs of nutrients into the river system from agricultural run-off and several sewage plants, dredging of the upper reaches of the Awbeg, over-grazing within the woodland areas, and invasion by non-native species, for example Rhododendron and Cherry Laurel.

Overall, the River Blackwater is of considerable conservation significance for the occurrence of good examples of habitats and populations of plant and animal species that are listed on Annexes I and II of the E.U. Habitats Directive respectively. Furthermore, it is of high conservation value for the populations of bird species that use it. Two Special Protection Areas, designated under the E.U. Birds Directive, are also located within the site - Blackwater Callows and Blackwater Estuary. Additionally, the importance of the site is enhanced by the presence of a suite of uncommon plant species.

Blackwater Callows SPA (Site Code 004094)

The Blackwater Callows SPA comprises the stretch of the River Blackwater that runs in a west to east direction between Fermoy and Lismore in Counties Cork and Waterford, a distance of almost 25 km. The site includes the river channel and strips of seasonally-flooded grassland within the flood plain. Sandstone ridges, which run parallel to the river, confine the area of flooding to a relatively narrow corridor.

The river channel has a well-developed aquatic plant community, which includes such species as Pond Water-crowfoot (Ranunculus peltatus), Canadian Pondweed (Elodea canadensis) and a variety of pondweeds (Potamogeton spp.), water-milfoils (Myriophyllum spp.) and water-starworts (Callitriche spp.).

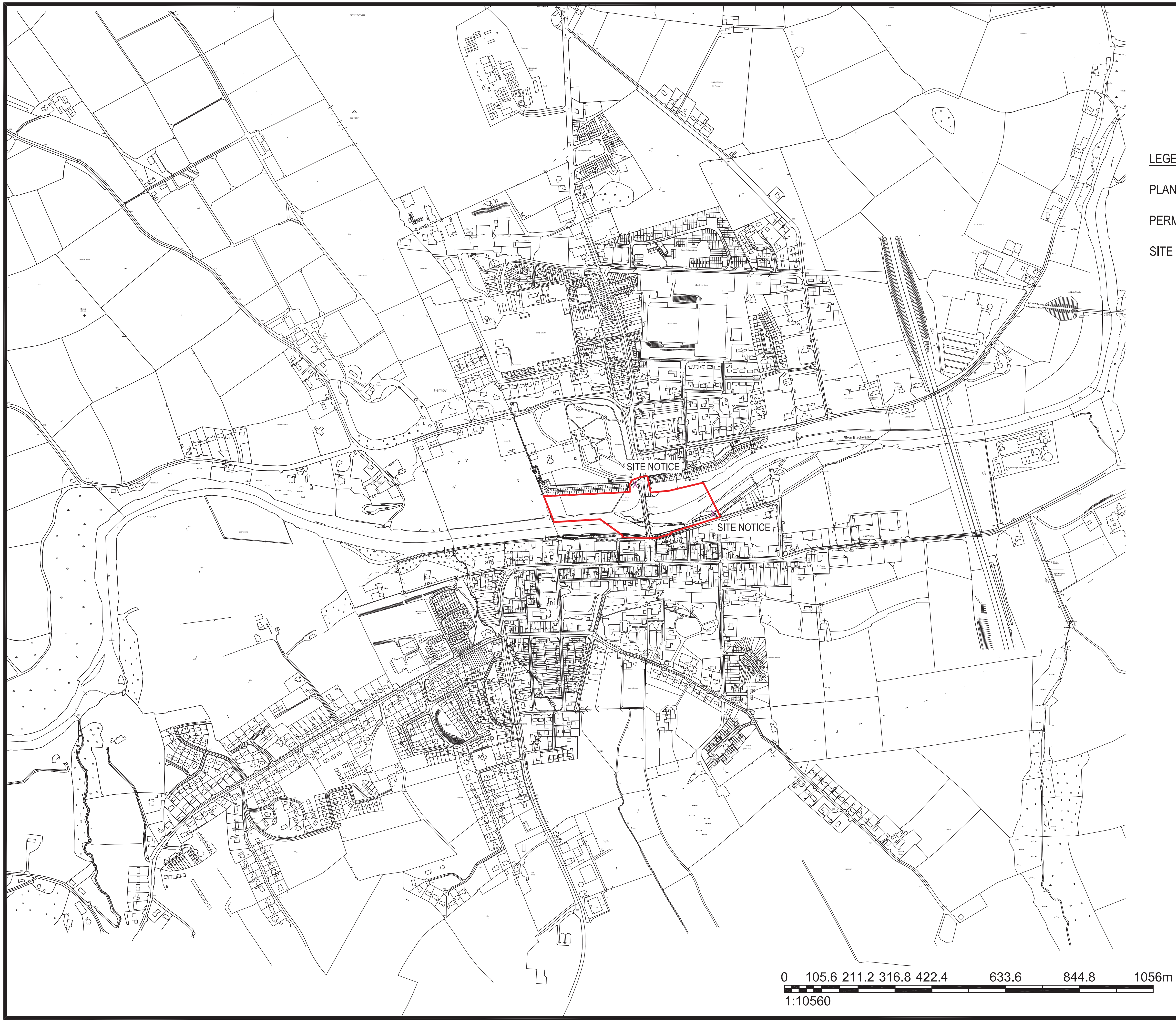
The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Whooper Swan, Wigeon, Teal and Black-tailed Godwit. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The site is of high ornithological interest on account of its wintering waterfowl populations. Whooper Swan occurs in numbers of international importance (212) - all figures are mean peaks for the five winters 1995/96 to 1999/2000. Bewick's Swan were regularly recorded at the site up to the mid-1990s; however, in the winters of 1997/98 and 1998/99 only four and two individuals respectively were recorded, and the species is no longer considered to be a regular visitor. This decline is in line with a national decrease and a marked contraction in range. The site supports nationally important populations of Wigeon (2,313), Teal (898) and Black-tailed Godwit (251). Other wintering species that occur include Mallard (398) Shoveler (26), Lapwing (191), Curlew (457) and Black-headed Gull (311).

Little Egret uses the site throughout the year as there is a nearby breeding colony downstream. The river system provides an important feeding area for these birds.

The Blackwater Callows SPA is of importance for its populations of wintering waterfowl, including an internationally important population of Whooper Swan and nationally important populations of Wigeon, Teal and Black-tailed Godwit. The presence of Whooper Swan, as well as Little Egret, is of particular note as these species are listed on Annex I of the E.U. Birds Directive. Part of the Blackwater Callows SPA is a Wildfowl Sanctuary.

Appendix 2. Drawings



LEGEND:

PLANNING RED LINE BOUNDARY

PERMANENT WAYLEAVES

SITE NOTICE LOCATION

REV	STAT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	02.06.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY:	REVIEWED BY:	APPROVED BY:
LC	MV	DC

TJ O'CONNOR & ASSOCIATES
CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: FERMOY WEIR REMEDIATION & FISH BYPASS CHANNEL

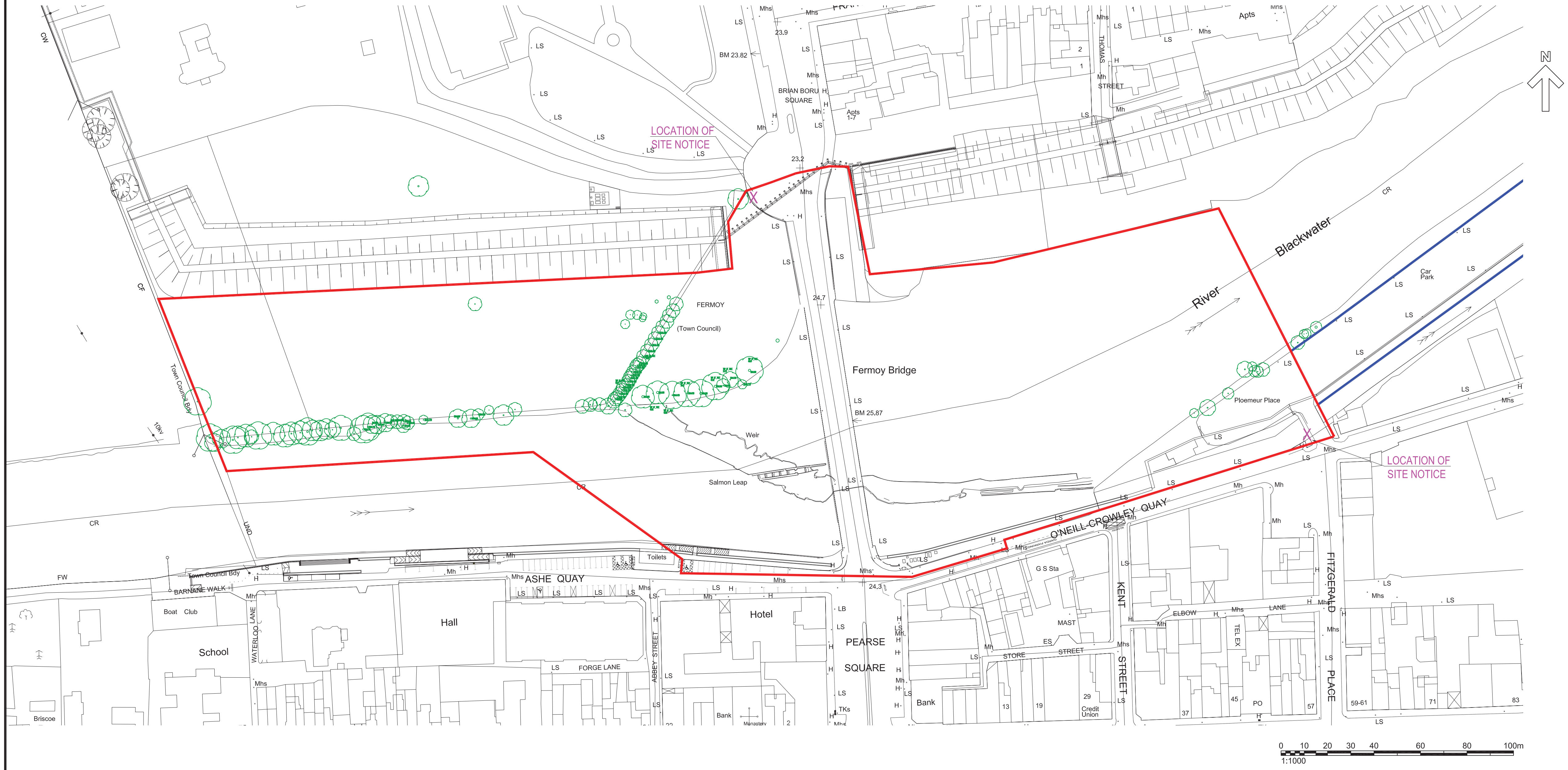
CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: SITE LOCATION MAP

SCALE: 1:10560 (A3)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0048

REV: C01



LEGEND:

PLANNING RED LINE BOUNDARY	
PERMANENT WAYLEAVES	
SITE NOTICE LOCATION	X
OTHER LANDS IN THE CONTROL OF THE APPLICANT	

MAP REPRODUCED BY PERMISSION OF ORDNANCE SURVEY IRELAND (CORK CCMA 9802)

REV	STAT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	02.06.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY:	REVIEWED BY:	APPROVED BY:
LC	MV	DC

TJ O'CONNOR & ASSOCIATES
CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: FERMOY WEIR REMEDIATION AND FISH BYPASS CHANNEL

CLIENT: CORK COUNTY COUNCIL

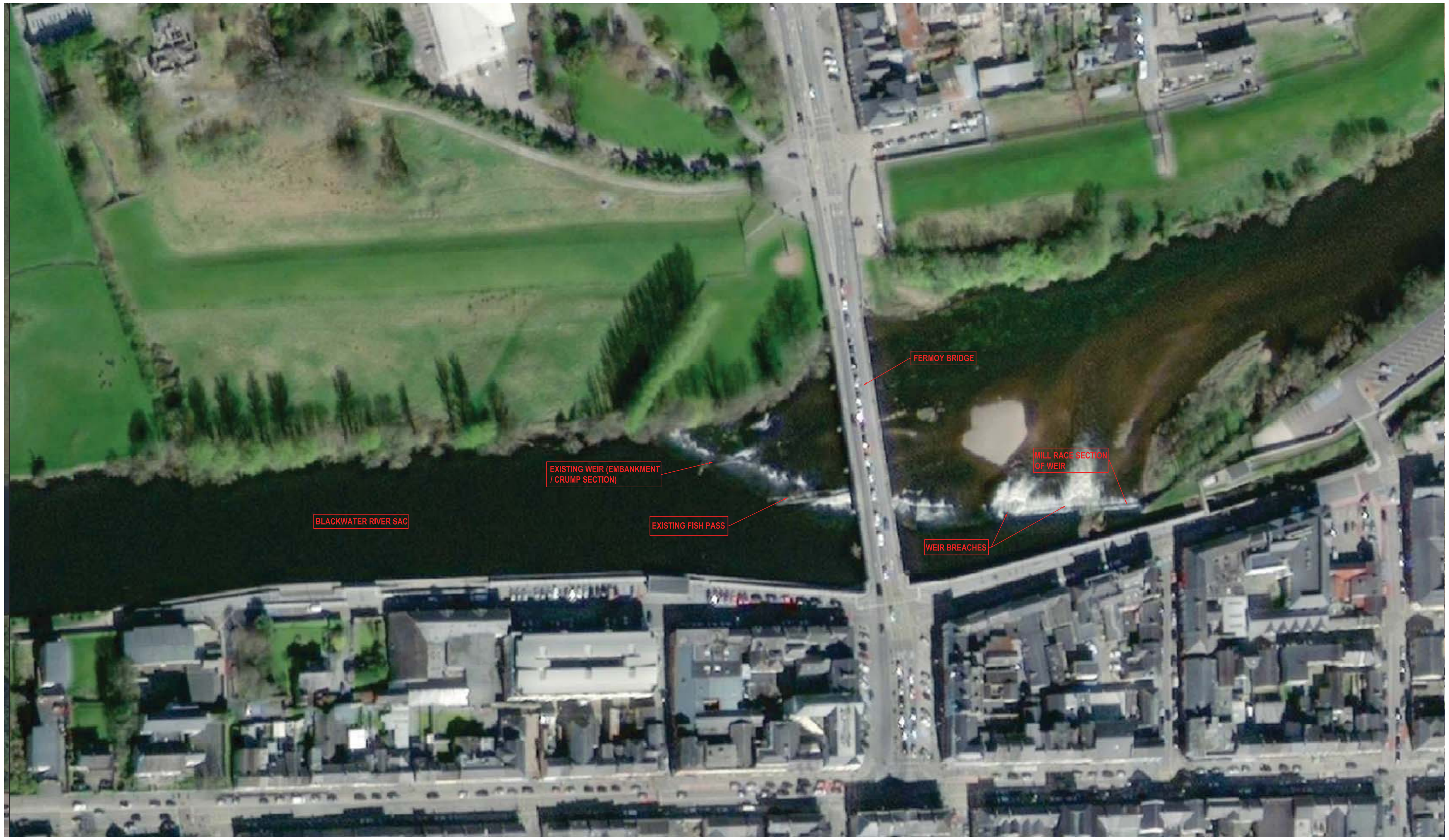
DRAWING TITLE: SITE LOCATION PLAN

SCALE: 1:1000 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER

19011-TJOC-PL-XX-DR-C-0049

REV: C01



N

0 10 20 30 40 60 80 100m
1:1000

Lidar Survey supplied by
Cork County Council
26th June 2018

REV	STAT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	02.06.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY:	REVIEWED BY:	APPROVED BY:
LC	MV	DC

TJ O'CONNOR & ASSOCIATES
CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: FERMOY WEIR REMEDIATION AND FISH BYPASS CHANNEL

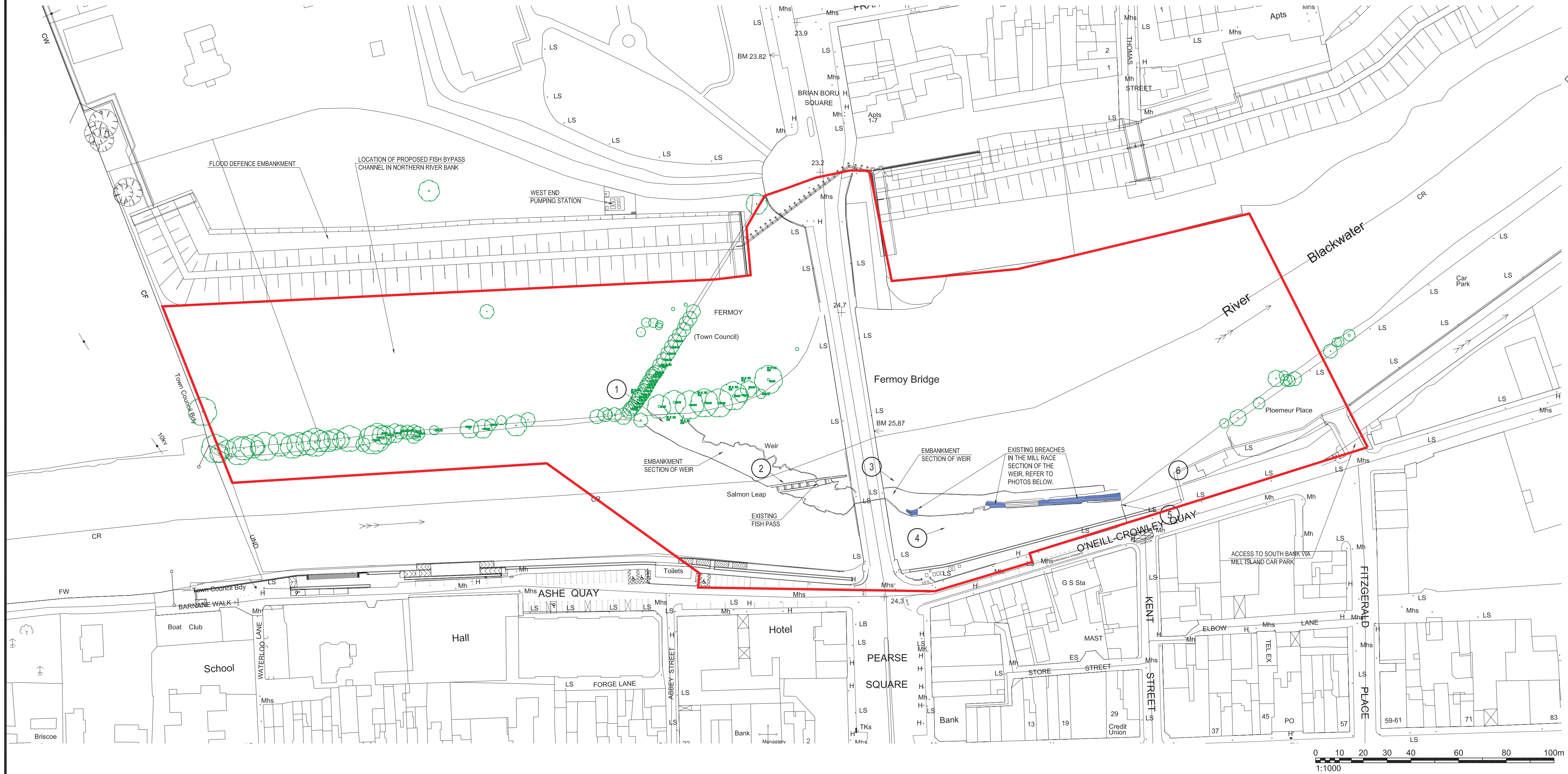
CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: FERMOY WEIR AERIAL VIEW OF EXISTING SITE

SCALE: 1:1000 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0050

REV: C01



NOTES:

1. TREE INFORMATION SHOWN ON THIS DRAWING IS TAKEN FROM GEODATA SURVEYING LTD. TOPOGRAPHICAL SURVEY OF JUNE 2020.
2. EXISTING WEIR INFORMATION SHOWN ON THIS DRAWING IS TAKEN FROM WEIR SURVEY CARRIED OUT BY MURPHY GEOSPACIAL IN AUGUST 2018. EXTENT OF BREACHES SHOWN ARE AS SURVEYED IN 2018 AND MAY HAVE INCREASED IN THE TIME SINCE THE SURVEY HAD BEEN CARRIED OUT.
3. PHOTOS TAKEN IN MARCH 2021.

LEGEND:

- SITE BOUNDARY
- EXISTING TREES
- PHOTO LOCATION AND DIRECTION
- EXISTING BREACHES IN WEIR

PHOTO 1 - EMBANKMENT WEIR

PHOTO 3 - INTERFACE BETWEEN EMBANKMENT AND MILL RACE WEIR

PHOTO 5 -EXISTING BREACHES IN MILL RACE SECTION OF WEIR

PHOTO 2 - EXISTING FISH LADDER

PHOTO 4 - EXISTING BREACHES IN MILL RACE SECTION OF WEIR
(LOOKING DOWNSTREAM)

PHOTO 6 -EXISTING BREACHES IN MILL RACE SECTION OF WEIR
(LOOKING UPSTREAM)

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Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: FERMOY WEIR REMEDIATION AND FISH BYPASS CHANNEL

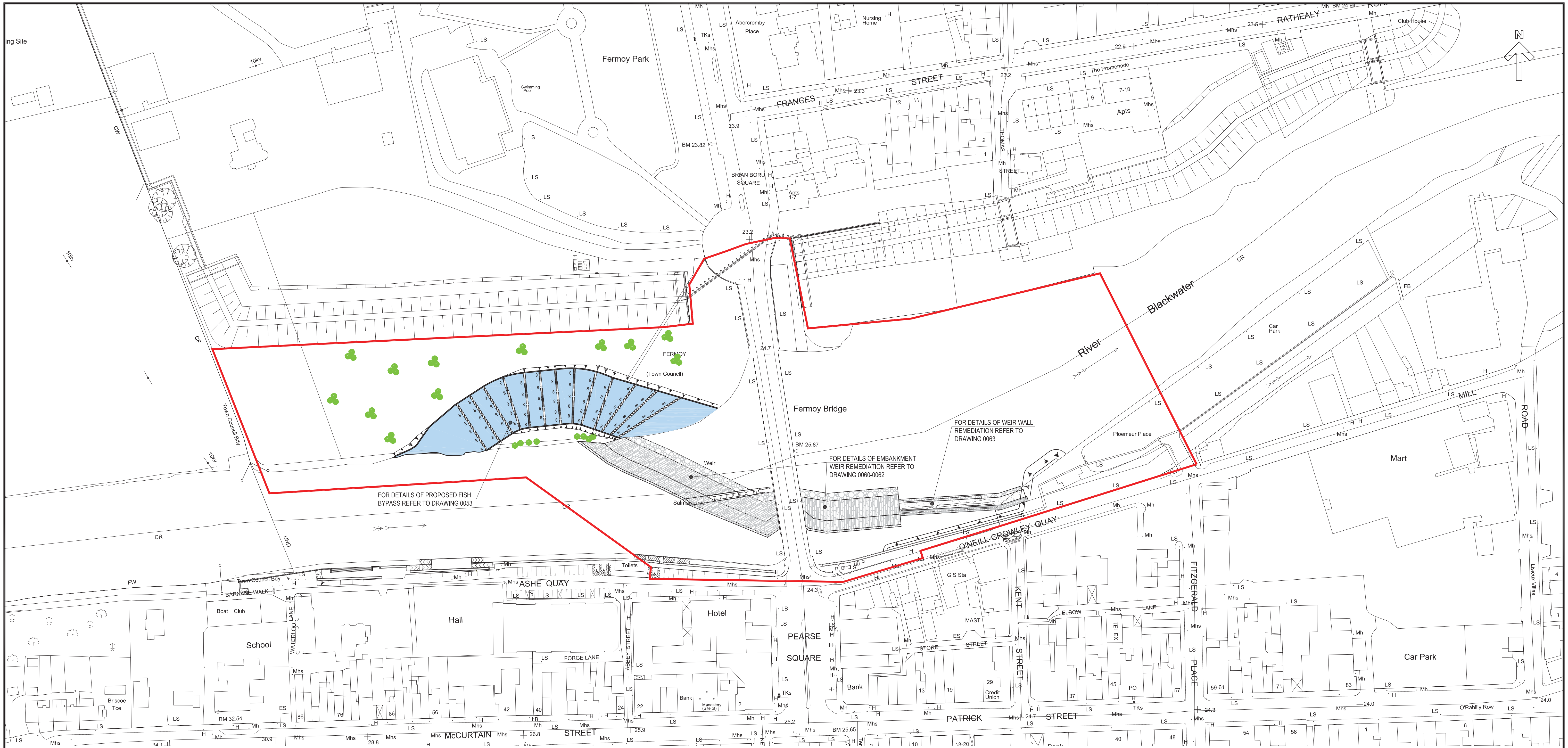
CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: EXISTING SITE LAYOUT PLAN

SCALE: 1:1000 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER: 19011-TJOC-PL-XX-DR-C-0051

REV: C01



0 10 20 30 40 60 80 100m
1:1000

NOTES:

1. FOR DETAILS OF FISH BYPASS REFER TO DRAWING 0053.
2. FOR DETAILS OF REMEDIATION OF EMBANKMENT SECTION OF WEIR REFER TO DRAWINGS 0060-0062.
3. FOR DETAILS OF REMEDIATION TO MILL RACE SECTION OF WEIR REFER TO DRAWINGS 0060 AND 0063.

MAP REPRODUCED BY PERMISSION OF ORDNANCE SURVEY IRELAND (CORK CCMA 9802)

REV	STAT	DESCRIPTION	DATE
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Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: FERMOY WEIR REMEDIATION AND FISH BYPASS CHANNEL

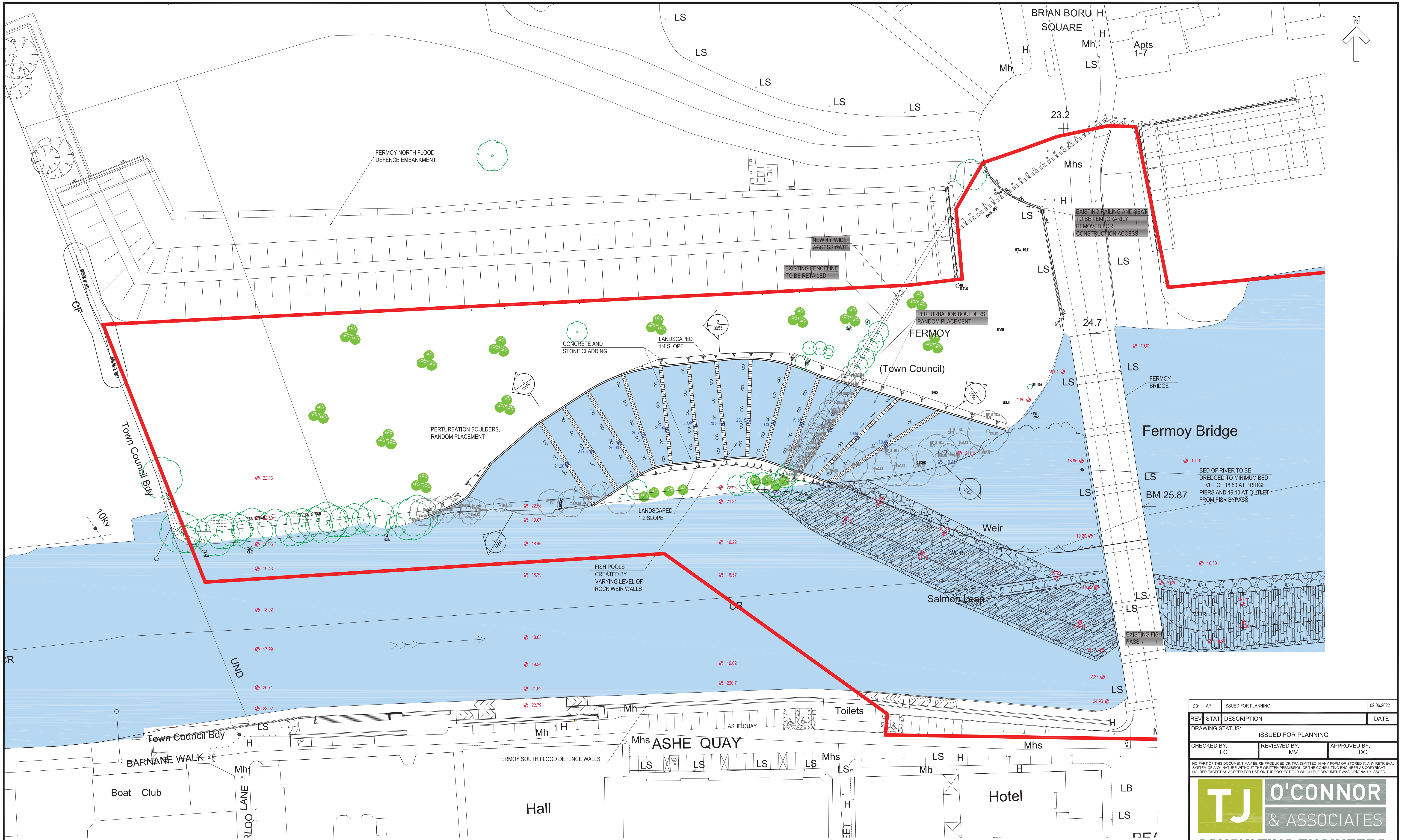
CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: KEY PLAN
PROPOSED FISH BYPASS, WEIR AND MILL ISLAND PLAN

SCALE: 1:1000 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0052

REV: C01



0 5 10 15 20 30 40 50m
1:500

LEGEND:

EXISTING RIVER BED LEVELS	19.02
PROPOSED LEVELS	19.02
EXISTING TREES	
EXISTING TREES TO BE REMOVED	
PROPOSED PLANTING	

NOTES:

1. REFER TO DRAWINGS 0054 AND 0055 FOR SECTION DETAILS OF PROPOSED FISH BYPASS CHANNEL.
2. ALL LEVELS SHOWN RELATE TO ORDNANCE DATUM MALIN HEAD.

REV	STAT	DESCRIPTION		DATE
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PROJECT: FERMOY WEIR REMEDIATION AND FISH BYPASS CHANNEL

CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: PROPOSED FISH BYPASS PLAN

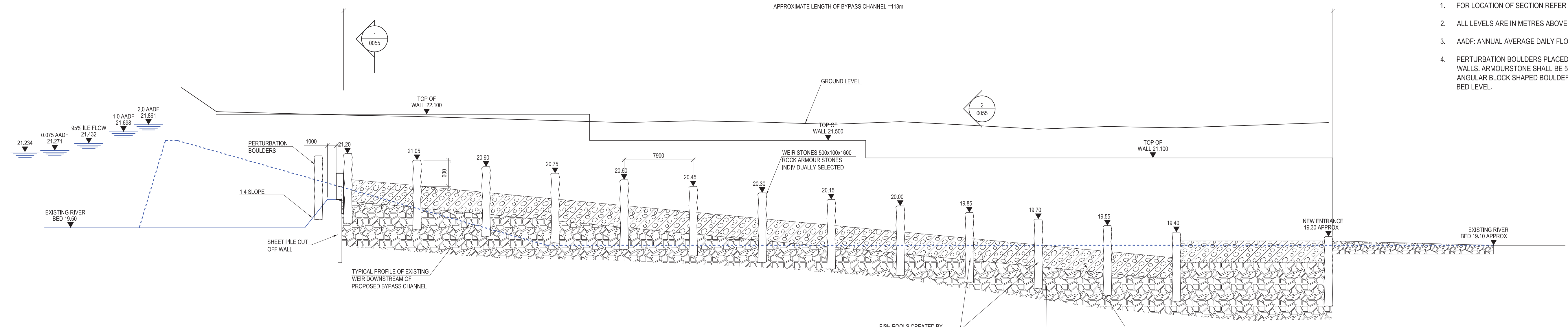
SCALE: 1:500 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-XX-XX-DR-C-0053

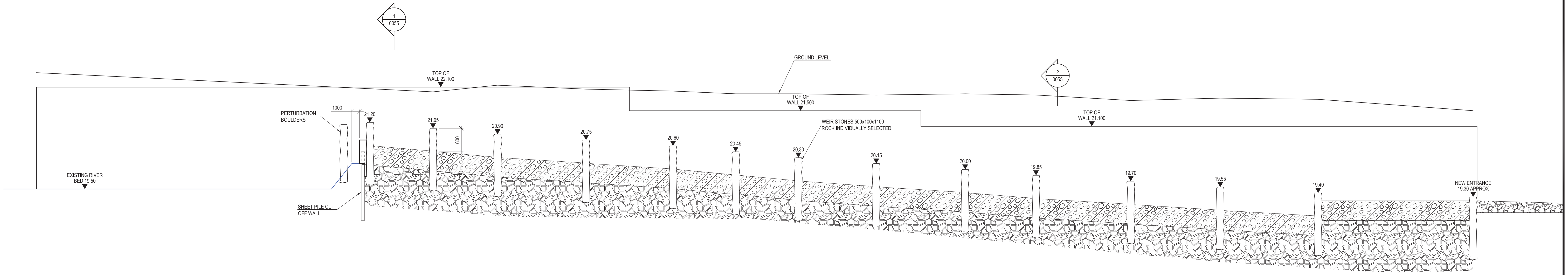
REV: C01

NOTES:

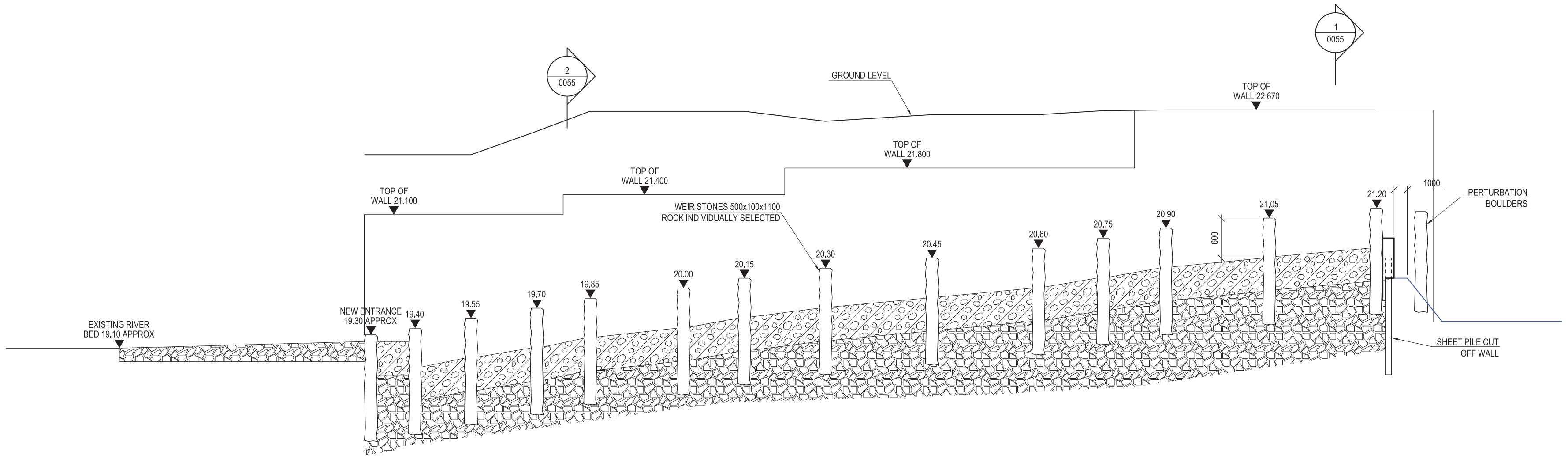
1. FOR LOCATION OF SECTION REFER TO DRAWING 0053.
2. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM MALIN HEAD.
3. AADF: ANNUAL AVERAGE DAILY FLOW
4. PERTURBATION BOULDERS PLACED 1m UPSTREAM OF GAPS IN THE WEIR WALLS. ARMOURSTONE SHALL BE 500x1000x1600 HIGH MIN. DIMENSIONS ANGULAR BLOCK SHAPED BOULDERS PROJECTION 500mm ABOVE THE RAMP BED LEVEL.



1
0054
LONGITUDINAL SECTION THROUGH BYPASS CHANNEL
[TAKEN ALONG CENTRELINE OF BYPASS CHANNEL]
SCALE: 1:250 [H], 1:50[V]



2
0054
ELEVATION OF NORTHERN WALL OF BYPASS CHANNEL
SCALE: 1:250 [H], 1:50[V]



3
0054
ELEVATION OF SOUTHERN WALL OF BYPASS CHANNEL
SCALE: 1:250 [H], 1:50[V]

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PROJECT: FERMOY WEIR REMEDIATION AND FISH BYPASS CHANNEL

CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: PROPOSED FISH BYPASS LONGITUDINAL SECTION

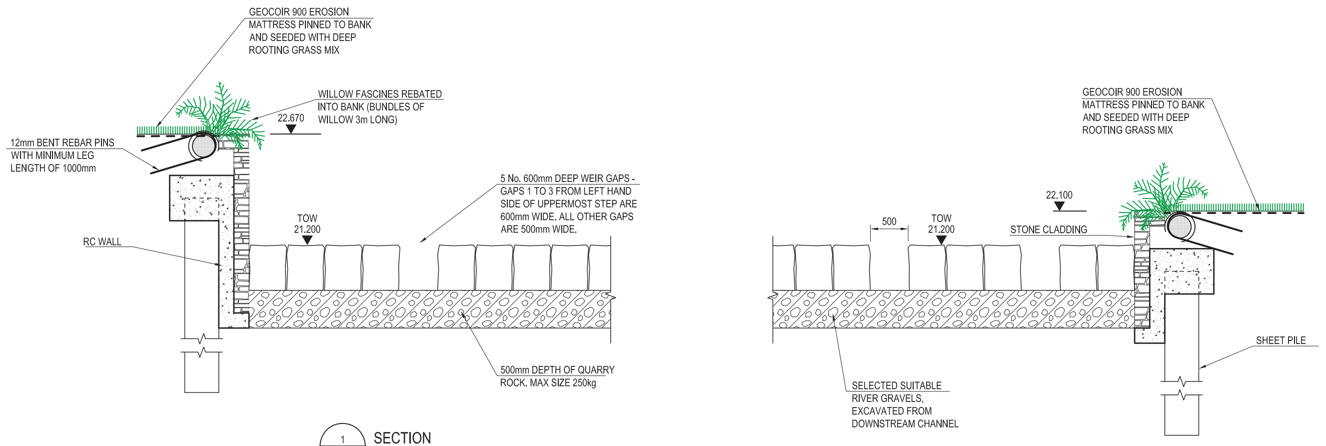
SCALE: 1:250 [H], 1:50 [V] (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-XX-XX-DR-C-0054

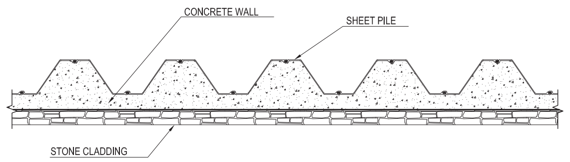
REV: C01

NOTES:

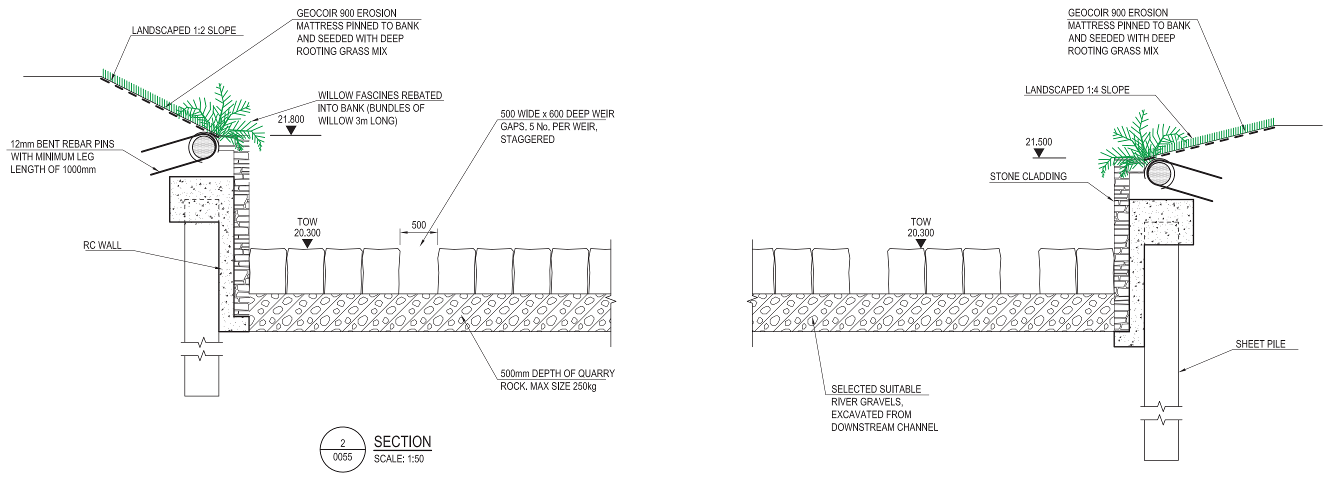
1. FOR LOCATION OF SECTIONS REFER TO DRAWING 0053.
2. ALL LEVELS ARE IN METERS ABOVE ORDNANCE DATUM MALIN HEAD



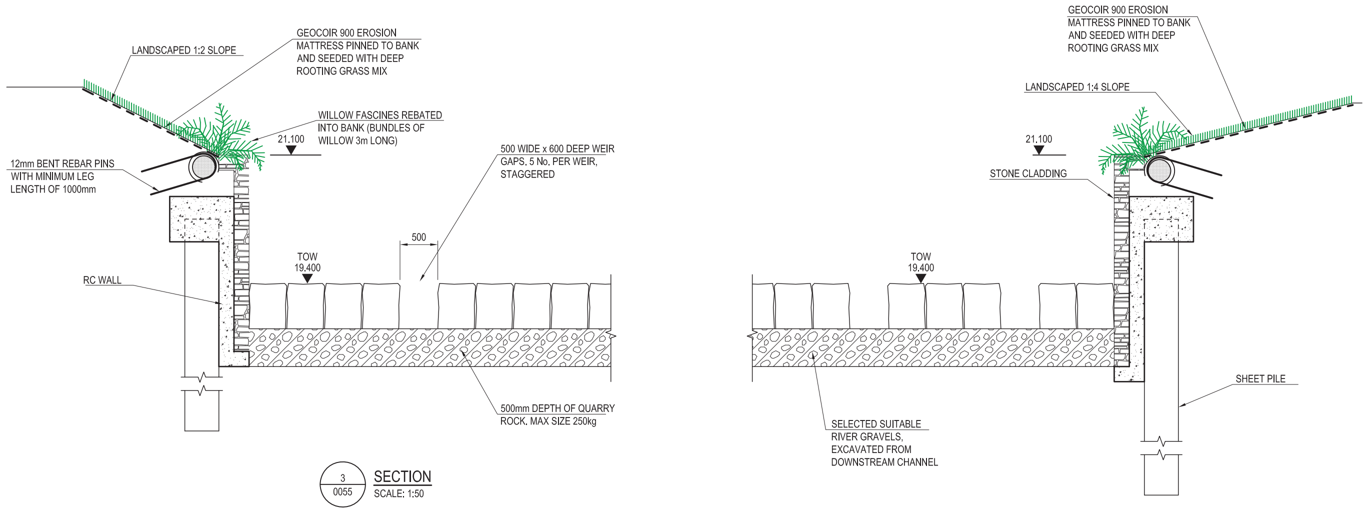
1 / 0055 SECTION
SCALE: 1:50



4 / 0055 DETAIL PART PLAN OF SHEET PILE WALL
SCALE: 1:50



2 / 0055 SECTION
SCALE: 1:50



3 / 0055 SECTION
SCALE: 1:50

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Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: FERMOY WEIR REMEDIATION AND FISH BYPASS CHANNEL

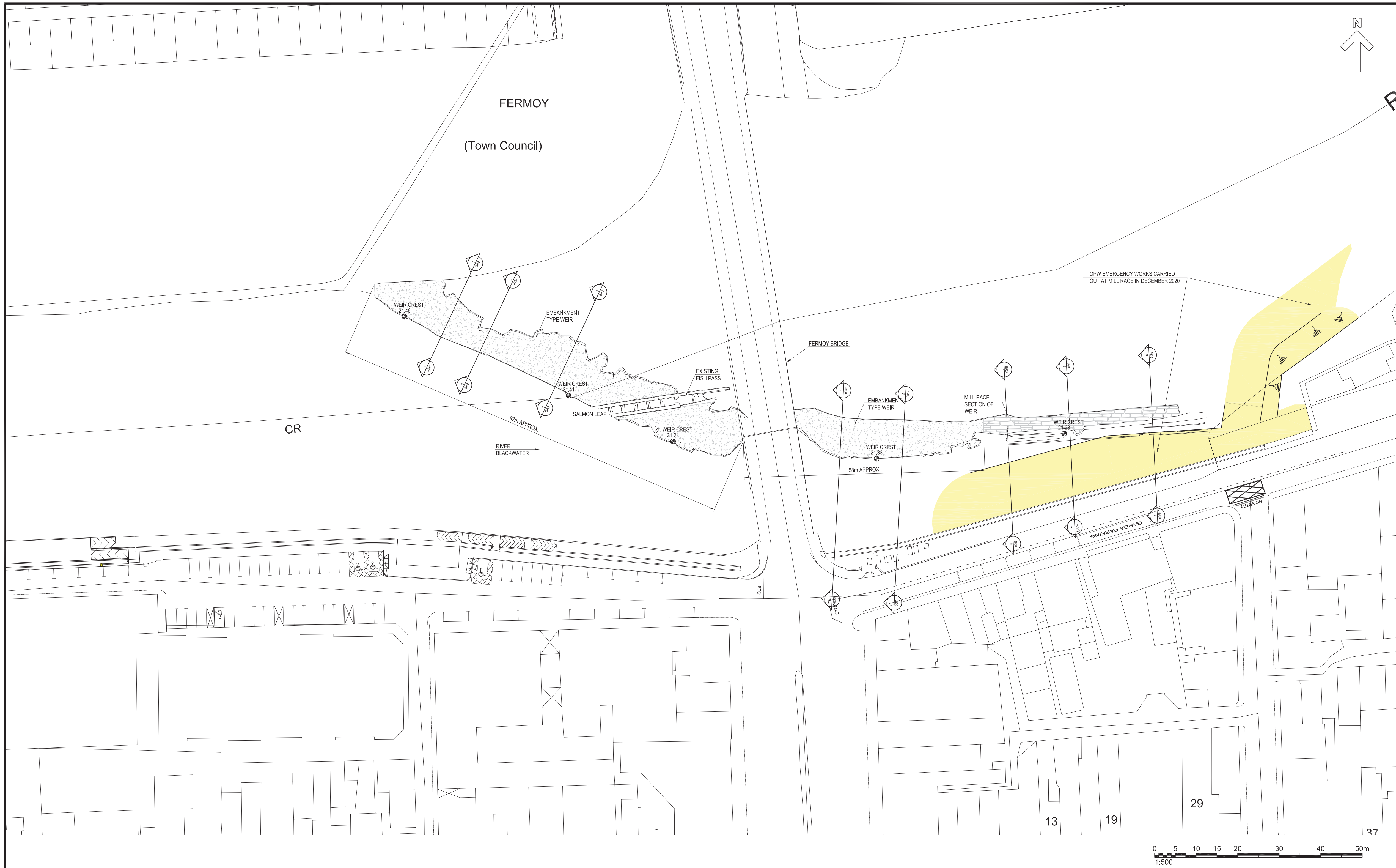
CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: FISH BYPASS SECTIONS

SCALE: 1:50 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-XX-XX-DR-C-0055

REV: C01



NOTES:

1. EXTENT OF EXISTING WEIR BASE ON TOPOGRAPHICAL SURVEY UNDERTAKEN BY MURPHY GEOSPACIAL IN AUGUST 2018.
2. FOR SECTIONS THROUGH EXISTING WEIR REFER TO DRAWING 0059.

APPROXIMATE EXTENT OF BED STABILISATION WORKS UNDERTAKEN BY THE OPW IN 2020

MAP REPRODUCED BY PERMISSION OF ORDNANCE SURVEY IRELAND (CORK CCMA 9802)

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Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: FERMOY EMBANKMENT WEIR REMEDIATION AND FISH BYPASS CHANNEL

CLIENT: CORK COUNTY COUNCIL

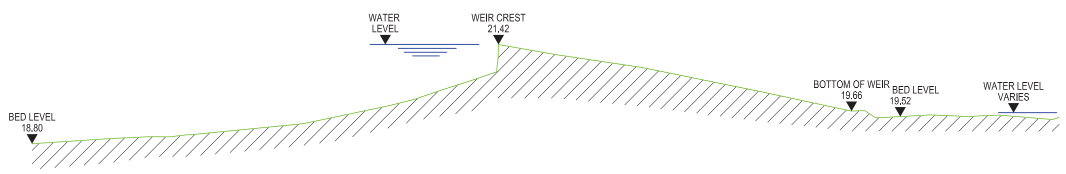
DRAWING TITLE: WEIR REMEDIATION PLAN OF EXISTING WEIR

SCALE: 1:500 (A1)

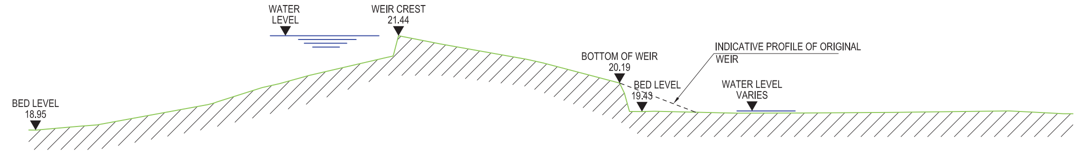
PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER

19011-TJOC-PL-XX-DR-C-0058

REV: C01



1 / 0059 EXISTING EMBANKMENT WEIR SECTION
SCALE: 1:100



2 / 0059 EXISTING EMBANKMENT WEIR SECTION
SCALE: 1:100

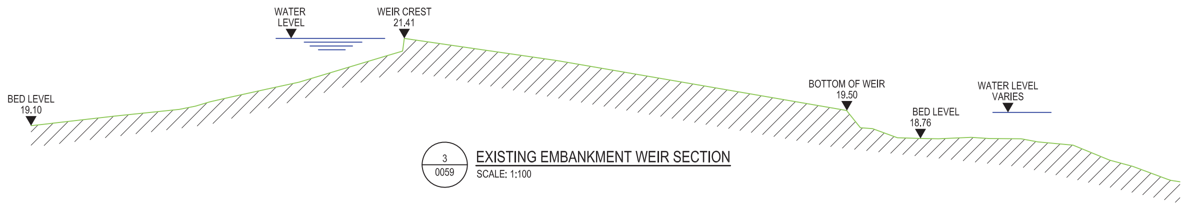
NOTES:

1. FOR LOCATION OF SECTIONS REFER TO DRAWING 0058.
2. ALL LEVELS SHOWN ARE IN METERS ABOVE ORDNANCE DATUM, MALIN HEAD.
3. AUGUST 2018 AND AUGUST 2020 SURVEYS OF THE RIVER BED AND WEIR UNDERTAKEN BY MURPHY GEOSPATIAL AND CARRIED OUT TO ITM.
4. AUG 2018 SURVEY DRAWING REFERENCE 27232 18024_Fermoy_Weir
5. AUG 2020 SURVEY DRAWING REFERENCE MSL37760_01
6. SECTIONS SHOW APPROXIMATE BED PROFILE FOLLOWING WORKS COMPLETED BY OPW IN AUTUMN 2020.

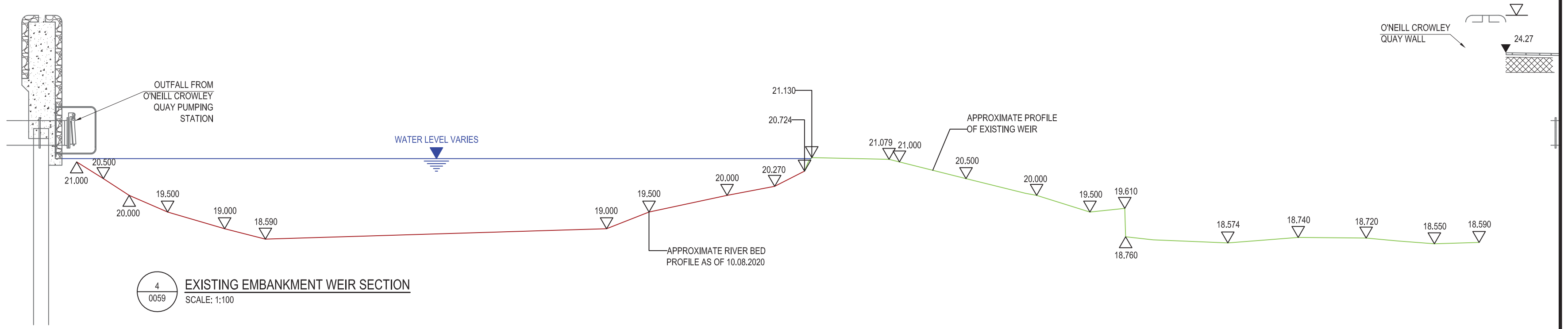
LEGEND:

AUGUST 2018 SURVEY PROFILE

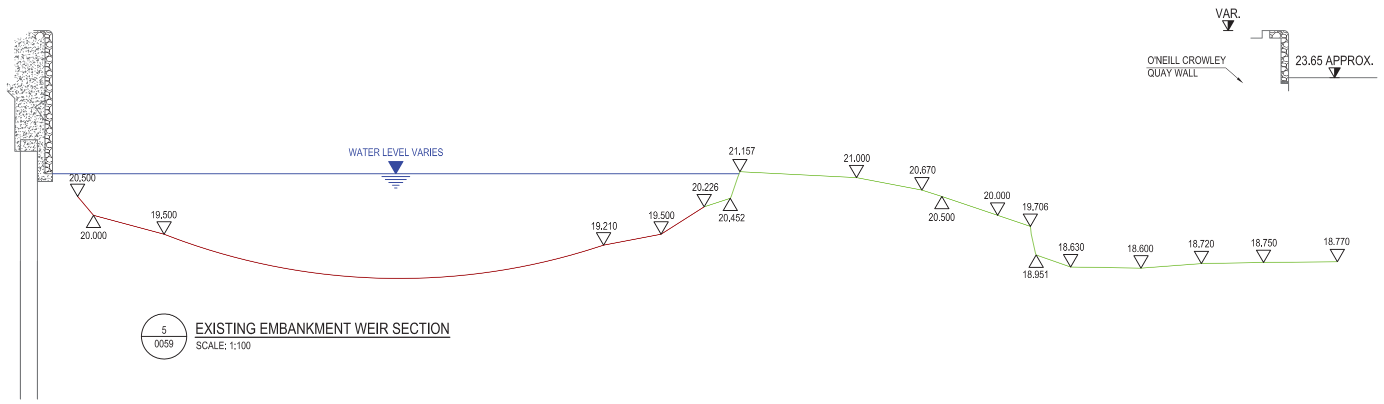
AUGUST 2020 SURVEY BED PROFILE



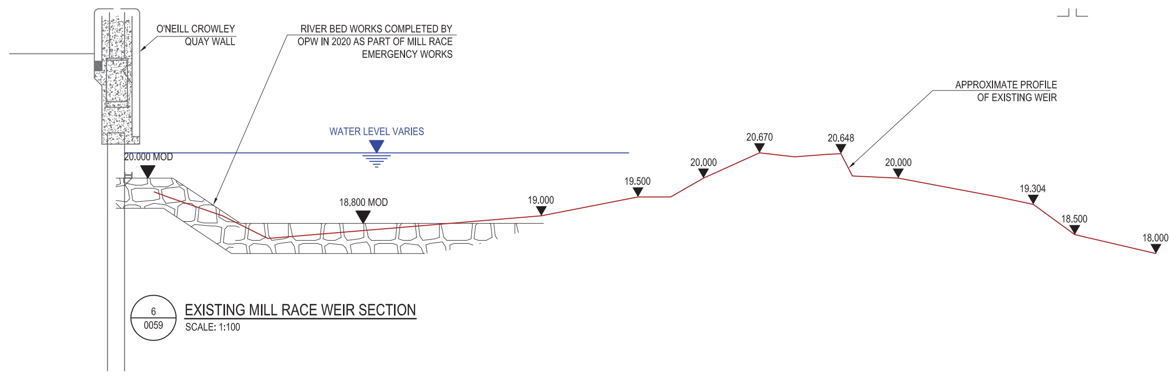
3 / 0059 EXISTING EMBANKMENT WEIR SECTION
SCALE: 1:100



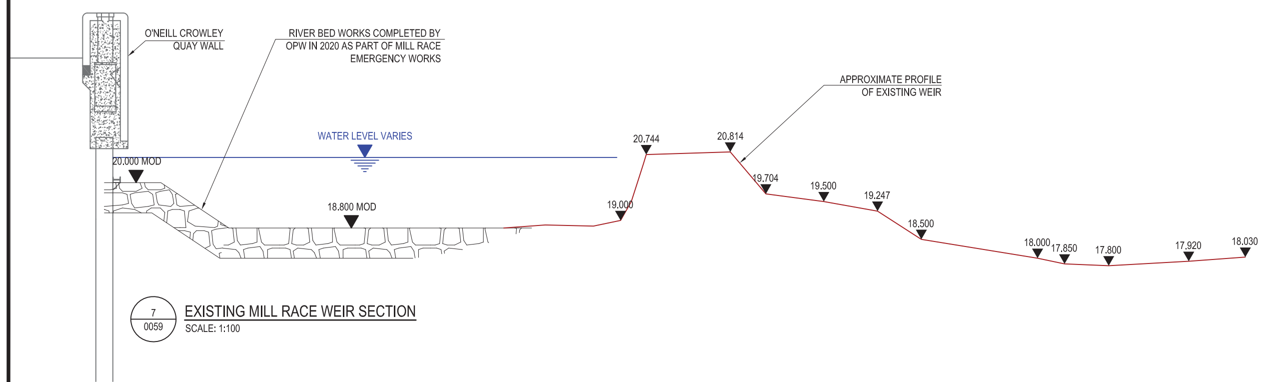
4 / 0059 EXISTING EMBANKMENT WEIR SECTION
SCALE: 1:100



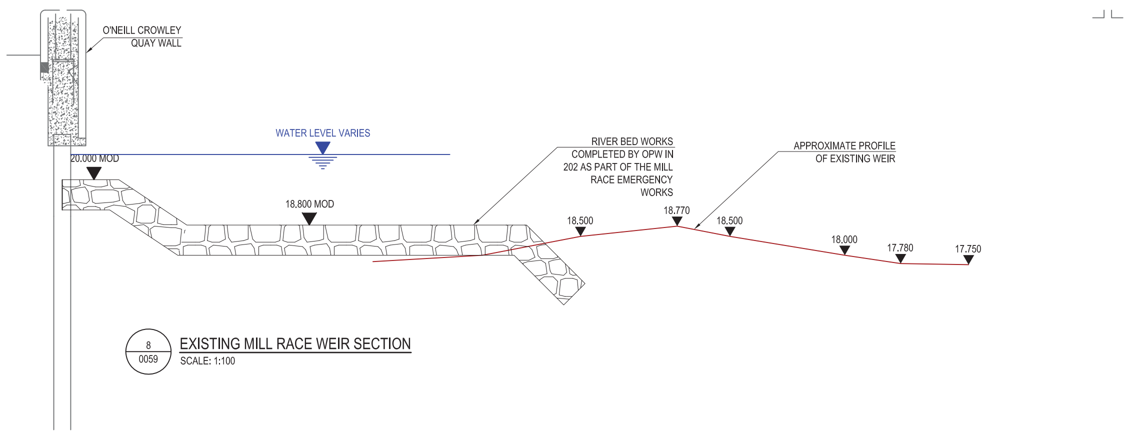
5 / 0059 EXISTING EMBANKMENT WEIR SECTION
SCALE: 1:100



6 / 0059 EXISTING MILL RACE WEIR SECTION
SCALE: 1:100



7 / 0059 EXISTING MILL RACE WEIR SECTION
SCALE: 1:100



8 / 0059 EXISTING MILL RACE WEIR SECTION
SCALE: 1:100

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PROJECT: FERMOY WEIR REMEDIATION AND FISH BYPASS CHANNEL

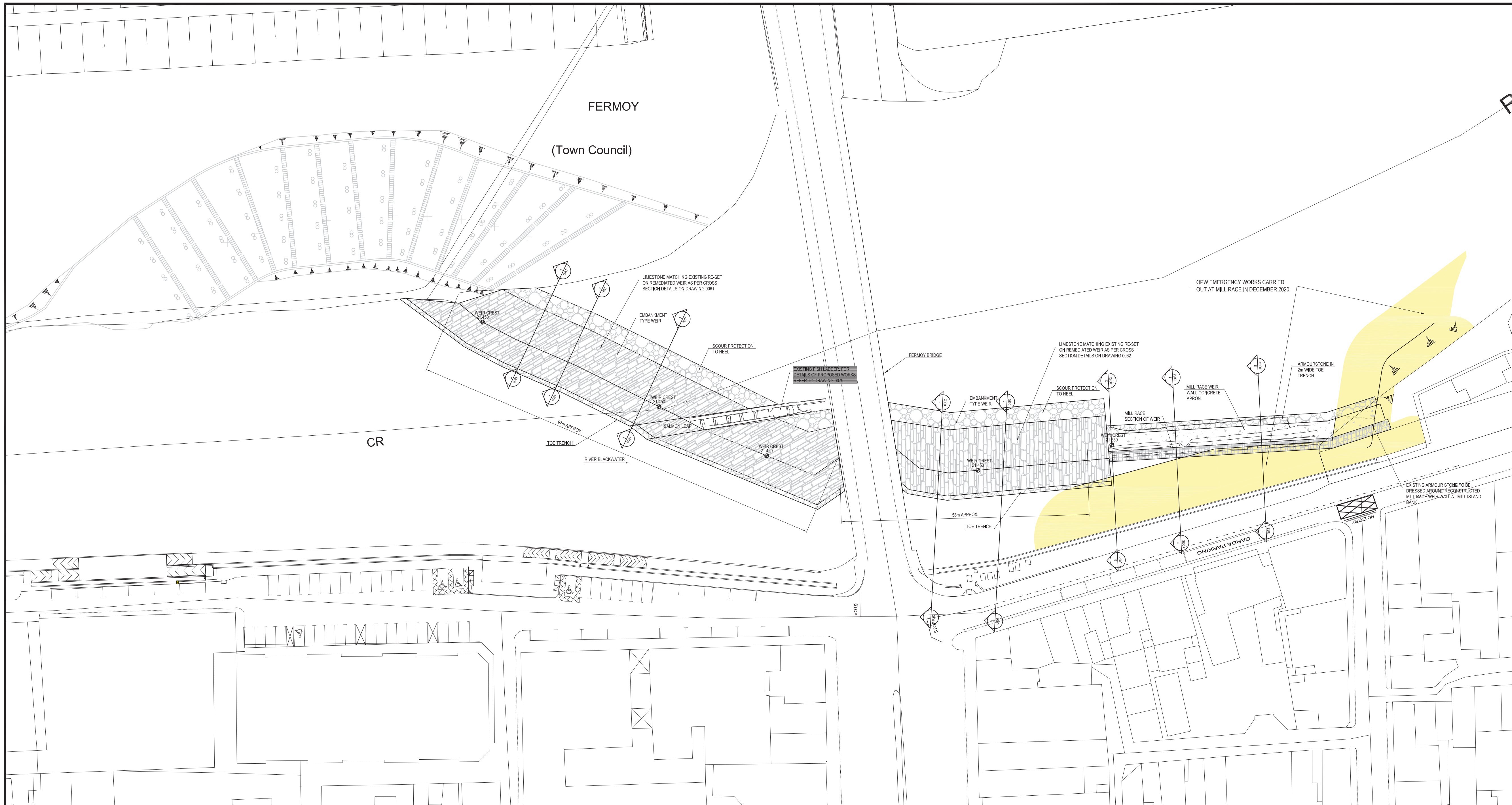
CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: PROPOSED WEIR REMEDIATION EXISTING SECTIONS

SCALE: AS SHOWN (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0059

REV: C01



0 5 10 15 20 30 40 50m
1:500

NOTES:

1. FOR SECTIONS THROUGH PROPOSED EMBANKMENT WEIR REFER TO DRAWINGS 0061 AND 0062.
2. FOR SECTIONS THROUGH PROPOSED MILL RACE WEIR REFER TO DRAWING 0063.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM MALIN HEAD.
4. WEIR REMEDIATION SHALL BE UNDERTAKEN IN ACCORDANCE WITH THE CONSERVATION ENGINEER'S RECOMMENDATIONS.

APPROXIMATE EXTENT OF BED STABILISATION WORKS UNDERTAKEN BY THE OPW IN 2020

MAP REPRODUCED BY PERMISSION OF ORDNANCE SURVEY IRELAND (CORK CCMA 9802)

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PROJECT: FERMOY EMBANKMENT WEIR REMEDIATION AND FISH BYPASS CHANNEL

CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: WEIR REMEDIATION PLAN OF PROPOSED WEIR

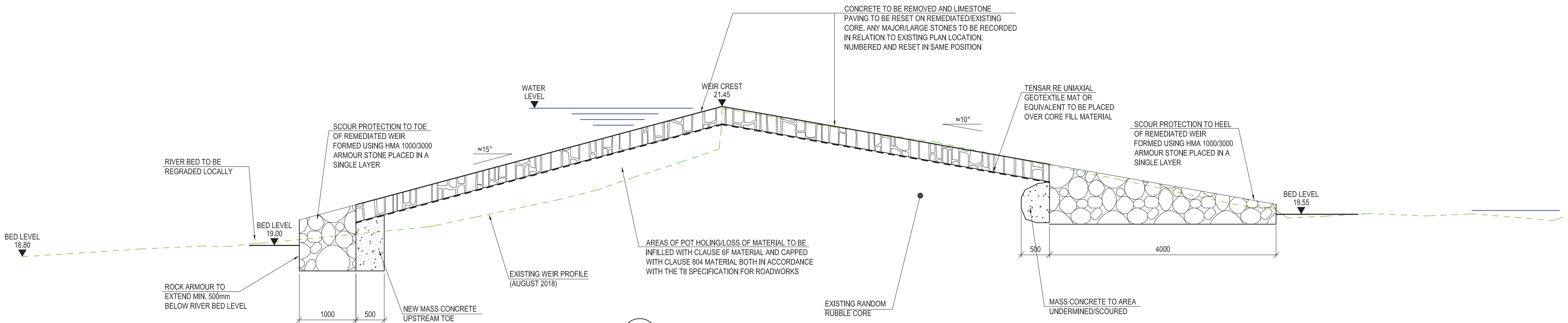
SCALE: 1:500 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0060

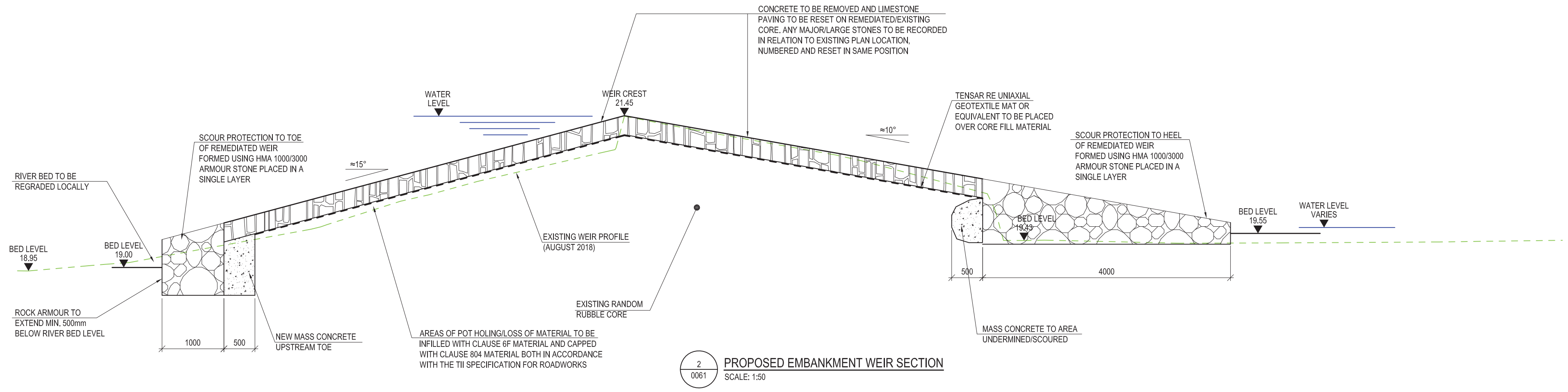
REV: C01

NOTES:

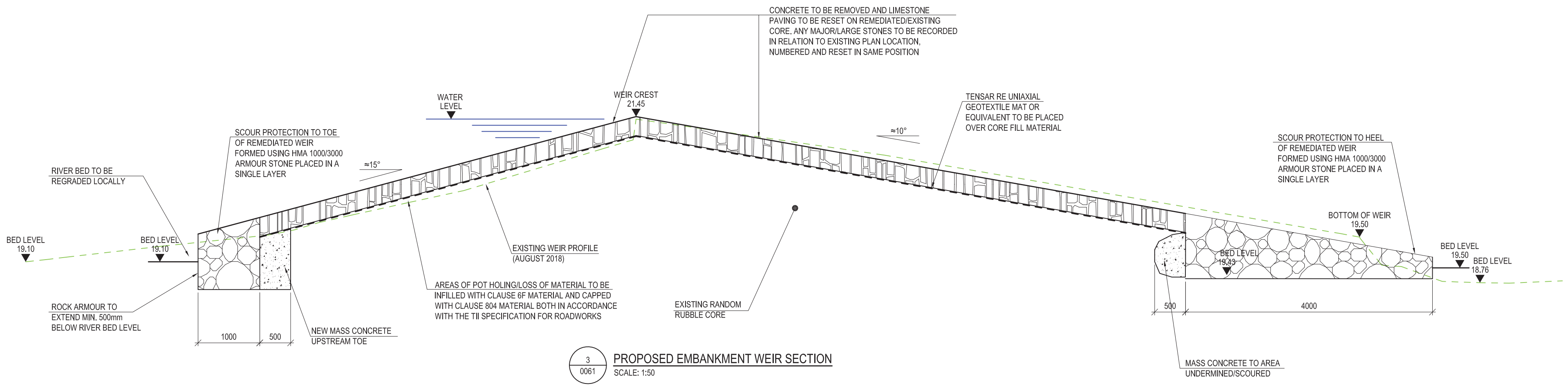
1. ALL LEVELS SHOWN ARE IN METERS ABOVE ORDNANCE DATUM, MALIN HEAD.
2. FOR LOCATIONS OF SECTIONS REFER TO DRAWING 0060.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH SURVEY DRAWINGS OF EXISTING WEIR STRUCTURE AND WITH SECTION DRAWINGS 0062 AND 0063.
4. WEIR REMEDIATION SHALL BE UNDERTAKEN IN ACCORDANCE WITH THE CONSERVATION ENGINEER'S RECOMMENDATIONS.



1 / 0061 PROPOSED EMBANKMENT WEIR SECTION
SCALE: 1:50



2 / 0061 PROPOSED EMBANKMENT WEIR SECTION
SCALE: 1:50



3 / 0061 PROPOSED EMBANKMENT WEIR SECTION
SCALE: 1:50

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PROJECT: FERMOY WEIR REMEDIATION AND FISH BYPASS CHANNEL

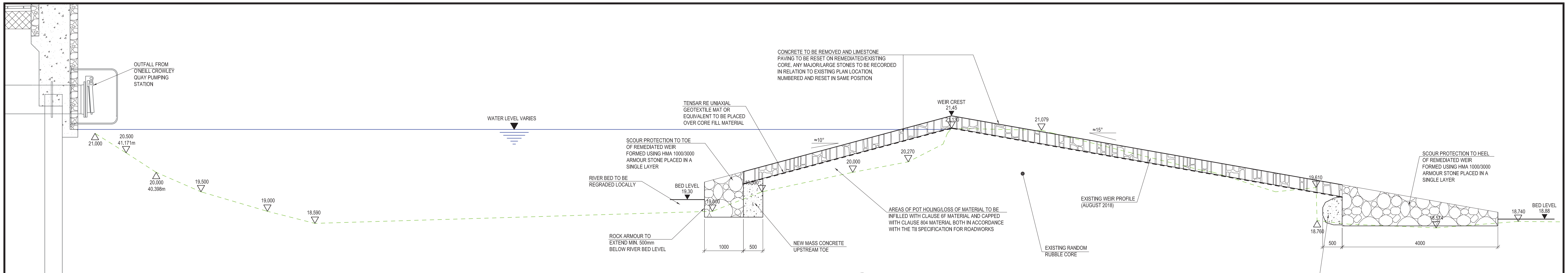
CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: WEIR REMEDIATION PROPOSED SECTIONS

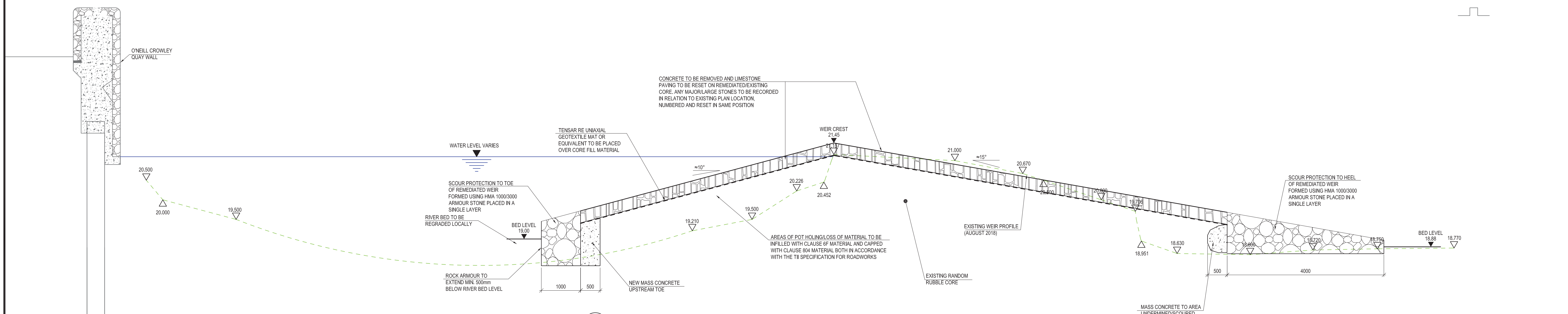
SCALE: AS SHOWN (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0061

REV: C01



1
0062
PROPOSED EMBANKMENT WEIR SECTION
SCALE: 1:50



2
0062
PROPOSED EMBANKMENT WEIR SECTION
SCALE: 1:50

NOTES:

1. ALL LEVELS SHOWN ARE IN METERS ABOVE ORDNANCE DATUM, MALIN HEAD.
2. FOR LOCATIONS OF SECTIONS REFER TO DRAWING 0060.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH SURVEY DRAWINGS OF EXISTING WEIR STRUCTURE AND WITH SECTION DRAWINGS 0061 AND 0063.
4. WEIR REMEDIATION SHALL BE UNDERTAKEN IN ACCORDANCE WITH THE CONSERVATION ENGINEER'S RECOMMENDATIONS.

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PROJECT: FERMOY WEIR REMEDIATION AND FISH BYPASS CHANNEL

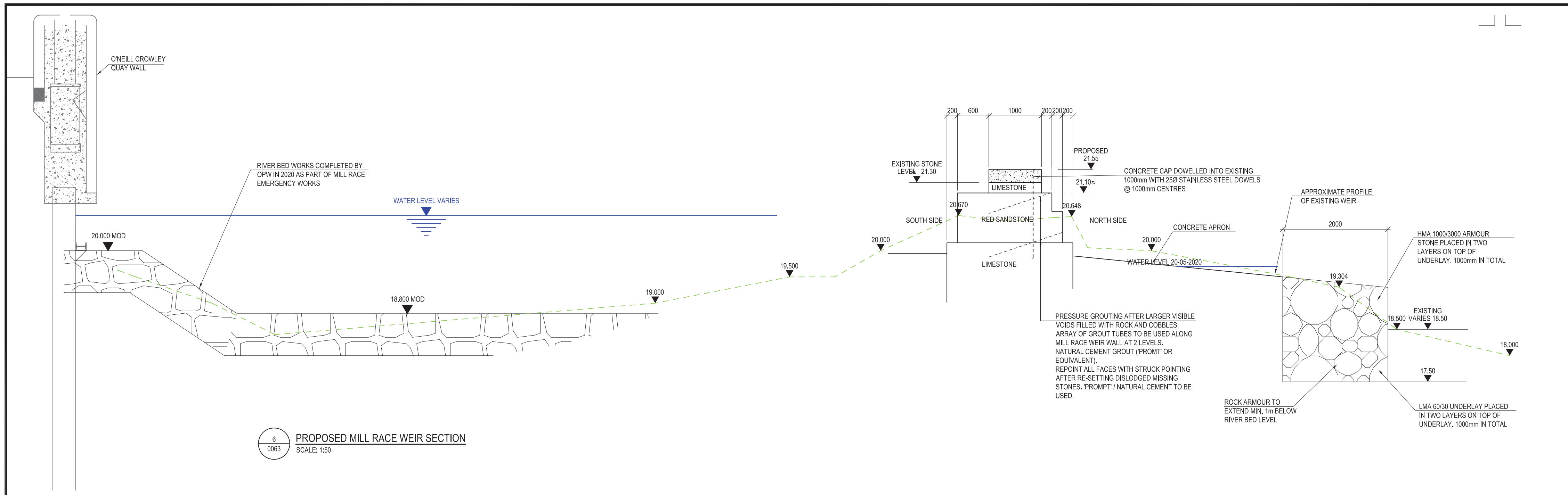
CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: WEIR REMEDIATION PROPOSED SECTIONS

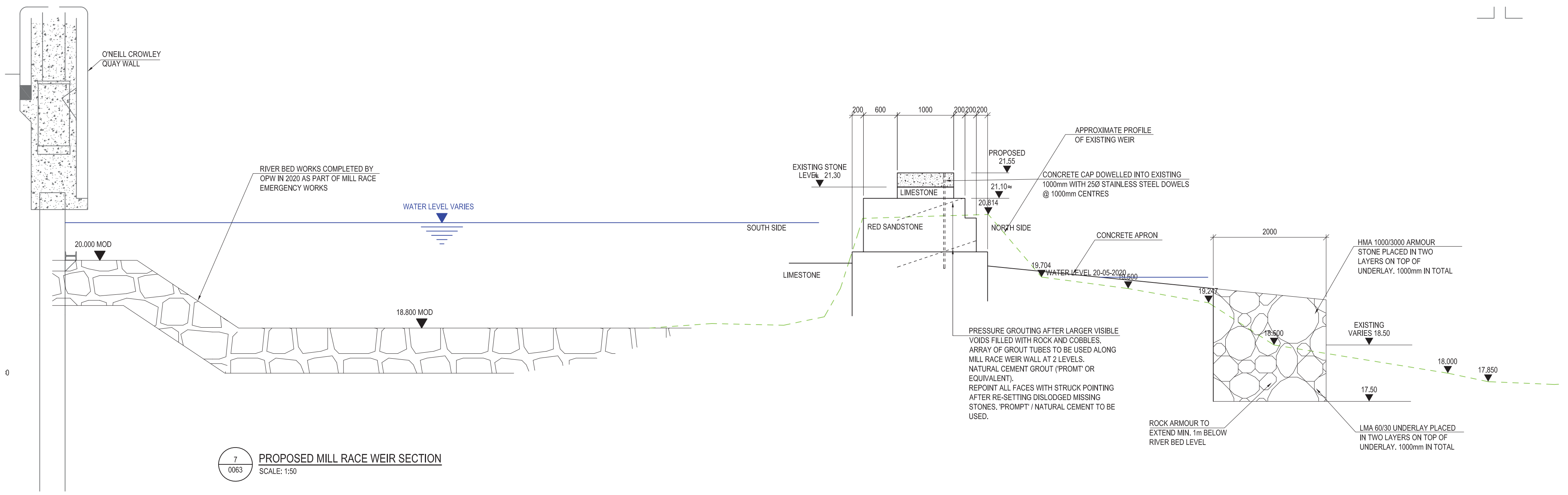
SCALE: AS SHOWN (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0062

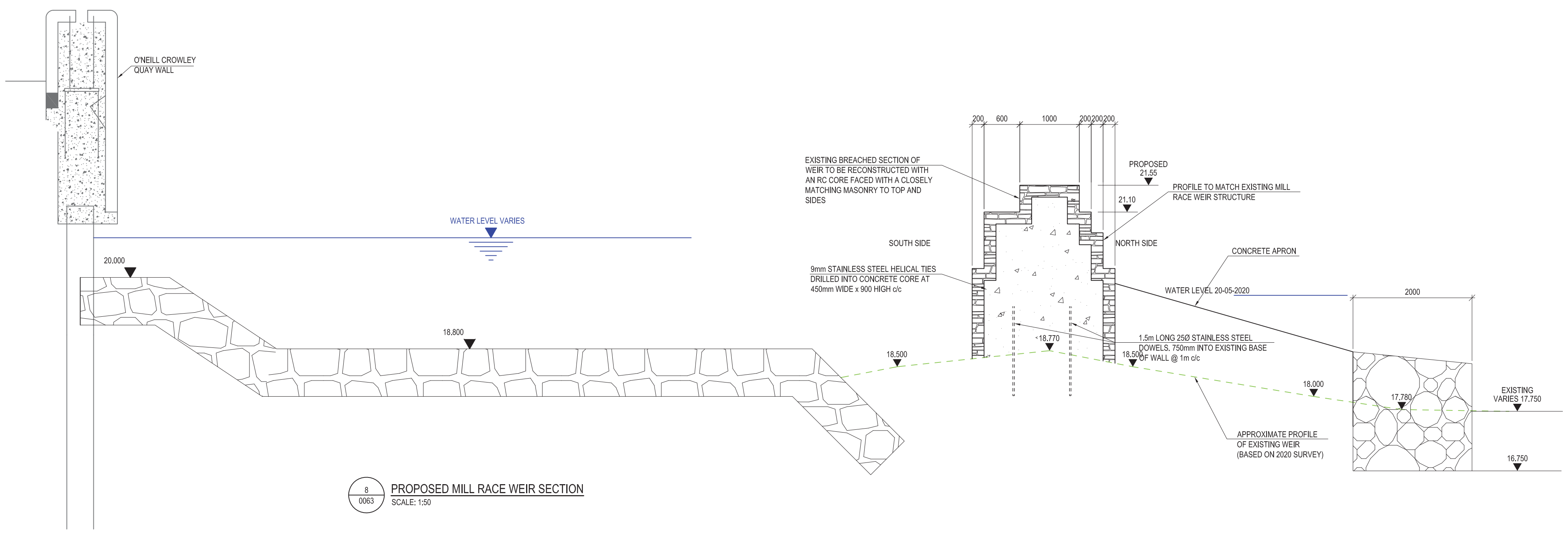
REV: C01



6 / 0063 **PROPOSED MILL RACE WEIR SECTION**
SCALE: 1:50



7 / 0063 **PROPOSED MILL RACE WEIR SECTION**
SCALE: 1:50



8 / 0063 **PROPOSED MILL RACE WEIR SECTION**
SCALE: 1:50

NOTES:

1. ALL LEVELS SHOWN ARE IN METERS ABOVE ORDNANCE DATUM, MALIN HEAD.
2. FOR LOCATIONS OF SECTIONS REFER TO DRAWING 0060.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH SURVEY DRAWINGS OF EXISTING WEIR STRUCTURE AND WITH SECTION DRAWINGS 0061 AND 0062.
4. WEIR REMEDIATION SHALL BE UNDERTAKEN IN ACCORDANCE WITH THE CONSERVATION ENGINEER'S RECOMMENDATIONS.

REV	SUIT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	02.06.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY:	REVIEWED BY:	APPROVED BY:
LC	MV	DC

TJ O'CONNOR & ASSOCIATES
CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

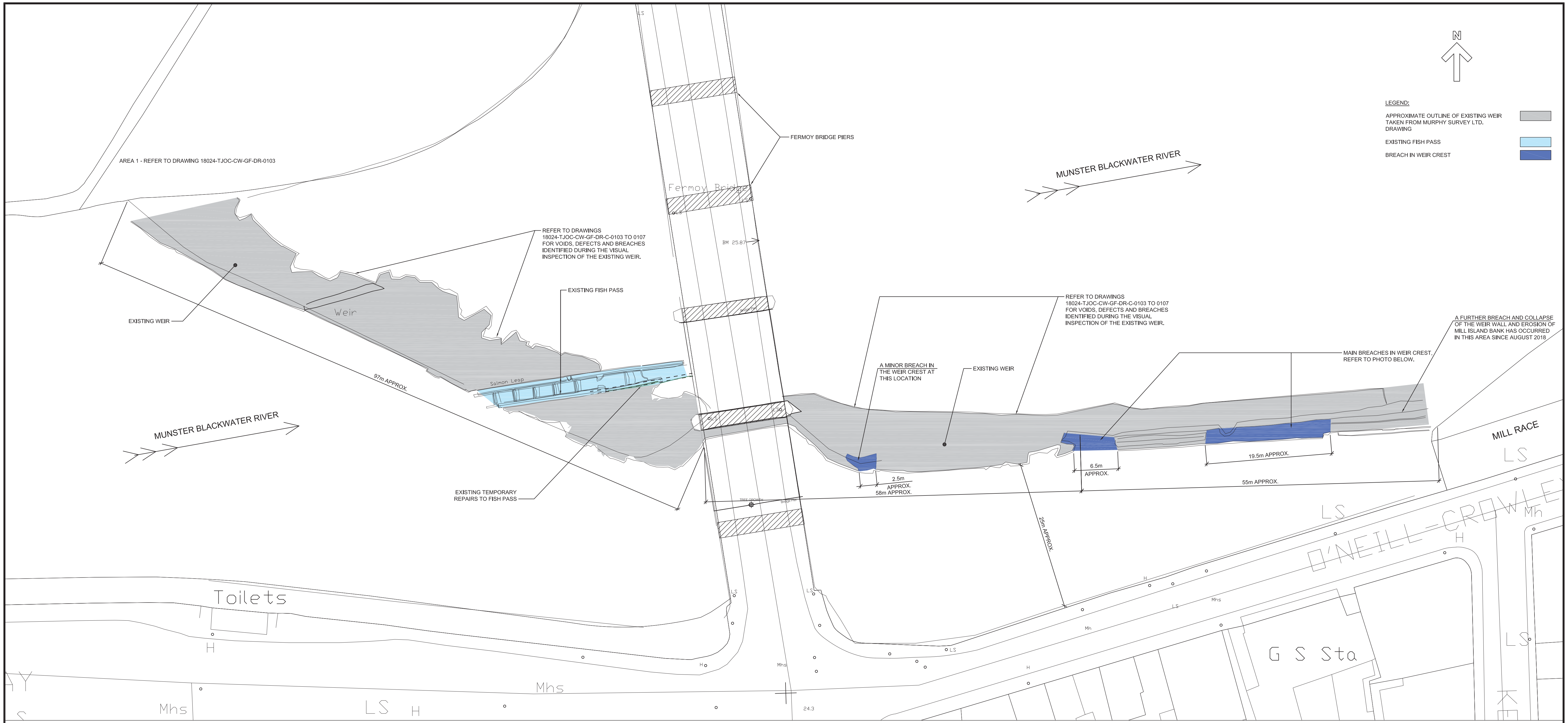
PROJECT: FERMOY WEIR REMEDIATION AND FISH BYPASS CHANNEL

CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: WEIR REMEDIATION PROPOSED SECTIONS

SCALE: AS SHOWN (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0063
REV: C01



1 / 0073 EXISTING WEIR LAYOUT
SCALE: 1:300

0 3 6 9 12 18 24 30m
1:300

2 / 0073 PHOTO OF EXISTING WEIR ON EAST SIDE OF FERMOY BRIDGE

3 / 0073 AERIAL PHOTO OF FERMOY WEIR

NOTES:

1. REFER TO DRAWINGS 19011-TJOC-PL-XX-DR-C-0074 TO 0078 FOR FURTHER NOTES AND PHOTOGRAPHS.
2. DIMENSIONS SHOWN ON DRAWING ARE APPROXIMATE ONLY AND ARE BASED ON THE SURVEY UNDERTAKEN BY MURPHY SURVEYS LTD ON 23rd AUGUST 2018.
3. COMMENTS AND PHOTOGRAPHS ON THE CONDITION OF THE WEIR ARE BASED ON A VISUAL INSPECTION OF THE WEIR ON 15th AUGUST 2018. NO OPENING UP WORKS OF ANY KIND WERE UNDERTAKEN DURING THE VISUAL INSPECTION.

REV	SUIT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	02.06.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY:	REVIEWED BY:	APPROVED BY:
LC	MV	DC

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CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: FERMOY WEIR REMEDIATION

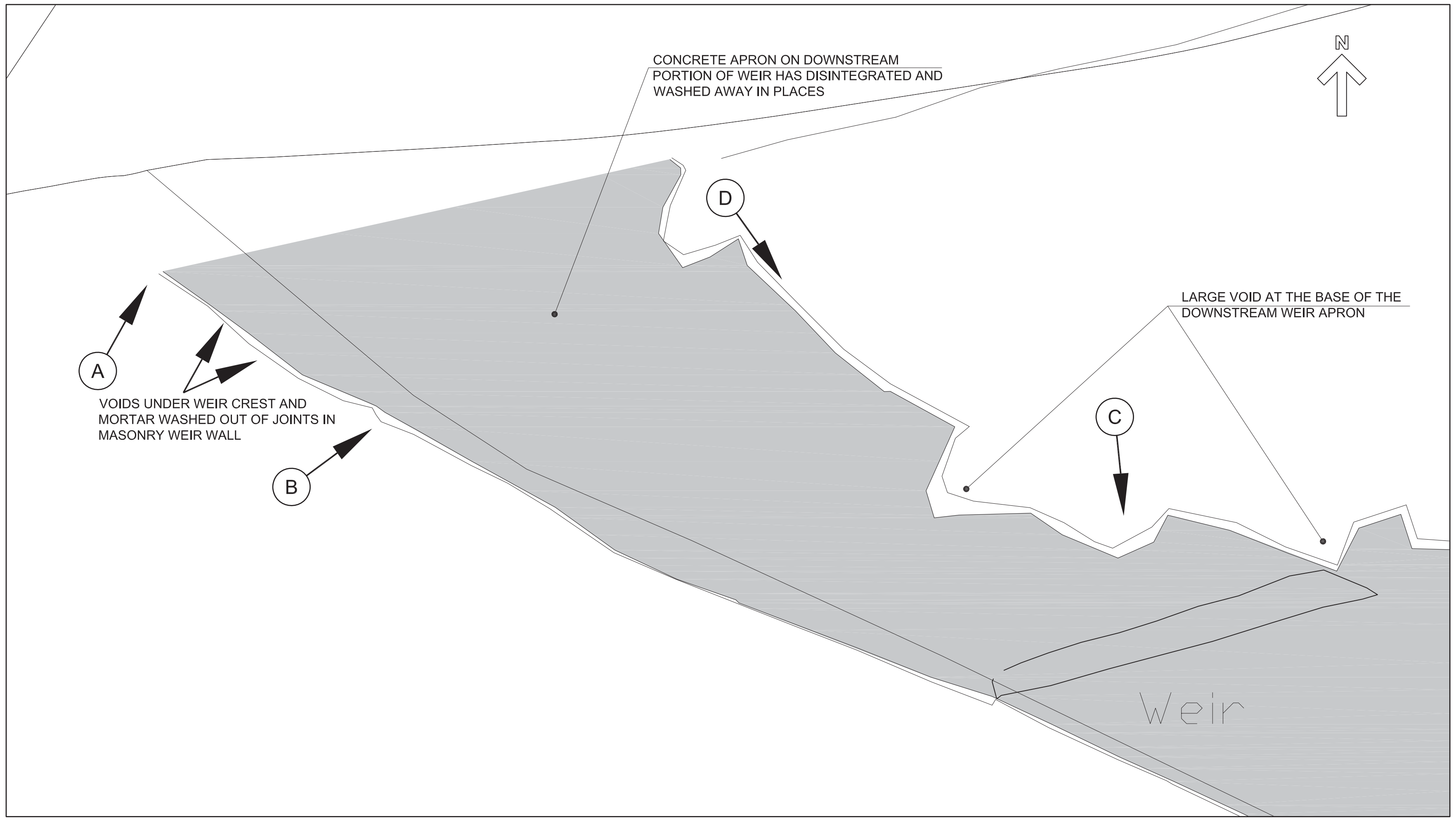
CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: SUMMARY OF EXISTING WEIR CONDITION IN 2018

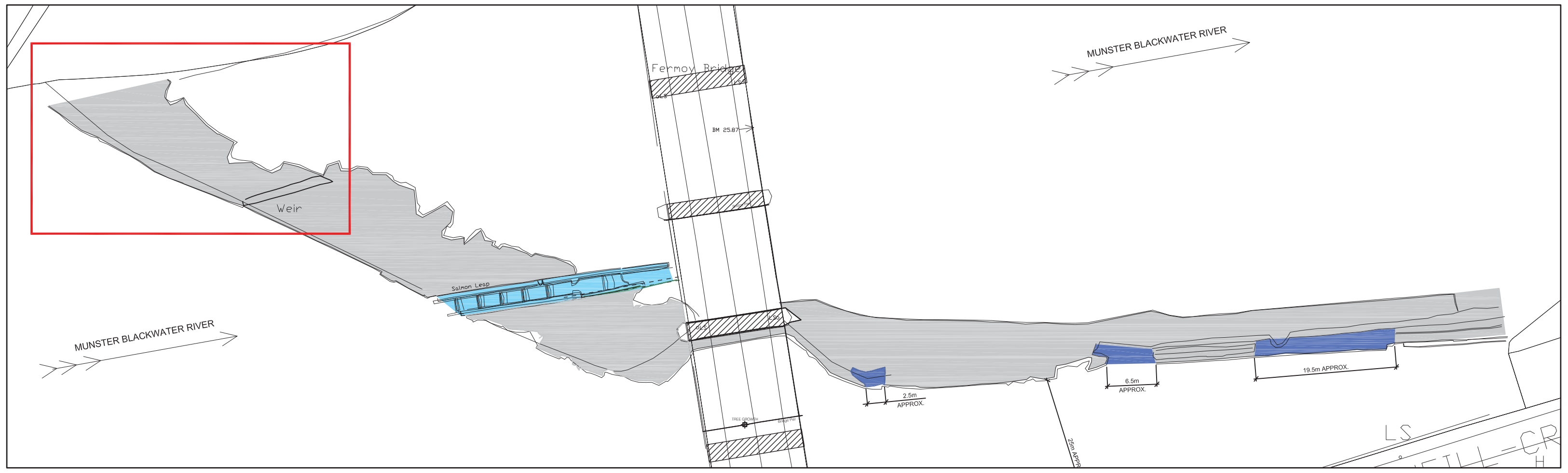
SCALE: 1:300 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0073

REV: C01



1
0074
EXISTING WEIR LAYOUT - AREA 1
SCALE: 1:100



2
0074
KEYPLAN - AREA 1
SCALE: 1:500

A
0074
VOIDS UNDER WEIR CREST

B
0074
MORTAR AND FINES WASHED OUT OF JOINTS IN MASONRY WEIR WALLS

C
0074
LARGE VOID AT THE BASE OF THE DOWNSTREAM WEIR APRON

D
0074
CONCRETE APRON OF WEIR HAS DISINTEGRATED AND WASHED AWAY IN PLACES

NOTES:

1. COMMENTS AND PHOTOGRAPHS ON THE CONDITION OF THE WEIR ARE BASED ON A VISUAL INSPECTION OF THE WEIR ON 15th AUGUST 2018. NO OPENING UP WORKS OF ANY KIND WERE UNDERTAKEN DURING THE VISUAL INSPECTION.

REV	SUIT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	02.06.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY: LC | REVIEWED BY: MV | APPROVED BY: DC

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CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

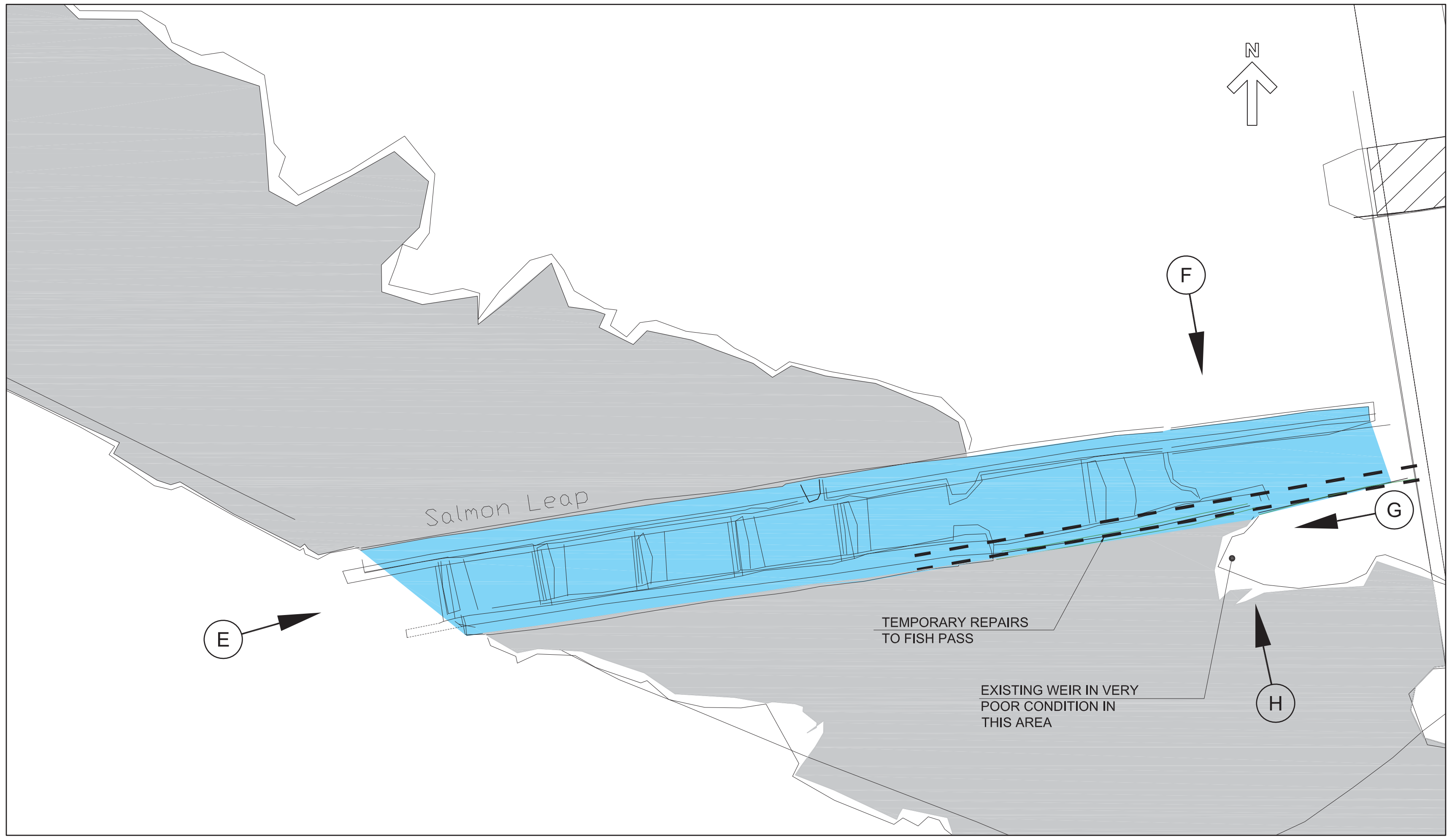
PROJECT: FERMOY WEIR REMEDIATION

CLIENT: CORK COUNTY COUNCIL

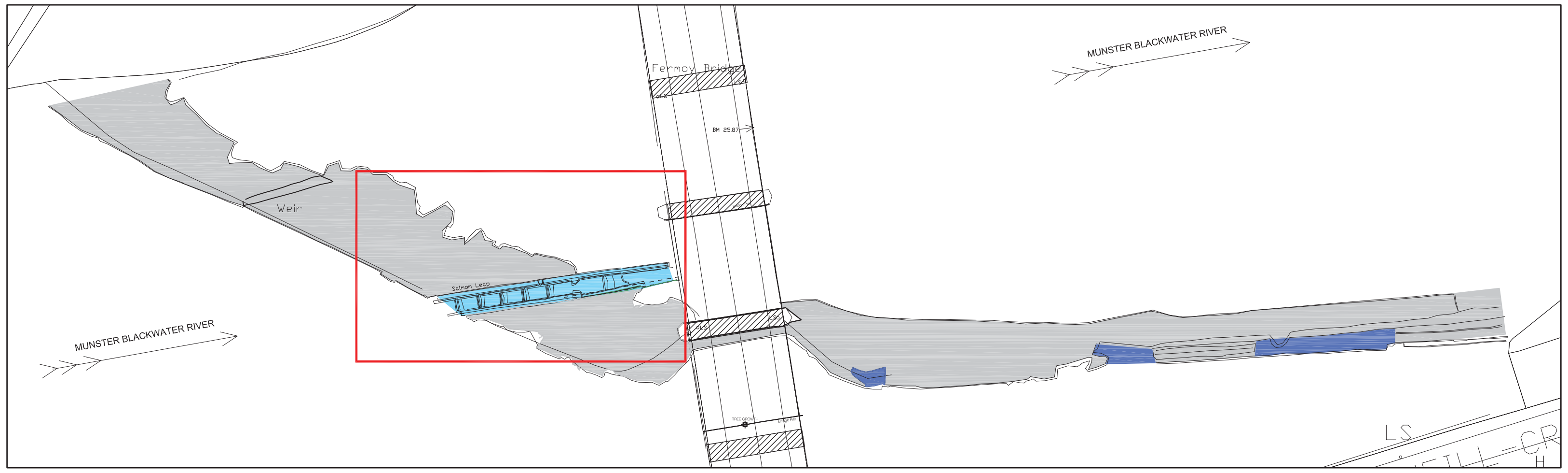
DRAWING TITLE: EXISTING WEIR CONDITION AREA 1

SCALE: 1:100 (A1)

19011-TJOC-PL-XX-DR-C-0074 REV: C01



1 / 0075 EXISTING WEIR LAYOUT - AREA 2
SCALE: 1:100



2 / 0075 KEYPLAN - AREA 2
SCALE: 1:500

E / 0075 VIEW OF UPSTREAM END OF FISH PASS

F / 0075 VIEW OF DAMAGE TO FISH PASS WALL

G / 0075 WEIR APRON HAS DISINTEGRATED AND WASHED AWAY

H / 0075 VIEW OF TEMPORARY REPAIRS TO FISH PASS AND DISLODGED MATERIAL FROM WEIR

NOTES:

1. COMMENTS AND PHOTOGRAPHS ON THE CONDITION OF THE WEIR ARE BASED ON A VISUAL INSPECTION OF THE WEIR ON 15th AUGUST 2018. NO OPENING UP WORKS OF ANY KIND WERE UNDERTAKEN DURING THE VISUAL INSPECTION.

REV	SUIT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	02.06.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY: LC | REVIEWED BY: MV | APPROVED BY: DC

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CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: FERMOY WEIR REMEDIATION

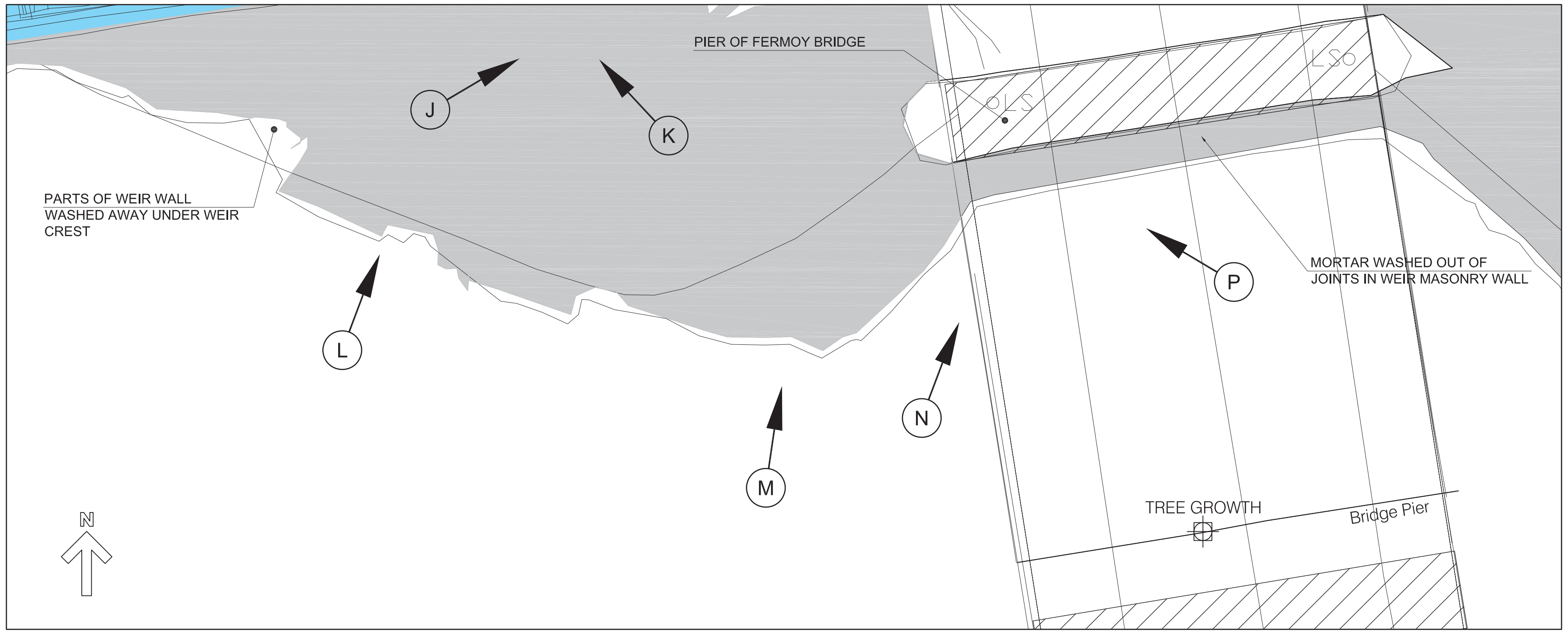
CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: EXISTING WEIR CONDITION
AREA 2

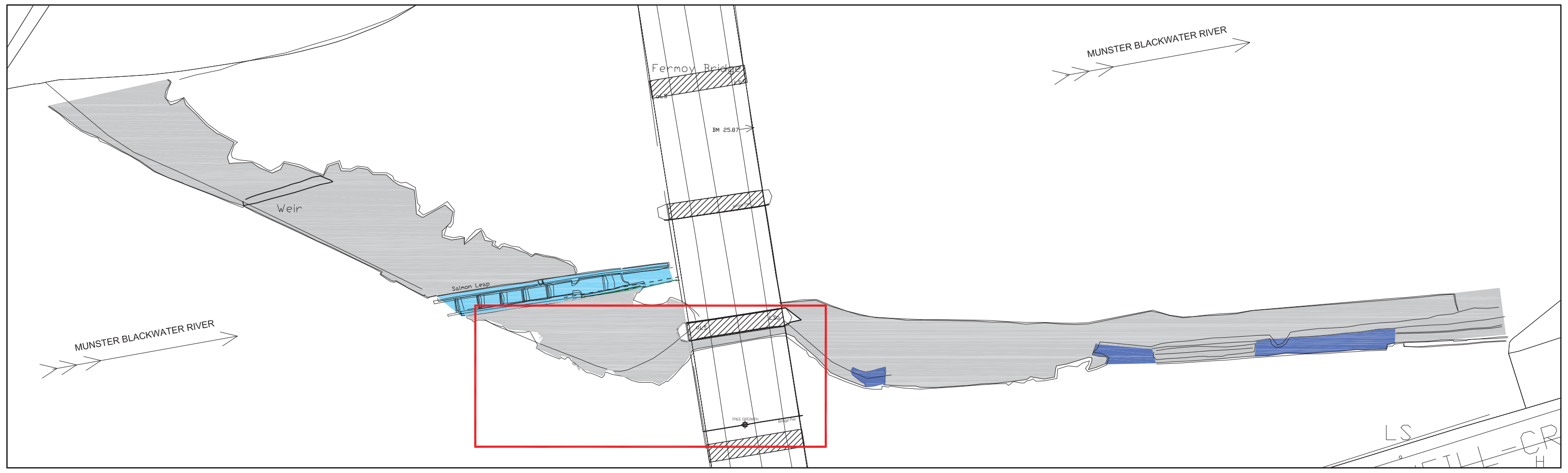
SCALE: 1:100 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0075

REV: C01



1 0076 EXISTING WEIR LAYOUT - AREA 3
SCALE: 1:100



2 0076 KEYPLAN - AREA 3
SCALE: 1:500

M 0076 PART OF WEIR WALL WASHED AWAY UNDER WEIR CREST

N 0076 MORTAR AND FINES WASHED OUT OF MASONRY WEIR WALL ADJACENT TO FERMOY BRIDGE

P 0076 MORTAR AND FINES WASHED OUT OF MASONRY WEIR WALL ADJACENT TO FERMOY BRIDGE

J 0076 WEIR APRON DISINTEGRATED AND WASHED AWAY AT JUNCTION WITH FISH PASS

K 0076 WEIR APRON DISINTEGRATED AND WASHED AWAY AT JUNCTION WITH FISH PASS

L 0076 PART OF WEIR WALL WASHED AWAY UNDER WEIR CREST

NOTES:

1. COMMENTS AND PHOTOGRAPHS ON THE CONDITION OF THE WEIR ARE BASED ON A VISUAL INSPECTION OF THE WEIR ON 15th AUGUST 2018. NO OPENING UP WORKS OF ANY KIND WERE UNDERTAKEN DURING THE VISUAL INSPECTION.

REV	SUIT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	02.06.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY: LC | REVIEWED BY: MV | APPROVED BY: DC

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CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: FERMOY WEIR REMEDIATION

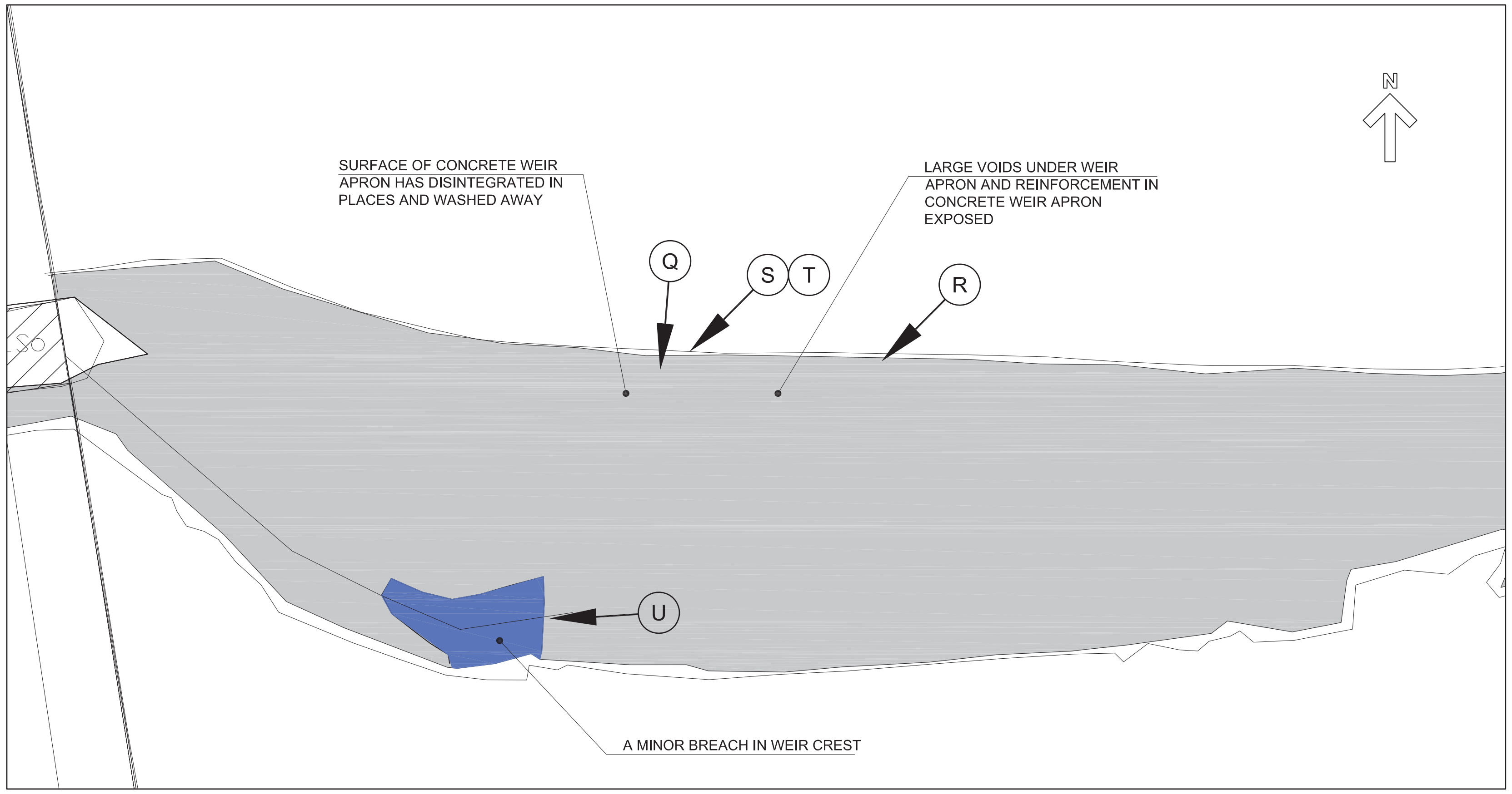
CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: EXISTING WEIR CONDITION AREA 3

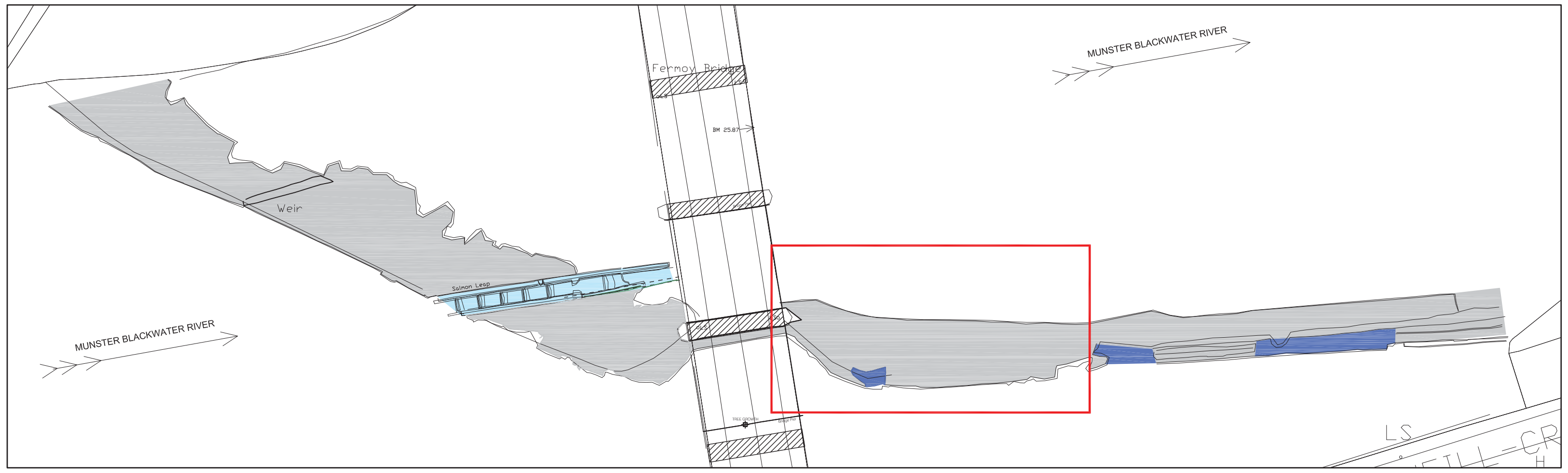
SCALE: 1:100 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0076

REV: C01

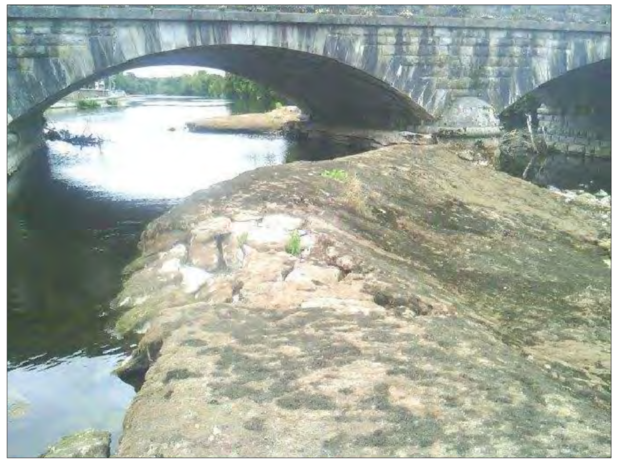


1/0077 EXISTING WEIR LAYOUT - AREA 4
SCALE: 1:100



2/0077 KEYPLAN - AREA 4
SCALE: 1:500

T/0077 LARGE VOIDS UNDER CONCRETE WEIR APRON, REINFORCEMENT EXPOSED AND CORRODED



U/0077 MINOR BREACH IN WEIR CREST

Q/0077 SURFACE OF CONCRETE WEIR APRON HAS DISINTEGRATED IN PLACES

R/0077 LARGE VOIDS UNDER CONCRETE WEIR APRON

S/0077 REINFORCEMENT EXPOSED AND CORRODED UNDER WEIR APRON

NOTES:

1. COMMENTS AND PHOTOGRAPHS ON THE CONDITION OF THE WEIR ARE BASED ON A VISUAL INSPECTION OF THE WEIR ON 15th AUGUST 2018. NO OPENING UP WORKS OF ANY KIND WERE UNDERTAKEN DURING THE VISUAL INSPECTION.

REV	SUIT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	02.06.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY: LC | REVIEWED BY: MV | APPROVED BY: DC

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CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: FERMOY WEIR REMEDIATION

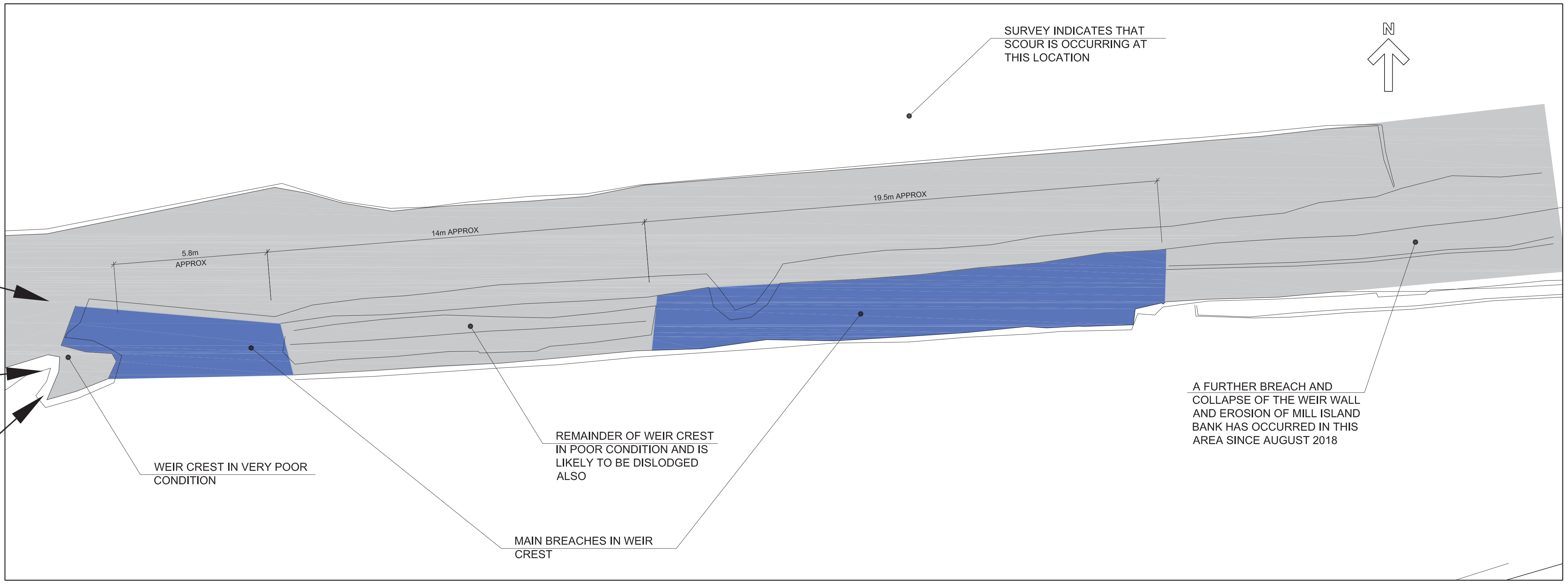
CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: EXISTING WEIR CONDITION AREA 4

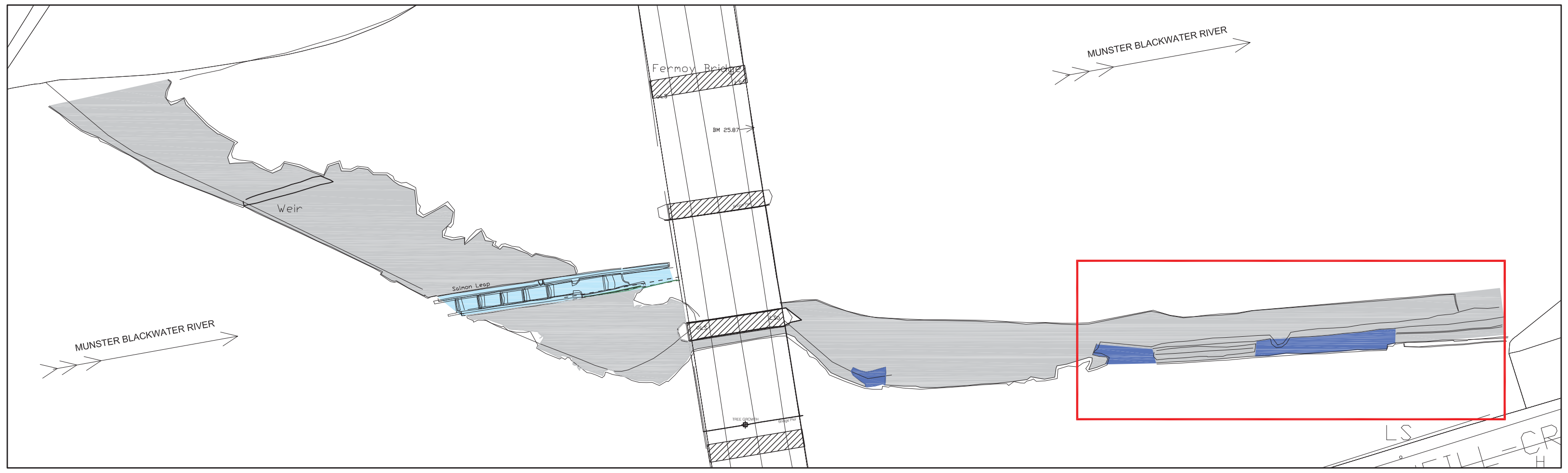
SCALE: 1:100 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0077

REV: C01



1 / 0078 EXISTING WEIR LAYOUT - AREA 5
SCALE: 1:100



2 / 0078 KEYPLAN - AREA 5
SCALE: 1:500

V / 0078 VIEW OF WEIR CREST

W / 0078 VIEW OF WEIR CREST AND DOWNSTREAM APRON

X / 0078 VIEW OF WEIR CREST CONDITION

NOTES:

1. COMMENTS AND PHOTOGRAPHS ON THE CONDITION OF THE WEIR ARE BASED ON A VISUAL INSPECTION OF THE WEIR ON 15th AUGUST 2018. NO OPENING UP WORKS OF ANY KIND WERE UNDERTAKEN DURING THE VISUAL INSPECTION.

REV	SUIT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	02.06.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY: LC | REVIEWED BY: MV | APPROVED BY: DC

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CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: FERMOY WEIR REMEDIATION

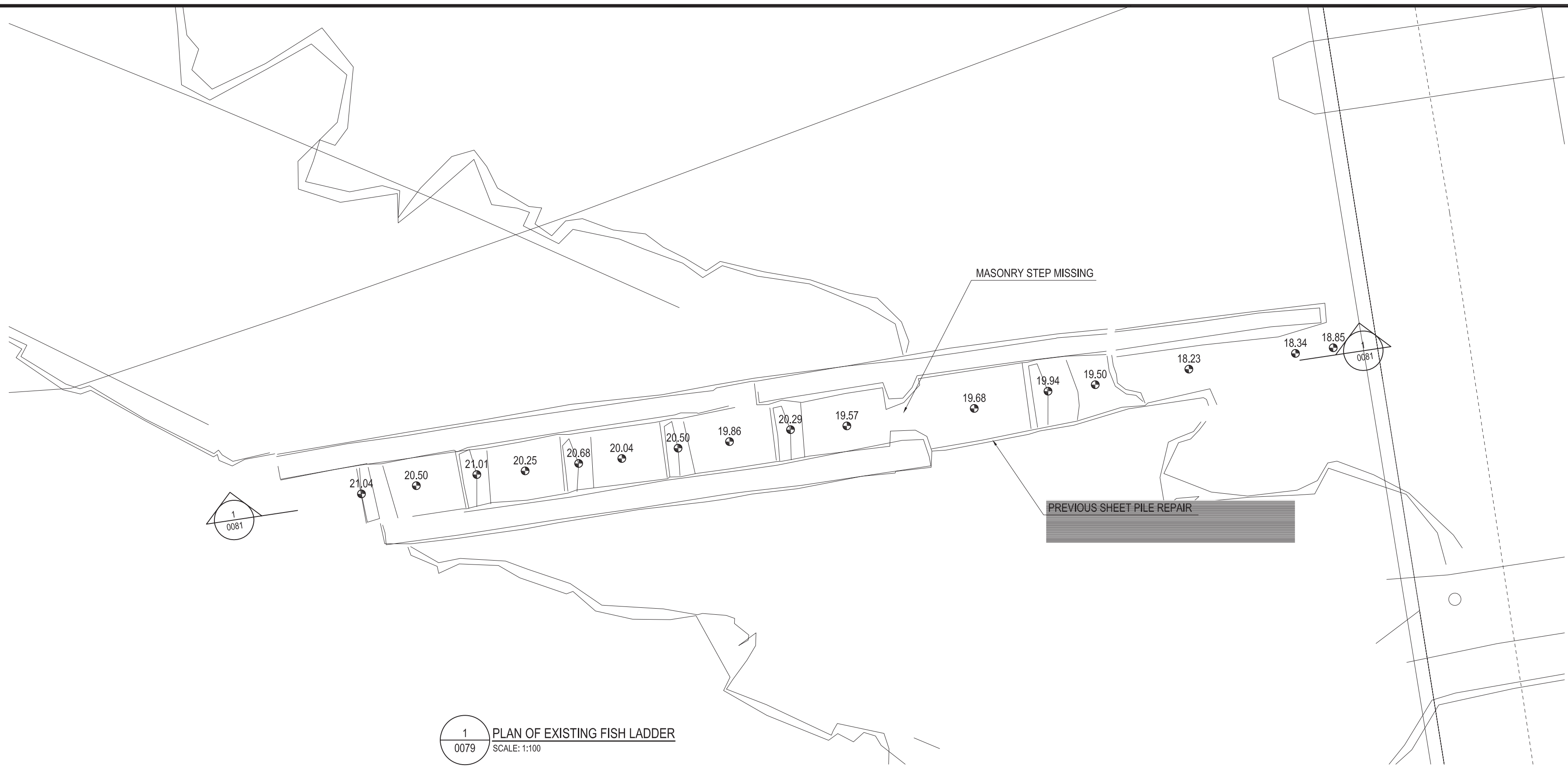
CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: EXISTING WEIR CONDITION AREA 5

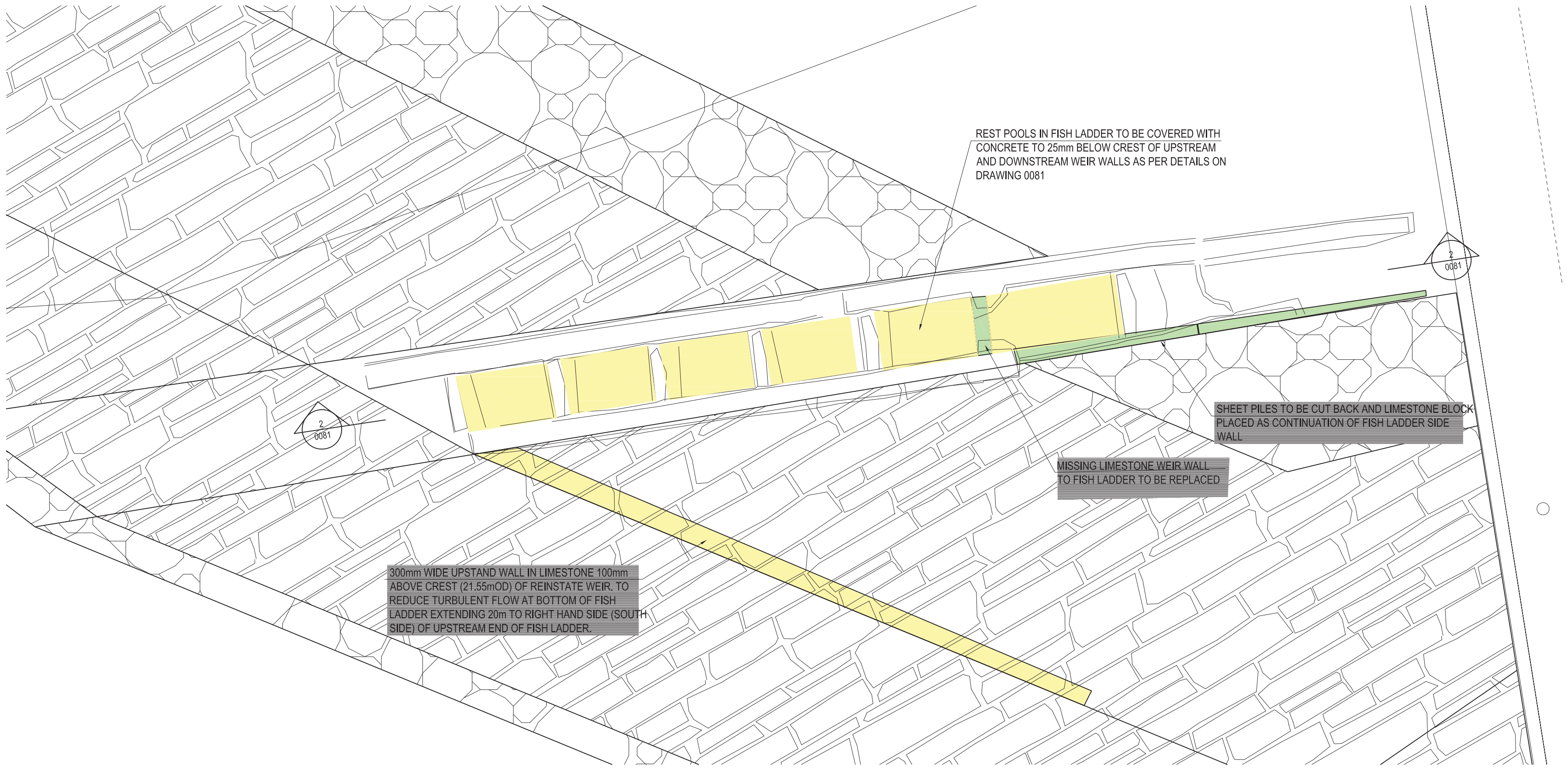
SCALE: 1:100 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0078

REV: C01



1 / 0079 PLAN OF EXISTING FISH LADDER
SCALE: 1:100



2 / 0079 PLAN OF PROPOSED WORKS TO EXISTING FISH LADDER
SCALE: 1:100

NOTES:

1. 1. FISH PASS REMEDIATION WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH CONSERVATION ENGINEER'S RECOMMENDATIONS AND DETAILS SHOWN ON DRAWING 0081.
2. LAYOUT OF EXISTING FISH LADDER BASED ON MURPHY SURVEYS TOPOGRAPHICAL SURVEY COMPLETED AUGUST 2018.

NOTE:
DETAILS AND DIMENSIONS OF PROPOSED WORKS TO FISH PASS ARE TAKEN FROM INFORMATION SUPPLIED BY OTHERS AND ARE SUBJECT TO APPROVAL FROM INLAND FISHERIES IRELAND

MAP REPRODUCED BY PERMISSION OF ORDNANCE SURVEY IRELAND (CORK CCMA 9802)

REV	STAT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	02.06.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY:	REVIEWED BY:	APPROVED BY:
LC	MV	DC

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CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: FERMOY WEIR REMEDIATION AND FISH BYPASS CHANNEL

CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: EXISTING FISH LADDER REMEDIATION PLAN

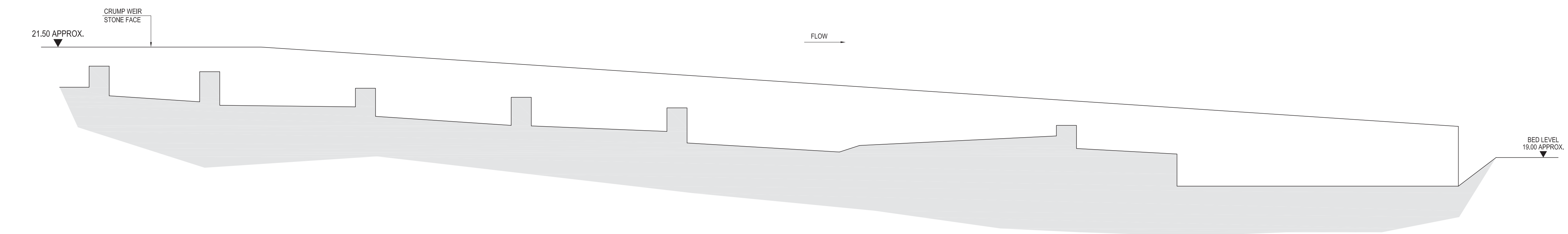
SCALE: 1:100 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0079

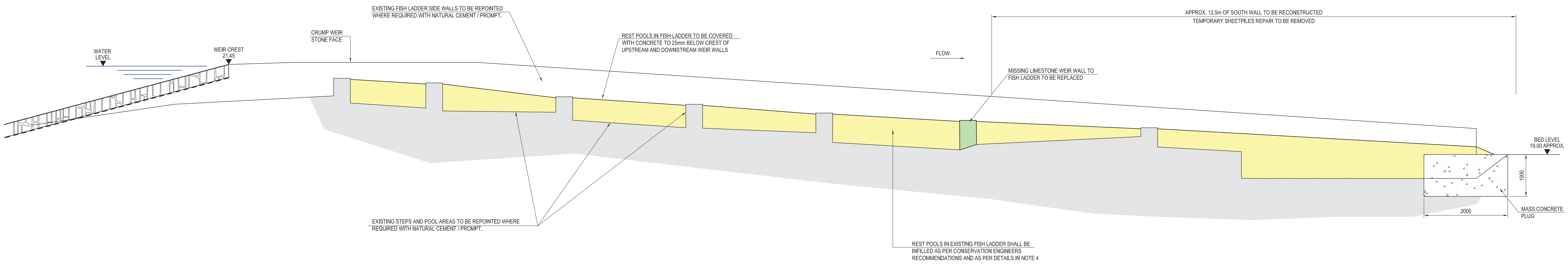
REV: C01

NOTES:

1. ALL WORKS CARRIED OUT IN THE RIVER AND TO THE FISH PASS TO BE AGREED WITH INLAND FISHERIES IRELAND PRIOR TO COMMENCEMENT OF THE WORKS.
2. WORKS IN THE RIVER WILL ONLY BE PERMITTED BETWEEN THE BEGINNING OF AUGUST TO MID SEPTEMBER IN ACCORDANCE WITH INLAND FISHERIES IRELAND GUIDELINES.
3. PROPOSED REMEDIAL WORK DETAILS AS PER CONSERVATION ENGINEER, TREVOR WOODS CONSULTING ENGINEERS, DETAILS.
4. COVERING
   DPM 1500 GAUGE TO BE LAID UP PASS INSIDE WALLS OVER BASE AND LAPPED MINIMUM 1m BETWEEN SHEETS / JOINTS.
   TYPE 6F FILL WITHIN 300mm EXISTING CAPPING.
   150mm CLAUSE 804 BLINDED WITH LEAN MIX CONCRETE.
   150mm CONCRETE SLAB (FIBRE MESH POLYPROPYLENE FIBRES)
   SURFACE TO BE STAMPED WITH RANDOM STONE PATTERN.
5. ALL LEVELS AS PER MURPHY SURVEYS 2018 SURVEY OF WEIR STRUCTURE.
6. EXISTING FISH LADDER SHALL BE INFILLED IN ORDER TO AVOID WHITE WATER CREATED BY THE STEPS IN THE LADDER ATTRACTING FISH FROM DOWNSTREAM OF THE WEIR.



1
0081
EXISTING FISH LADDER SECTION
SCALE: 1:50



2
0081
PROPOSED FISH LADDER SECTION
SCALE: 1:50

REV	STAT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	02.06.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY: LC | REVIEWED BY: MV | APPROVED BY: DC

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CONSULTING ENGINEERS
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Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: FERMOY WEIR REMEDIATION AND FISH BYPASS CHANNEL

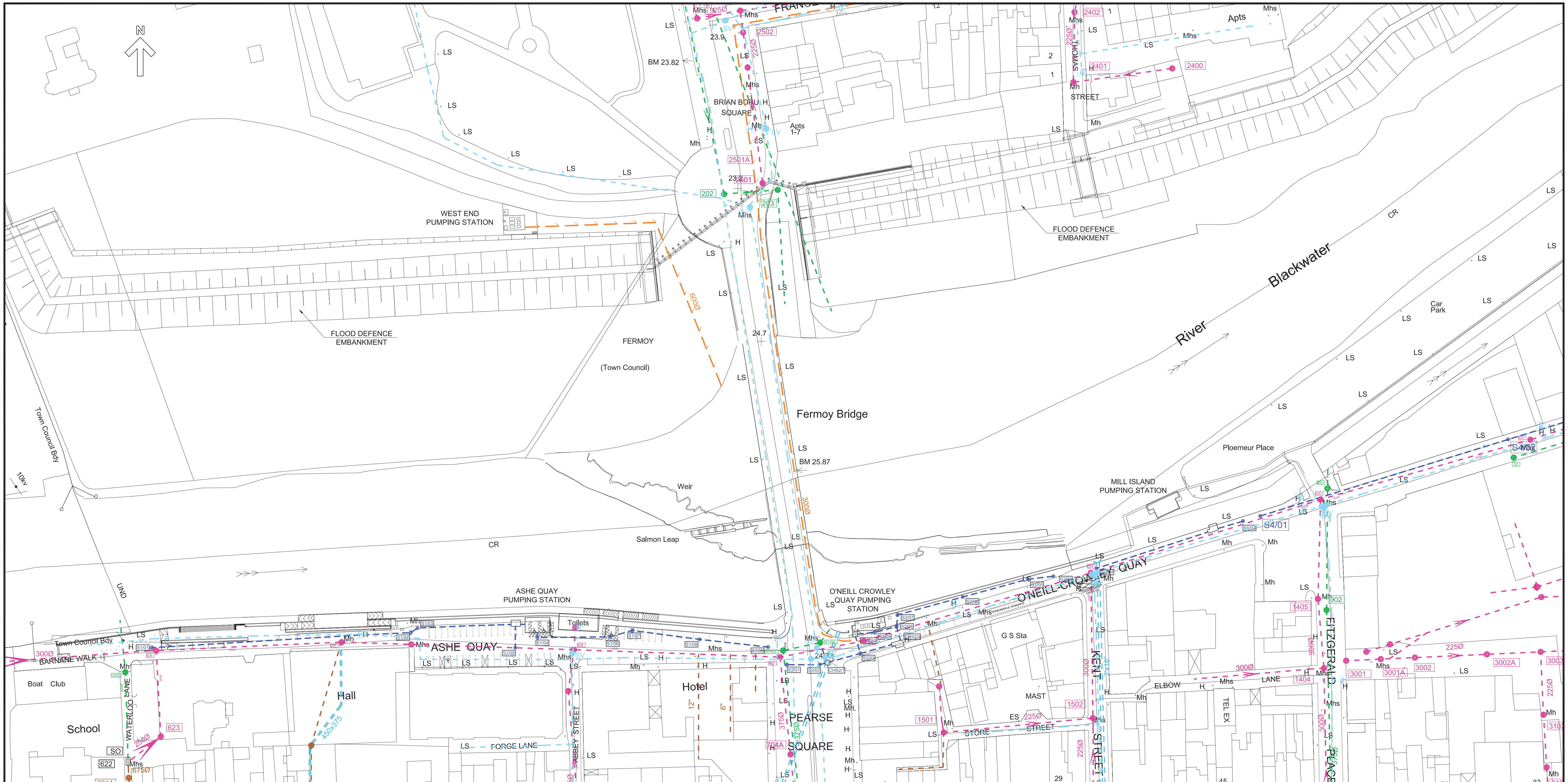
CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: EXISTING FISH LADDER REMEDIATION DETAILS - SHEET 2

SCALE: AS SHOWN (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
190080-TJOC-PL-XX-DR-C-0081

REV: C01



C01	AP	ISSUED FOR PLANNING	02.06.2022
REV	STAT	DESCRIPTION	DATE

0 7.5 15 22.5 30 45 60 75m
1:750

LEGEND

- FOUL SEWER
- SURFACE WATER SEWER
- COMBINED SEWER
- CULVERT SEWER
- RISING MAIN
- WATERMAIN

MAP REPRODUCED BY PERMISSION OF
ORDNANCE SURVEY IRELAND
(CORK CCMA 9802)

DRAWING STATUS:
ISSUED FOR REVIEW AND COMMENT

CHECKED BY:	REVIEWED BY:	APPROVED BY:
LC	MV	DC

TJ O'CONNOR & ASSOCIATES
CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT:
FERMOY WEIR REMEDIATION AND
FISH BYPASS CHANNEL

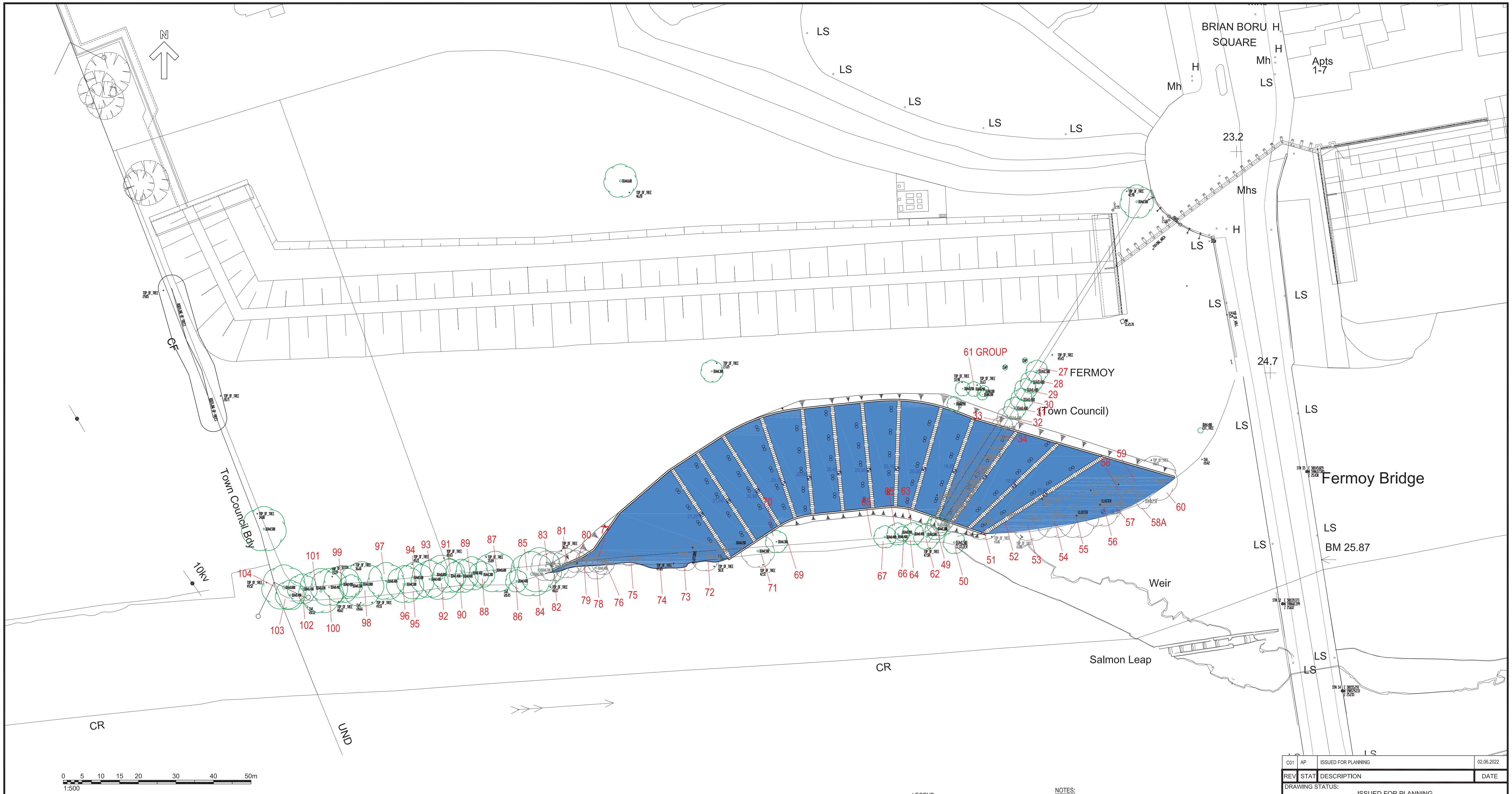
CLIENT:
CORK COUNTY COUNCIL

DRAWING TITLE:
EXISTING SERVICES

SCALE: 1:750 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0082

REV: P01



LEGEND:

EXISTING TREES

EXISTING TREES TO BE REMOVED

ROOT PROTECTION AREA

NOTES:

1. TREES LOCATIONS ARE BASED ON GEODATA 2020 TOPOGRAPHICAL SURVEY
2. DRAWING RECORDS TREES AND GROUPS OF TREES IDENTIFIED IN THE TREE SURVEY UNDERTAKEN BY MARK DONNELLY BSC ARBORIST IN 2021
3. TREE SURVEY DRAWING SHALL BE READ IN CONJUNCITON WITH THE ECOLOGISTS ECOLOGICAL IMPACT ASSESSMENT FOR THE PROJECT.

MAP REPRODUCED BY PERMISSION OF ORDNANCE SURVEY IRELAND (CORK CCMA 9802)

REV	STAT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	02.06.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY:	REVIEWED BY:	APPROVED BY:
LC	MV	DC

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PROJECT: FERMOY WEIR REMEDIATION AND FISH BYPASS CHANNEL

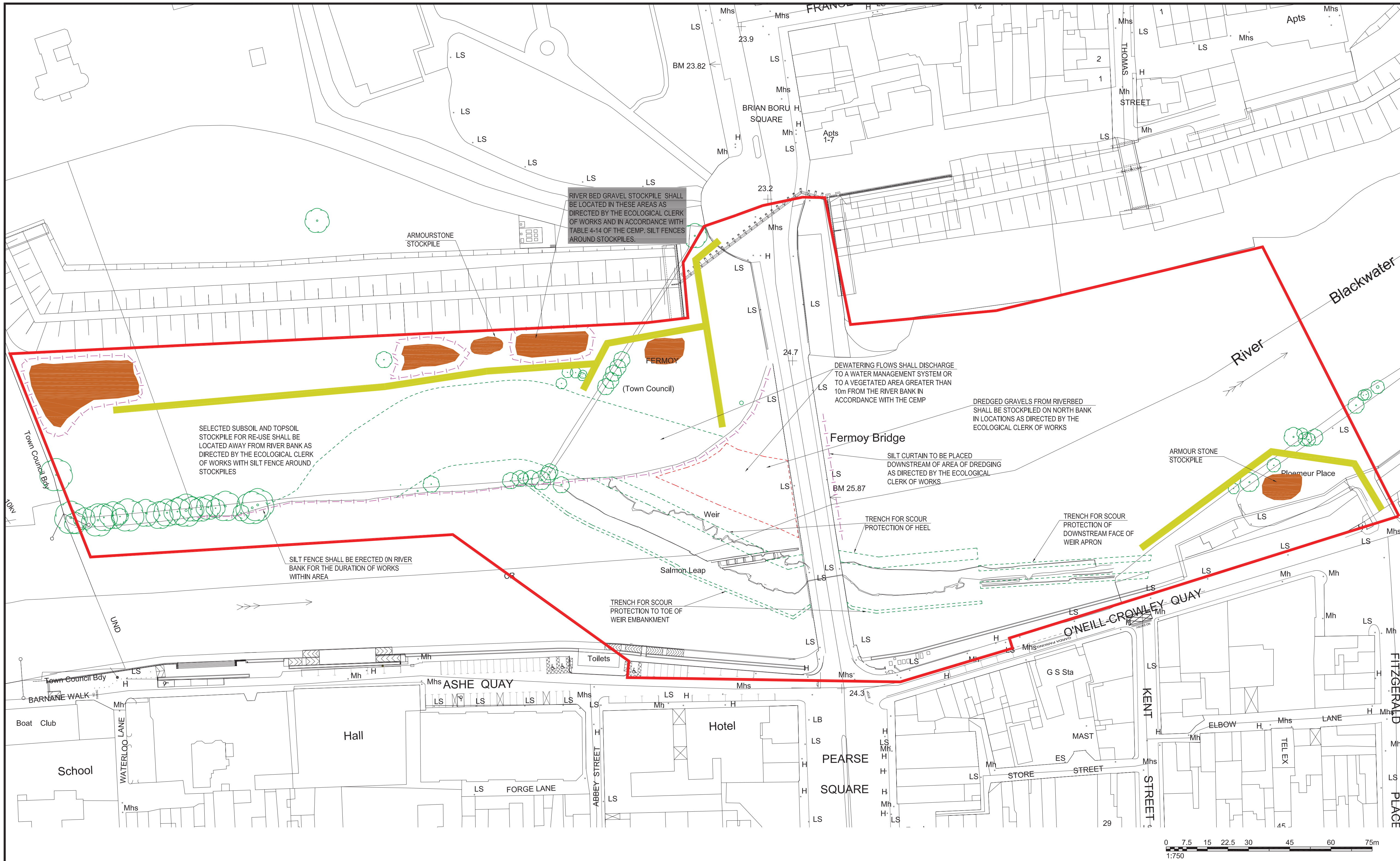
CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: TREE PROTECTION PLAN

SCALE: 1:500 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0083

REV: C01



N

NOTES:

1. WHERE FEASIBLE SOIL EXCAVATION SHALL TAKE PLACE DURING DRY PERIODS AND UNDERTAKEN WITH EXCAVATORS AND DUMP TRUCKS.
2. TOP SOIL AND SUBSOIL SHALL NOT BE MIXED TOGETHER.
3. STOCKPILES SHALL BE GRADED TO <1:4 PROFILE. TOPSOIL AND SUBSOIL SHALL BE STOCKPILED SEPARATELY.
4. SURFACE WATER MANAGEMENT SHALL COMPLY WITH MITIGATION MEASURES IDENTIFIED IN TABLE 4-5 OF THE CEMP.
5. SILT FENCES SHALL BE ERECTED AROUND EACH STOCKPILE.
6. RIVERBED GRAVELS SELECTED FOR RE-USE IN THE WORKS SHALL BE STOCKPILED IN A BUNDED AREA AS DIRECTED BY THE ECOLOGICAL CLERK OF WORKS.
7. STOCKPILES SHALL NOT ENCROACH ON ROOT PROTECTION AREAS OF ANY TREES.
8. THE LOCATIONS OF STOCKPILES SHOWN HERE ARE INDICATIVE. THE CONTRACTOR SHALL DEVELOP MATERIALS STORAGE PROPOSALS IN ACCORDANCE WITH THE CEMP AND TO THE SATISFACTION OF THE ECOLOGICAL CLERK OF WORKS.
9. STOCKPILING OF MATERIALS SHALL NOT BE PERMITTED WITHIN THE MAIN CHANNEL OF THE BLACKWATER APART FROM LOCAL STOCKPILES OF MATERIAL REQUIRED FOR THE REMEDIATION OF THE WEIR.

LEGEND:

- PROPOSED SITE BOUNDARY
- OUTLINE OF PROPOSED EXCAVATION
- AREA OF DREDGING
- SILT FENCE
- EXISTING TREES TO BE RETAINED
- CONSTRUCTION ACCESS ROUTES

MAP REPRODUCED BY PERMISSION OF ORDNANCE SURVEY IRELAND (CORK CCMA 9802)

REV	STAT	DESCRIPTION	DATE
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DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY:	REVIEWED BY:	APPROVED BY:
LC	MV	DC

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PROJECT: FERMOY WEIR REMEDIATION AND FISH BYPASS CHANNEL

CLIENT: CORK COUNTY COUNCIL

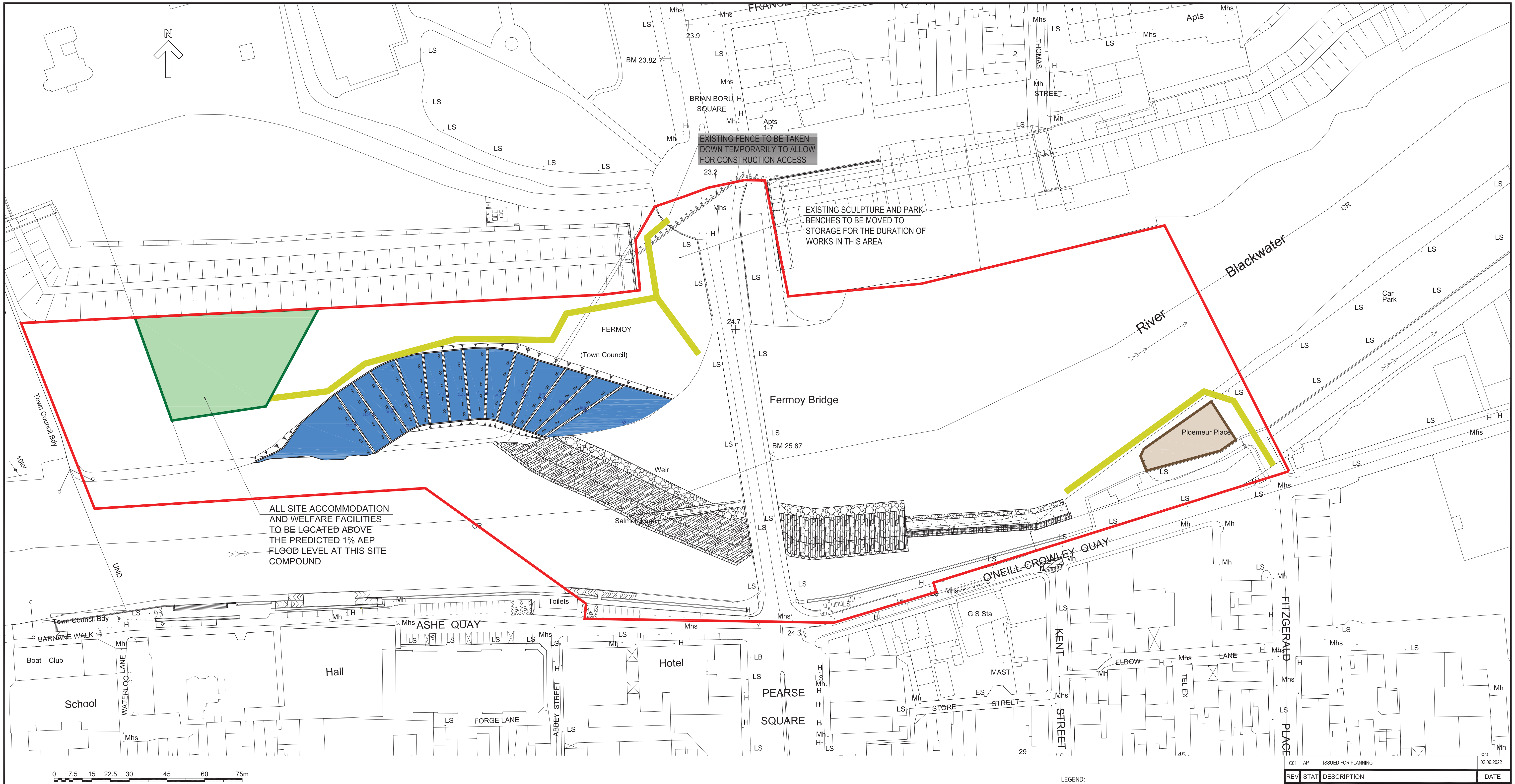
DRAWING TITLE: CONSTRUCTION SPOIL MANAGEMENT

SCALE: 1:750 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER

19011-TJOC-PL-XX-DR-C-0084

REV: C01



LEGEND:

SITE COMPOUND	
SATELLITE COMPOUND	
SITE BOUNDARY	
CONSTRUCTION ACCESS ROUTES	

MAP REPRODUCED BY PERMISSION OF ORDNANCE SURVEY IRELAND (CORK CCMA 9802)

REV	STAT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	02.06.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY: LC | REVIEWED BY: MV | APPROVED BY: DC

TJ O'CONNOR & ASSOCIATES
CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: FERMOY WEIR REMEDIATION AND FISH BYPASS CHANNEL

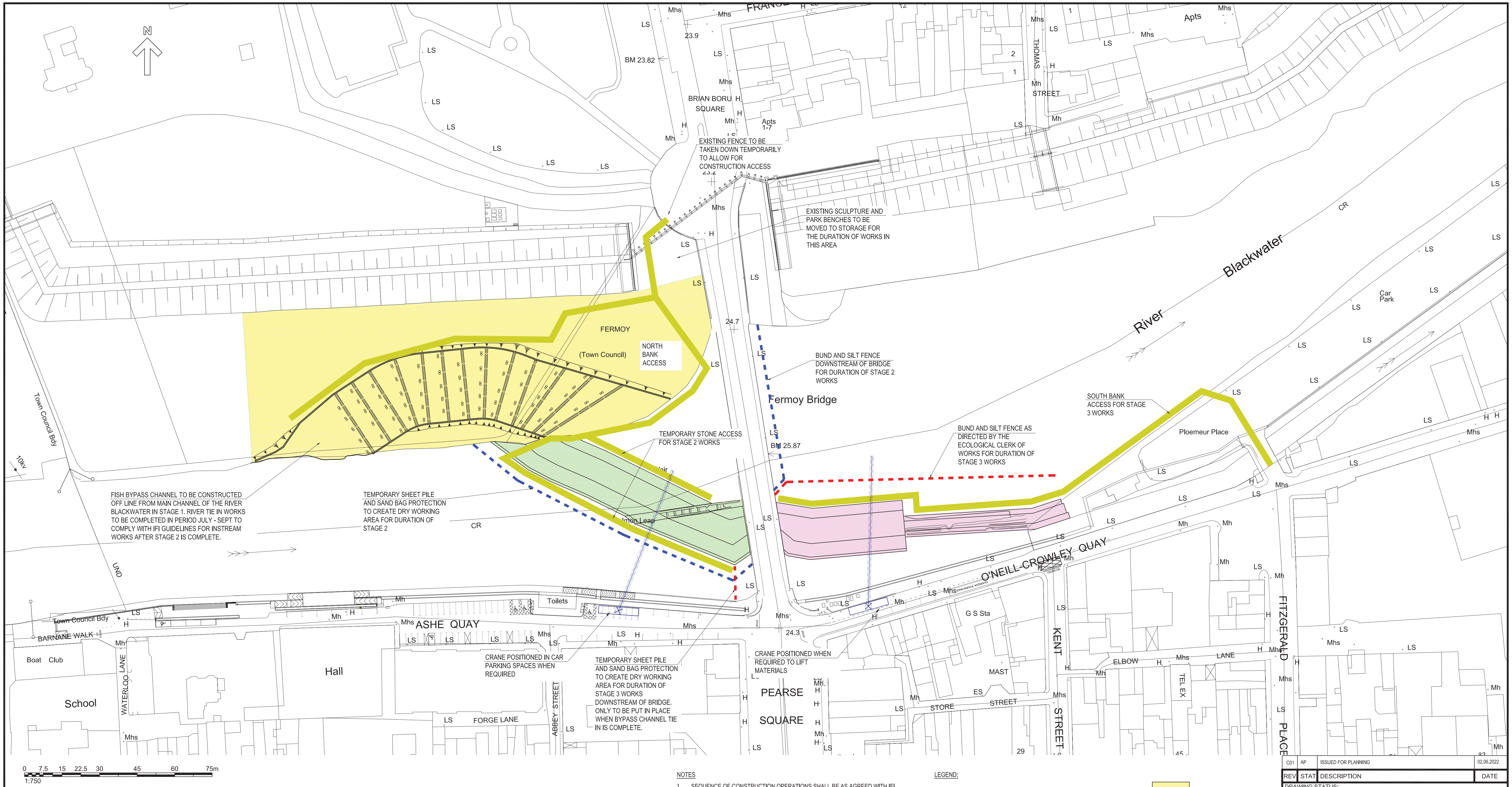
CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: SITE COMPOUNDS

SCALE: 1:750 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0085

REV: C01



NOTES

1. SEQUENCE OF CONSTRUCTION OPERATIONS SHALL BE AS AGREED WITH IFI AND SHALL BE IN COMPLIANCE WITH THE CEMP
2. INSTREAM WORKS SHALL BE UNDERTAKEN IN ACCORDANCE WITH FISHERIES IRELAND GUIDELINES FOR INSTREAM WORKS
3. STAGE 1 WORKS ON THE NORTH BANK OF THE RIVER TO CONSTRUCT THE FISH BYPASS CHANNEL SHALL PROCEED AS AN OFF LINE CONSTRUCTION. THE TIES INS OF THE FISH BYPASS CHANNEL TO THE RIVER SHALL BE COMPLETED AFTER THE STAGE 2 WORKS, TO REMEDIATE THE WEIR UPSTREAM OF FERMOY BRIDGE, ARE COMPLETE.
4. 4. STAGE 3 WORKS TO REMEDIATE THE WEIR DOWNSTREAM OF THE BRIDGE SHALL NOT COMMENCE PRIOR TO COMPLETION OF STAGE 2, WEIR REMEDIATION WORKS UPSTREAM OF THE BRIDGE, AND COMPLETION OF FISH BYPASS CHANNEL TIE INS TO RIVER BLACKWATER

LEGEND:

- STAGE 1 - WORKS ON NORTH BANK OF RIVER FOR BYPASS CHANNEL (yellow)
- STAGE 2 - IN STREAM WORKS UPSTREAM OF BRIDGE (green)
- STAGE 3 - IN STREAM WORKS DOWNSTREAM OF BRIDGE (pink)

MAP REPRODUCED BY PERMISSION OF ORDNANCE SURVEY IRELAND (CORK CCMA 9802)

REV	STAT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	02.06.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY:	REVIEWED BY:	APPROVED BY:
LC	MV	DC

TJ O'CONNOR & ASSOCIATES
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Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: FERMOY WEIR REMEDIATION AND FISH BYPASS CHANNEL

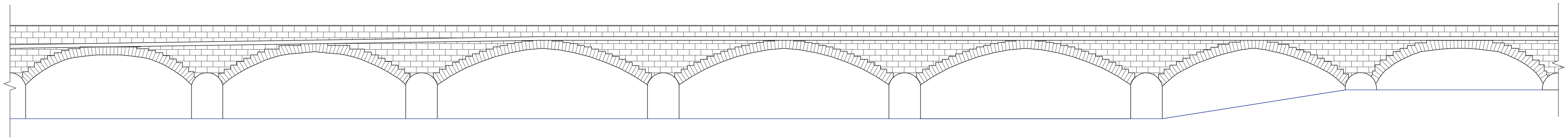
CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: INSTREAM WORKS PHASING

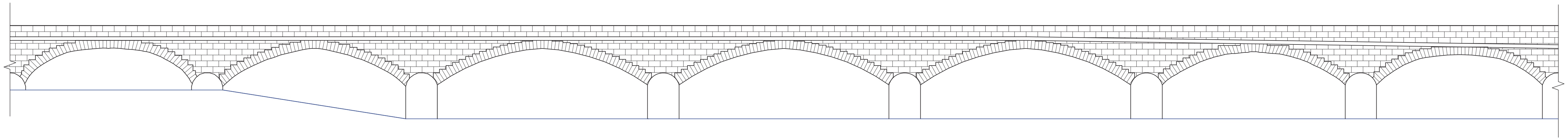
SCALE: 1:750 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0086

REV: C01



1
0087
EAST ELEVATION
SCALE: 1:150



2
0087
WEST ELEVATION
SCALE: 1:150

REV	SUIT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	02.06.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY:	REVIEWED BY:	APPROVED BY:
LC	MV	DC

TJ O'CONNOR & ASSOCIATES
CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: FERMOY WEIR REMEDIATION

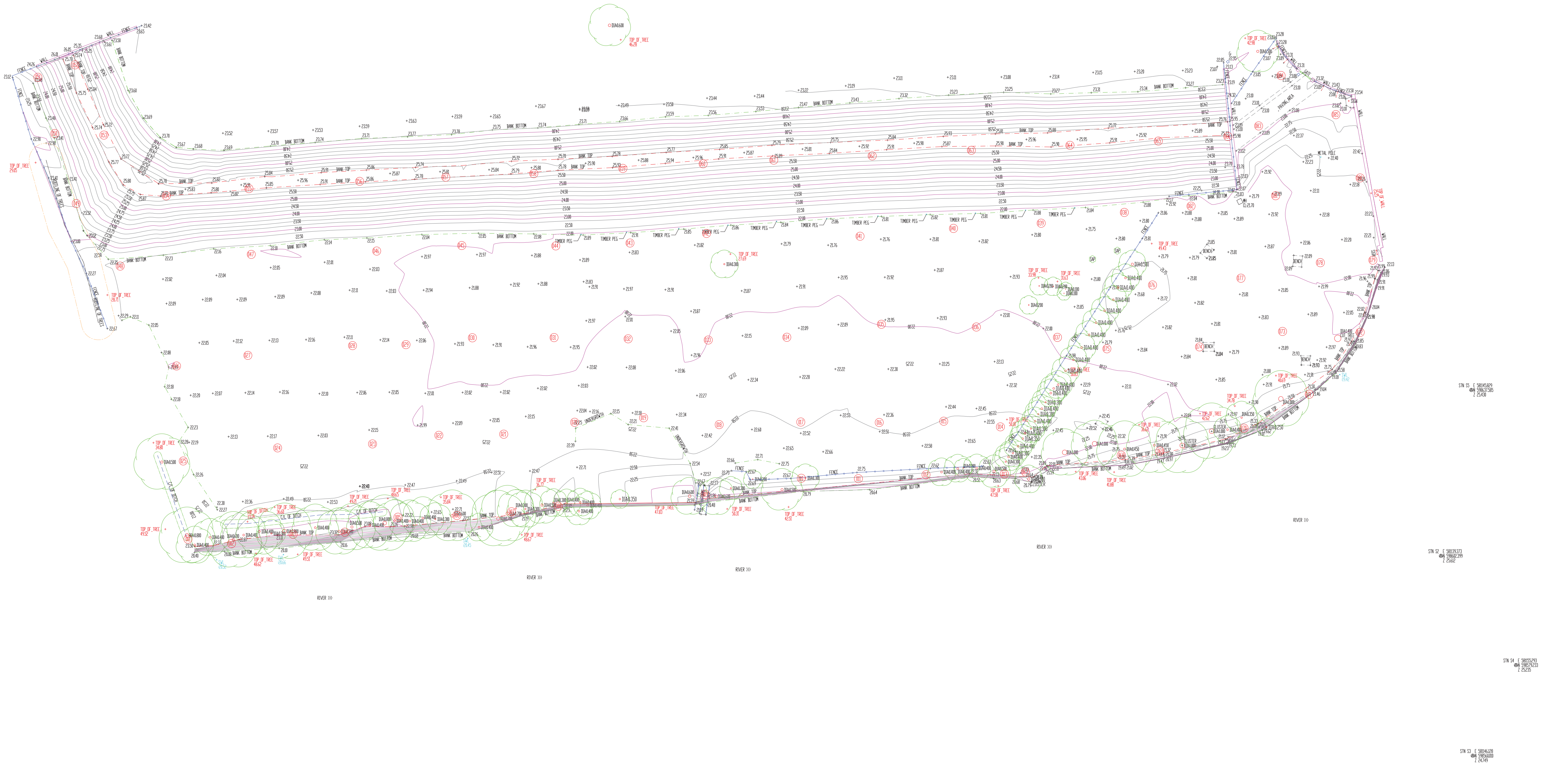
CLIENT: CORK COUNTY COUNCIL

DRAWING TITLE: FERMOY BRIDGE ELEVATIONS

SCALE: 1:150 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
19011-TJOC-PL-XX-DR-C-0087

REV: C01



Topographical Survey
Scale 1:500

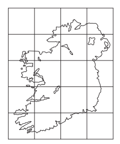
ITM NORTH

SURVEY NOTES
1. ALL LEVELS ARE RELATED TO MALIN HEAD DATUM (OSGM15)
2. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE STATED.
3. ANY DESCRIPENCIES IN THE SURVEY SHOULD BE REPORED TO GEODATA SURVEYING LTD IMMEDIATELY.
4. DO NOT SCALE, THIS SHALL ONLY BE PERMITTED IN DIGITAL FORM.
5. GRID IS 20m X 20m

0 10m 20m 30m
1:500

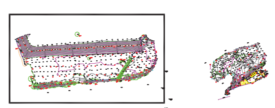
SYMBOLS

+0.00	SPOT LEVEL
	CONTROL SURVEY STATION
MH CL	MANHOLE COVER
UL	UTILITY INSP CHAMBER
G	GULLY
WM	WATER METER
SV	SLUICE VALVE
SC	STOP COCK
AV	AIR VALVE
	FIRE HYDRANT
TEL	TEL INSP CHAMBER
MP	MINI PILLAR
AJ	ARMSTRONG JUNCTION
LP	LAMP POST
TP	TELECOM POLE
EP	ESB POLE
	GATE
SWL:0.00	SURFACE WATER LEVEL
+BL:0.00	BED LEVEL WATERCOURSE
+IL	INVERT LEVEL
O/H ESB	OVERHEAD ESB LINE
O/H TEL	OVERHEAD TEL LINE
TL	TELECOM POLE
+TOP	TOP TAG
SIGN	SIGN
DIA = 0.8m	TREE ACTUAL SPREAD
000	TREE TAG NO.
BL	BOLLARD
UB	SOFFIT BEAM
CL	SOFFIT CEILING
HEAD	HEAD TO FFL
WB	WINDOW BOARD TO FFL
+RIDGE	RIDGE LEVEL
+EAVES	SOFFIT LEVEL
FFL:100	FINISH FLOOR LEVEL
+200	PEG REF NUMBER
	FOUL SEWER
	STORM SEWER
	COMBINED SEWER
ESB	ESB BOX
	UNIDENTIFIED EM SIGNAL
	ELECTRICAL CABLE
	PUBLIC LIGHTING
	UNIDENTIFIED GPR
	TRAFFIC
	TRENCH
	COMBINED SEWER
ESB	ESB BOX



COORDINATE SYSTEM
ITM-Irish Transverse Mercator

KEY PLAN



REVISION	DATE	DESCRIPTION	DRN BY	CKD BY
02	04-06-20	PHOTOS AND TREES	ML	KOB
01	28-05-20	TOPOGRAPHICAL SURVEY	ML	KOB

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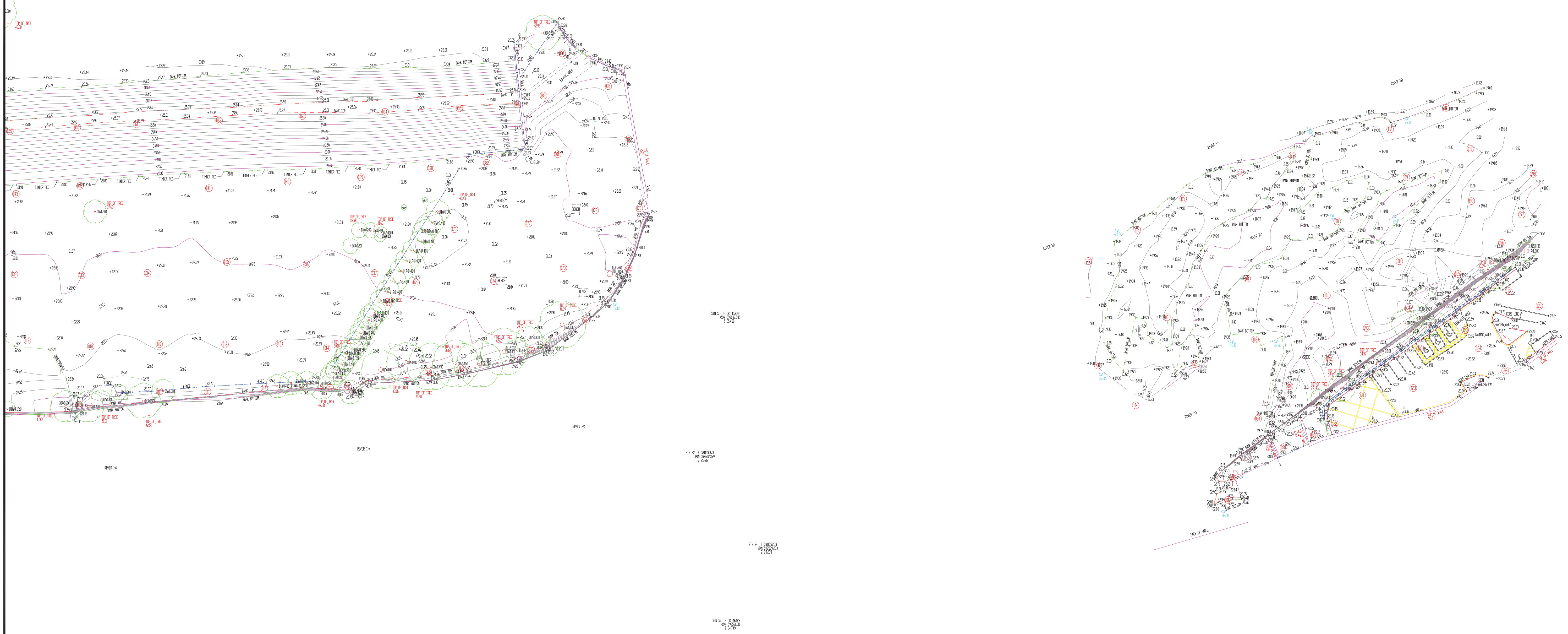
Geodata
Chartered Land Surveyors
47 Oliver Plunkett Street Bandon, Co Cork. P72 A443
Phone: (+353) (0)23 8852798 Fax: (+353) (0)23 8852799
Email: info@geodatasurvyeing.ie Website: www.geodatasurveying.ie

Client: TJ O'Connor 7 Associates
Project: Fermoy, Co Cork.
Title: Topographical Survey 2D
Scale: 1-500
Date: 04-06-20
Sheet: A1
Dwg. No: 20423-101



Topographical Survey
Scale 1:500

ITM NORTH

SURVEY NOTES

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5. GRID IS 20m X 20m

0 10m 20m 30m
1:500

SYMBOLS

+0.00	SPOT LEVEL	G	GULLY	AV	AIR VALVE	AJ	ARMSTRONG JUNCTION		GATE	O/H ESB	OVERHEAD ESB LINE	SIGN	SIGN	UB	SOFFIT BEAM	+RIDGE	RIDGE LEVEL		FOUL SEWER		UNIDENTIFIED EM SIGNAL		TRAFFIC
	CONTROL SURVEY STATION	WM	WATER METER		FIRE HYDRANT	LP	LAMP POST	SWL:0.00	SURFACE WATER LEVEL	O/H TEL	OVERHEAD TEL LINE	DIA = 0.8m	TREE ACTUAL SPREAD	CL	SOFFIT CEILING	+EAVES	SOFFIT LEVEL		STORM SEWER		ELECTRICAL CABLE		TRENCH
MH CL	MANHOLE COVER	SV	SLUICE VALVE	TEL	TEL INSP CHAMBER	TP	TELECOM POLE	+BL:0.00	BED LEVEL WATERCOURSE	TL	TELECOM POLE	000	TREE TAG NO.	HEAD	HEAD TO FFL	FFL:100	FINISH FLOOR LEVEL		COMBINED SEWER		PUBLIC LIGHTING		COMBINED SEWER
UL	UTILITY INSP CHAMBER	SC	STOP COCK	MP	MINI PILLAR	EP	ESB POLE	+IL	INVERT LEVEL	+TOP	TOP TAG	BL	BOLLARD	WB	WINDOW BOARD TO FFL	+200	PEG REF NUMBER	ESB	ESB BOX		UNIDENTIFIED GPR	ESB	ESB BOX

COORDINATE SYSTEM
ITM-Irish Transverse Mercator

KEY PLAN

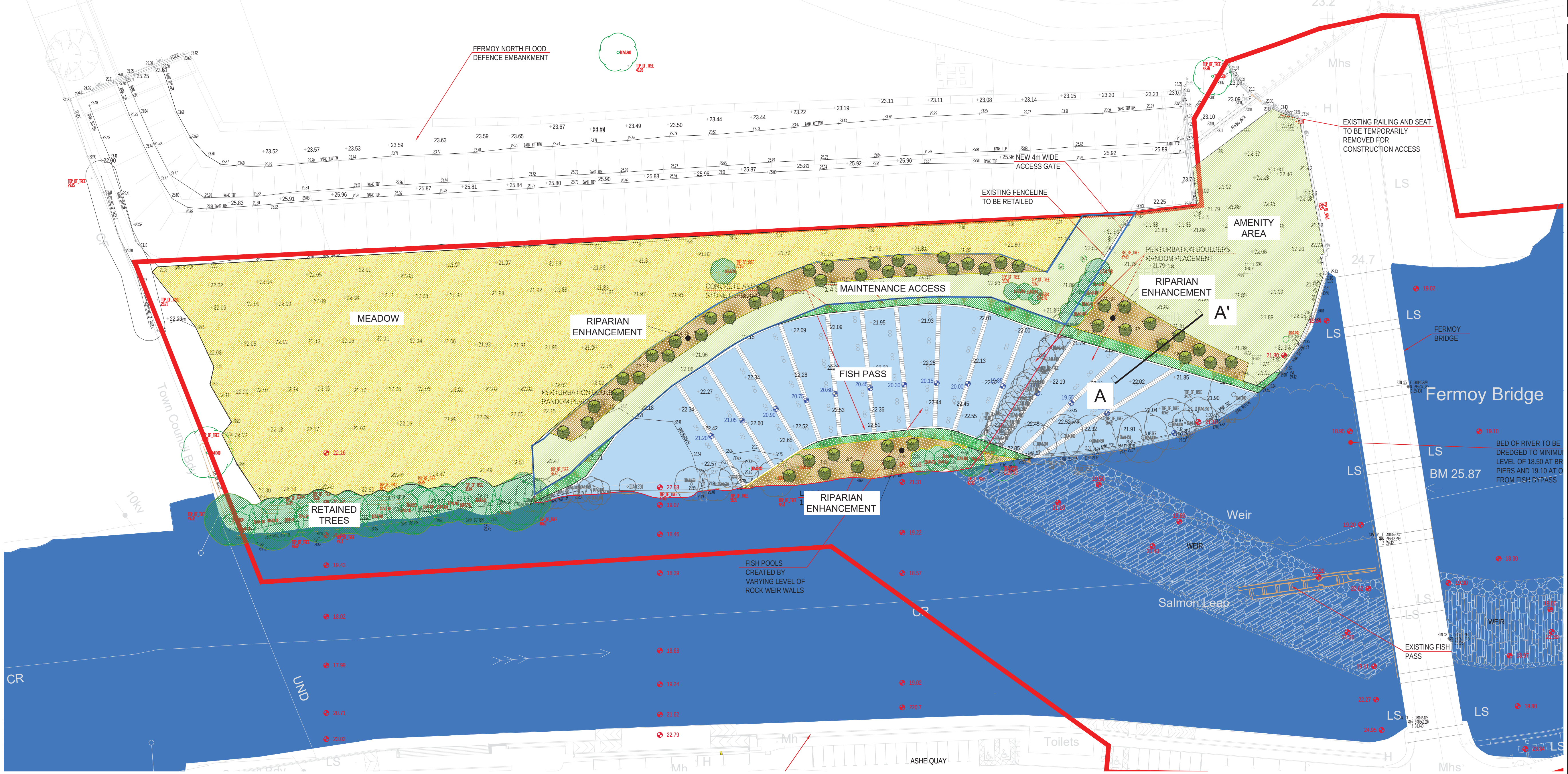
01	28-05-20	TOPOGRAPHICAL SURVEY	ML	KOB
REVISION	DATE	DESCRIPTION	DRN BY	CKD BY

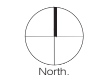
Geodata
Chartered Land Surveyors

47 Oliver Plunkett Street Bandon, Co Cork. P72 A443
Phone: (+353) (0)23 8852798 Fax: (+353) (0)23 8852799
Email: info@geodatasurveying.ie Website: www.geodatasurveying.ie

Client: TJ O'Connor 7 Associates
Project: Fermoy, Co Cork.
Title: Topographical Survey 2D
Scale: 1-500
Date: 28-05-20
Sheet: A1
Dwg. No: 20423-101

Landscape Plan
Scale 1:500





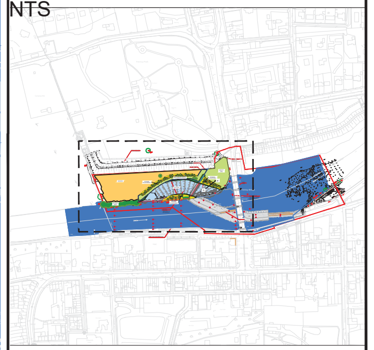
Note

Legend

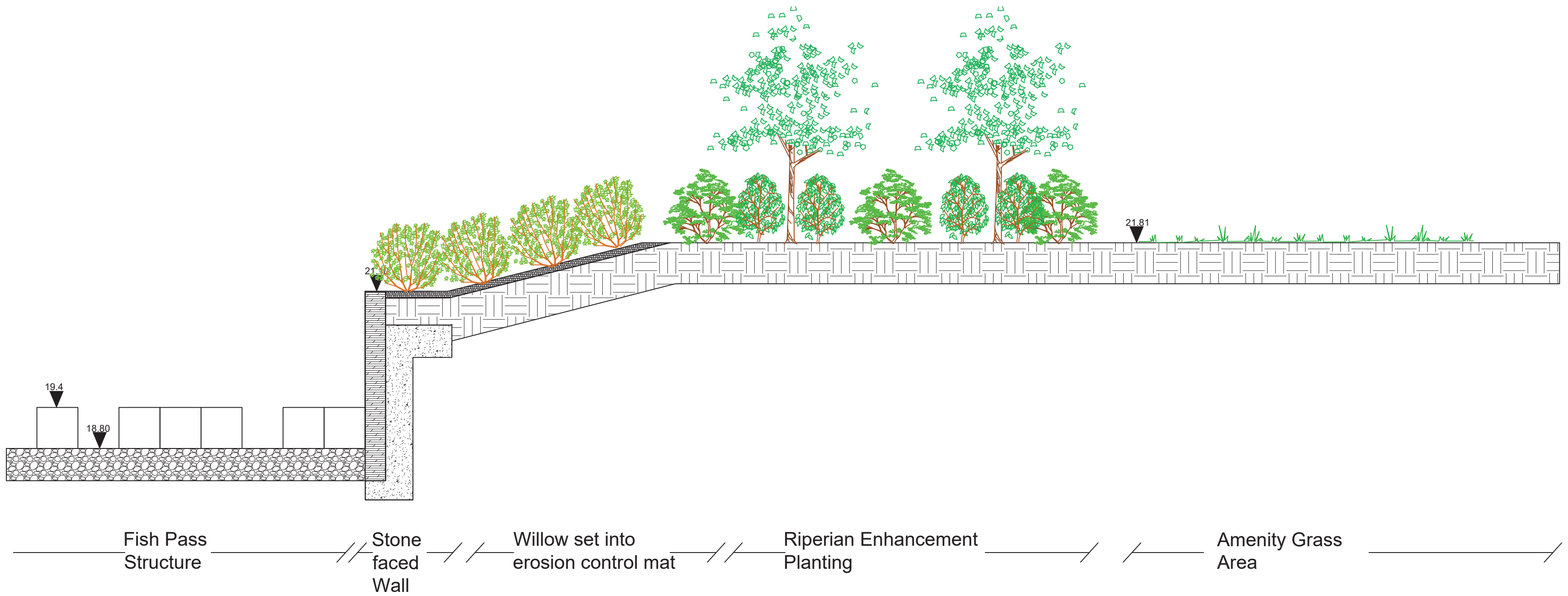
Legend:

- Trees — A mixture of native species are proposed including Alder, Willow, Scots Pine, Birch & Rowan - 12-14cms
- Existing retained trees protected during the site works
- Willow peg plants (locally sourced) set into bank beside fish pass
- **Native Species Riparian Enhancement**
  - 15% Alder - 8-10 cms Trees / 80-100cms Transplants
  - 15% Salix 8-10 cms Trees / 80-100cms Transplants
  - 10% Wild Cherry 8-10cms Trees / 80-100cms Transplants
  - 10% Bird Cherry 8.10cms Trees / 80-100cms Transplants
  - 10% Native Black Poplar 80-100cms Transplants.
  - 15% Holly 40-60Cms Transplants
  - 15% Blackthorn 90-120 Cms Transplants
  - 2.5% Bramble - 40-60cms Transplants
  - 2.5% Hazel - 60-90Cms Transplants
  - 2.5% Dog Rose - 60-90Cms Transplants
  - 2.5% Spindle - 90-120 Cms Transplants
- Grass Meadow
- Hardwearing dwarf amenity ryegrass for public access

Keyplan
NTS



Section A-A'
Scale 1:50



	Date	Note

Project name: FERMOY FISH PASS	Project number: 21-053
Drawing name: LANDSCAPE PLAN	Drawing number: LP-01-PP

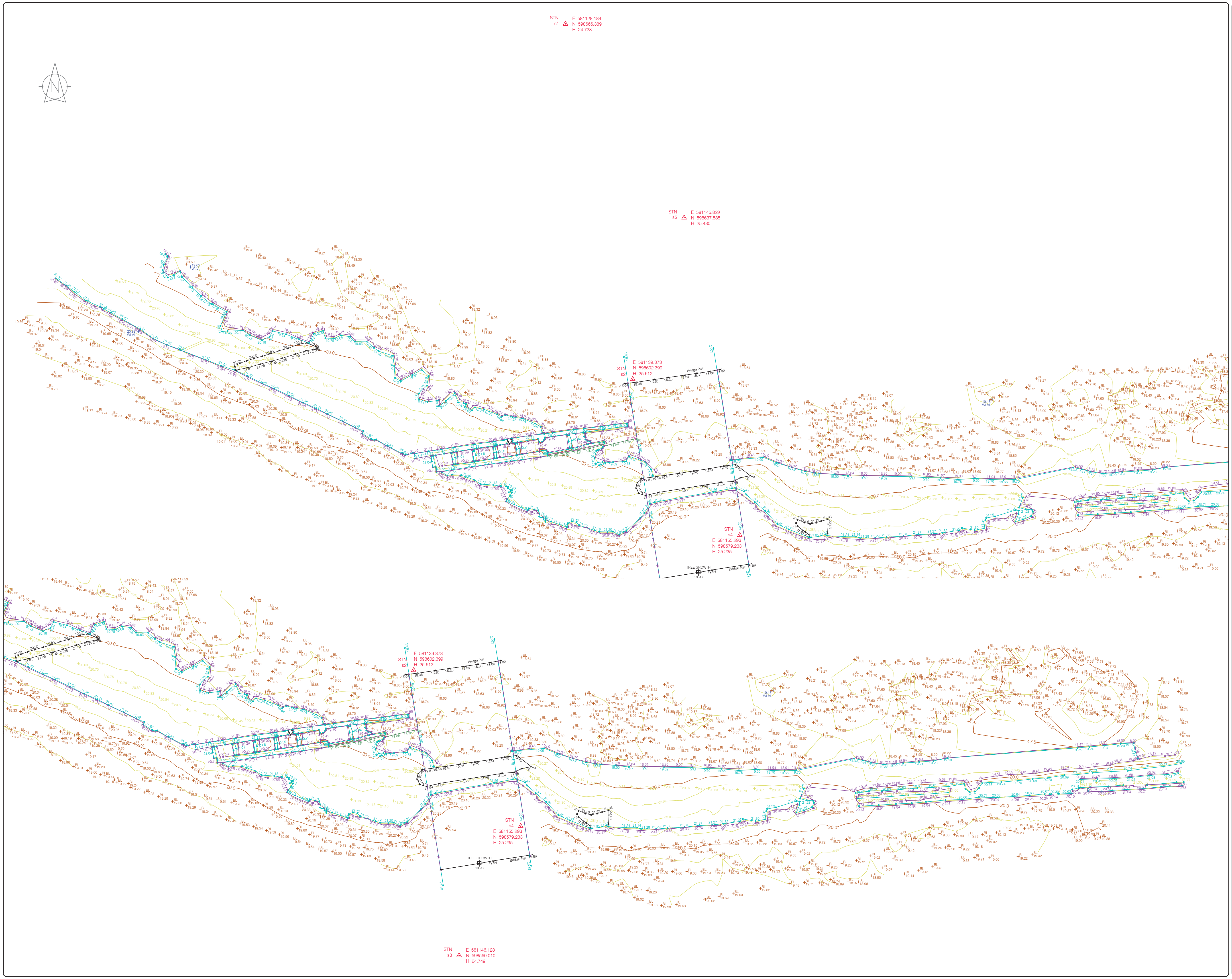
Drawing scale @ A1: 1:500 & 1:50	Drawn by: dos	Checked by: dot
Status: Planning		date: 04.04.2022

Contact details:
Linda Doyle (Director) mobile: 087 267 4196
e-mail linda@doyle-otroithigh.com
Daithi o'Troithigh (Director) mobile: 086 300 3499
e-mail daithi@doyle-otroithigh.com

Office address:
Pembroke House
28-32 Upper Pembroke Street
Dublin 2

doyle + o'troithigh
landscape - architecture

www.doyle-otroithigh.com



LEGEND

Street furniture & Services

Natural Features

Golf

Other

Built Features
Roads & Road Markings

Bridge Deck, Bridge Parapet, Building Façade, Footpath / Platform Train & Tram, Damp Proof Course / Verge, Bridge Pier / Wall & Gate Pillar / LUAS Trackbed, Cycleway / Private Landing Area, Property Line, Road Scar, Top of Fence, Wall / Retaining Wall, Railway / Tram Rail / Grating / Ramp, Building Canopy / Roof / Overhang, Step Level, Concrete Pad, Track

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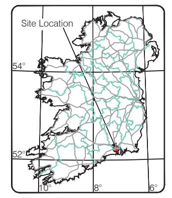

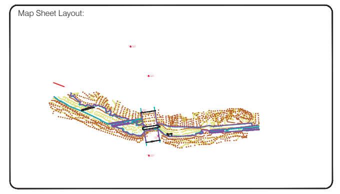

Surveyed by : MSL Date: Aug 2018
Drawn by : BK Date: Aug 2018
Checked by : KC Date: Aug 2018
Datum : Malin Head
Grid System: Irish National Grid ☐ ITM ■

Revisions

No.	Date	Description
0	28.08.18	First Drawing

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Head Office
Global House
Kilcullen Business Campus
Kilcullen Co. Kildare
Ireland
Phone: (+353) 045 484040
Fax: (+353) 045 484004
Email: info@murphysurveys.ie

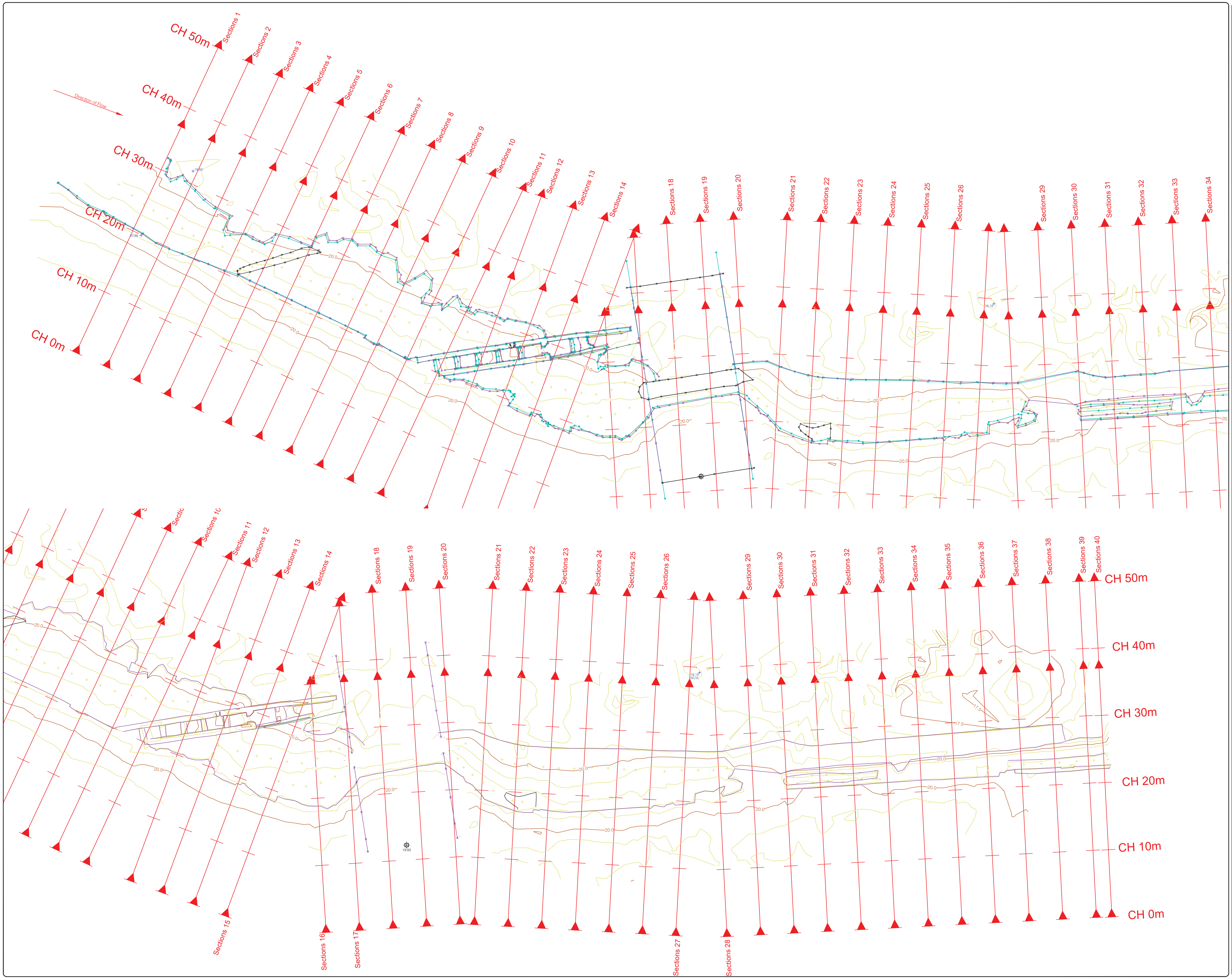
Client : TJ_O_Connor_&_Associates

Project : 27232 18024_Fermoy_Weir

Date : 28.08.18 **Scale :** 1:250@A1

Description : Topographical Survey

Drawing Number : FERMOY WEIR_PLAN



LEGEND

Street furniture & Services

Over Head Wires (LUAS) - Pylon ESB	RS Road Sign	PBOX Phone Box
Flowerbed	BS Bus Stop	Bench Seat
Duct	Pipe	BD Bollard
Kiosk	GAS Gas Cover	Lift
BEA Beacon	GY Gully	CPBox C P Box
Barrier	CH Coalhole Cover	U/G Vent U/G Car Park Vent
Pump	BH Bore Hole	BIN Waste Bin
Trial Pit	EP Electricity Pole	HY Hydrant
Bus/Tram Shelter	TP Telegraph pole	FH Fire Hydrant
Postbox	OCS OCS Pole	EBOX ESB Box
Valve - General	CP CCTV Camera Pole	ICE ESB Inspection Cover
Water Valve	LP Lamp Post	TFB Traffic Control Box
Gas Valve	FMH or Foul Manhole	LUAS LUAS Technical Cubicle
Sluice Valve	SMH or Surface Water MH	Ticket Vending Machine
Air Valve	MH or Manholes	WM Water Meter Cover
Stop Cock	AC Air Conditioning Vents	ICT Telecom Inspection Cover
CPP C P Post	ICU Services Inspection Cover	Monument / Toilets
MK Marker Post	ICTC Traffic Inspection Cover	Tank Storage
TL Traffic light	ICTV Cable TV Inspection Cover	Basement: MH, Cover & Pipe
PM Parking Meter	ICES ESAT Inspection Cover	DAM Dished Aerial Mark
PAM Plane Aerial Mark	ICNC NTL Inspection Cover	STAY Stay for pole
SCV Smart Card Validator	ICEM Eircom Inspection Cover	PP Pipe Protection
UV Unknown Valve	RE Rodding Eye	WO Washout

Natural Features

Surface Change	Water Level Water Level
Land Drain	CRWN Crown Level
Bottom of Slope	IL Invert level
Top of Slope	BL Bed Level
Ditch	S Spotheight
Water Edge / Lake / Pond	TOT Top of Tree
Hedge / Trees Drip Line / Vegetation	
Tree Coniferous	Tree Deciduous

Golf

FWAY Fair Way
GREE Green
TBOX Tee Box

Other

S1 E: 1000.000 N: 1000.000 H: 100.00 Survey Station
Photo point
River Alignment

Built Features
Roads & Road Markings

Building	Fence	FL 0.00 Floor Level
Edge of Road	Gate Gate	APX 0.00 Apex Height
Kerb Bottom	Road Centreline	EV 0.00 Eaves Height
Kerb Top	Top of Wall	PAR 0.00 Parapet Height
Bridge Abutment	Hoarding	SOFF 0.00 Soffit Elevation
Bridge Deck	Property Line	STPL 5.12 Step Level
Bridge Parapet	Road Scar	CONC Concrete Pad
Building Façade	Top of Fence	Track
Footpath / Platform Train & Tram	Wall / Retaining Wall	
Damp Proof Course / Verge	Railway / Tram Rail / Grating / Ramp	
Bridge Pier / Wall & Gate Pillar / LUAS Trackbed	Building Canopy / Roof / Overhang	
Cycleway / Private Landing Area		

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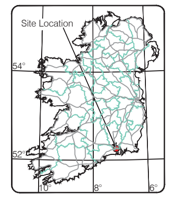
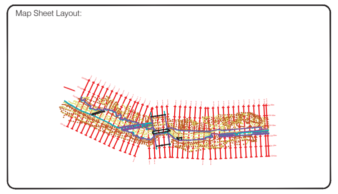


Map Sheet Layout



Surveyed by : MSL — Date: Aug 2018 — Datum : Malin Head
Drawn by : BK — Date: Aug 2018 — Grid System:
Checked by : KC — Date: Aug 2018 — Irish National Grid ☐ ITM ■

Revisions

No.	Date	Description
0	28.08.18	First Drawing

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Head Office
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Kilcullen Co. Kildare
Ireland
Phone: (+353) 045 484040
Fax: (+353) 045 484004
Email: info@murphysurveys.ie

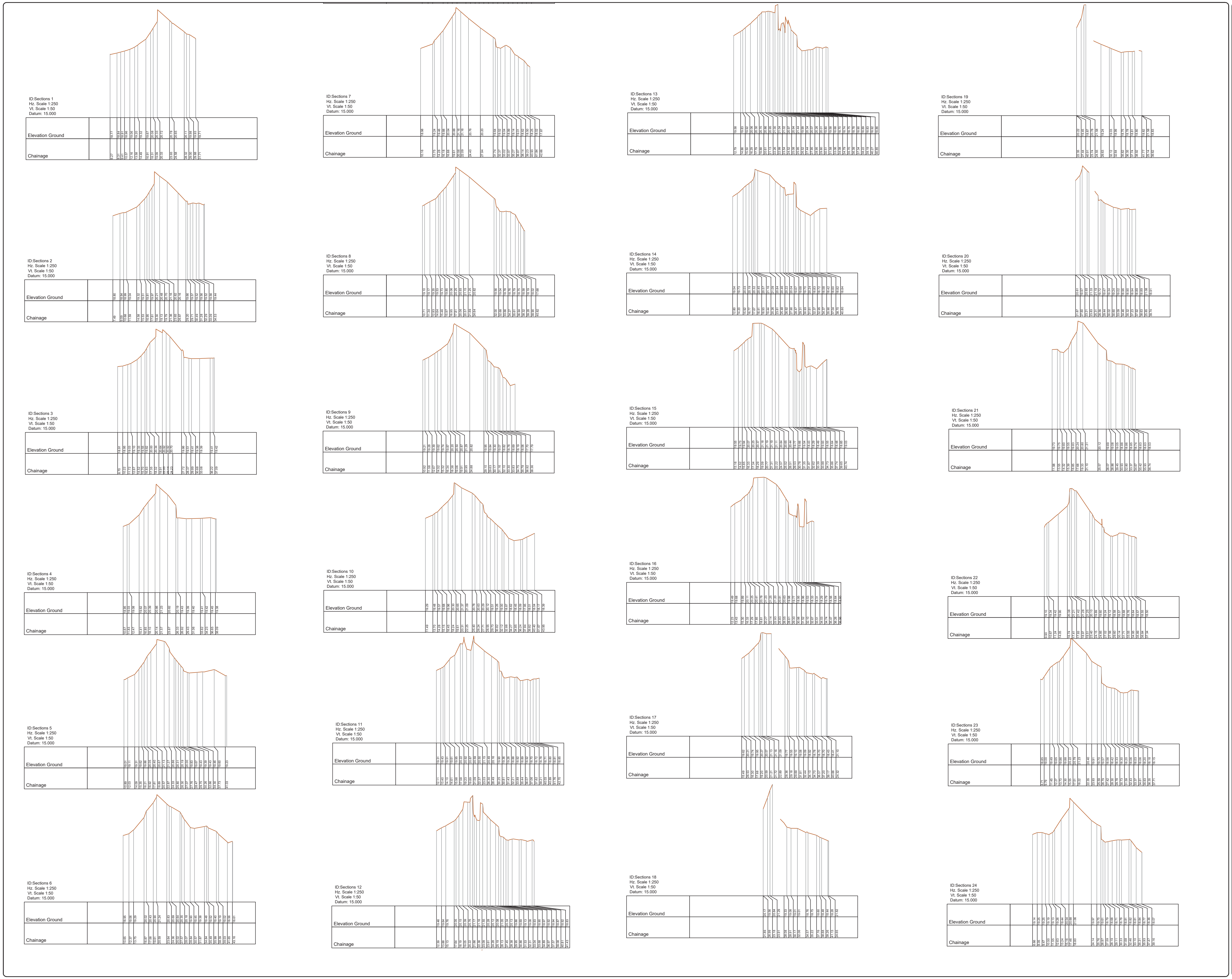
Client : TJ_O_Connor_&_Associates

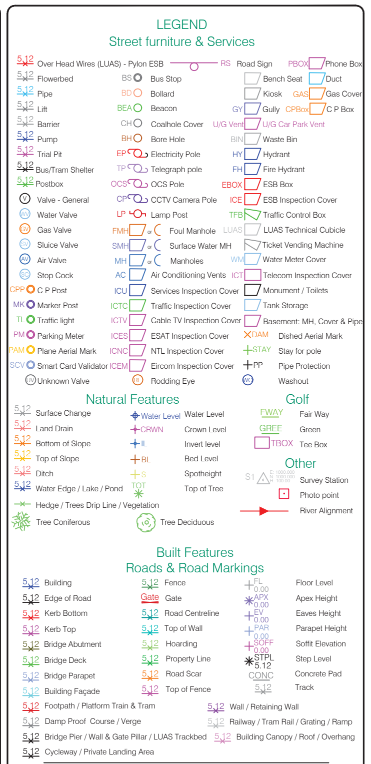
Project : 27232 18024_Fermoy_Weir

Date : 28.08.18 **Scale :** 1:250@A1

Description : Topographical Survey

Drawing Number : FERMOY WEIR_CROSS SECTIONS_PLAN





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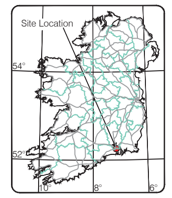

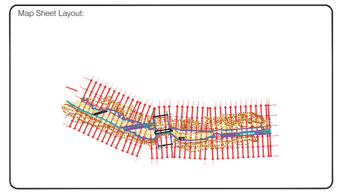

Surveyed by : MSL Date: Aug 2018 Datum : Malin Head
Drawn by : BK Date: Aug 2018 Grid System:
Checked by : KC Date: Aug 2018 Irish National Grid ☐ ITM ■

Revisions

No.	Date	Description
0	28.08.18	First Drawing

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Phone: (+353) 045 484040
Fax: (+353) 045 484004
Email: info@murphysurveys.ie

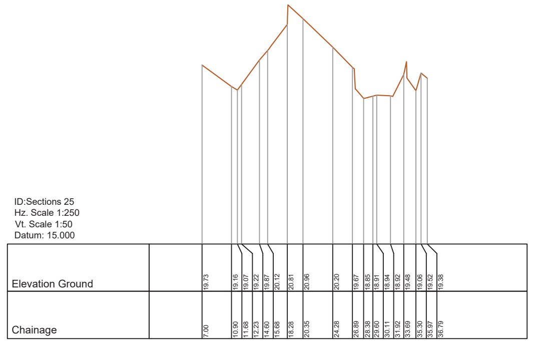
Client : TJ_O_Connor_&_Associates

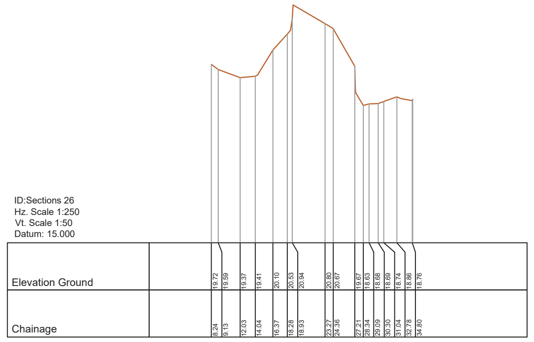
Project : 27232 18024_Fermoy_Weir

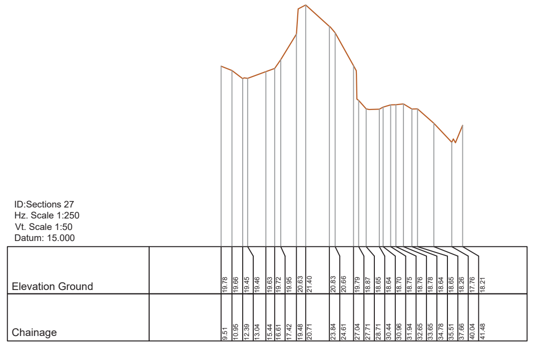
Date : 28.08.18 **Scale :** AS SHOWN@A1

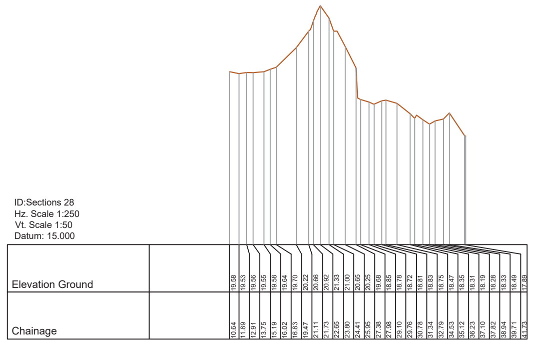
Description : Topographical Survey

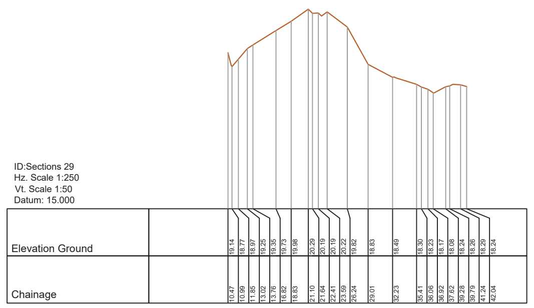
Drawing Number : FERMOY WEIR_CROSS SECTIONS_PROFILE_01

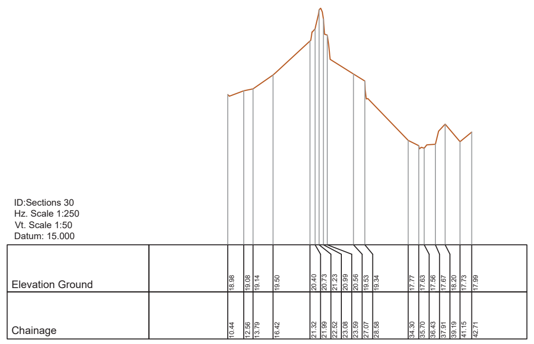


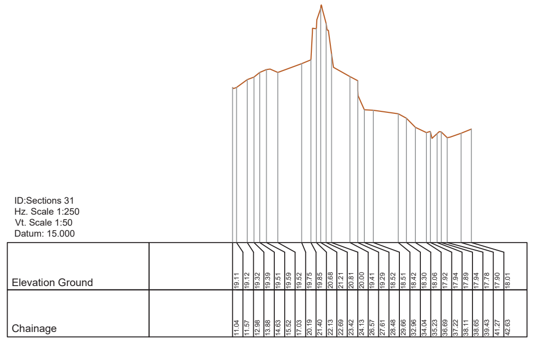


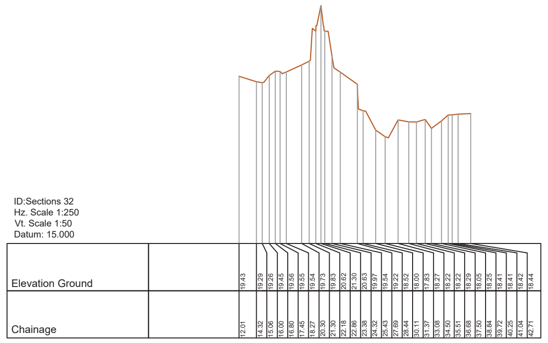


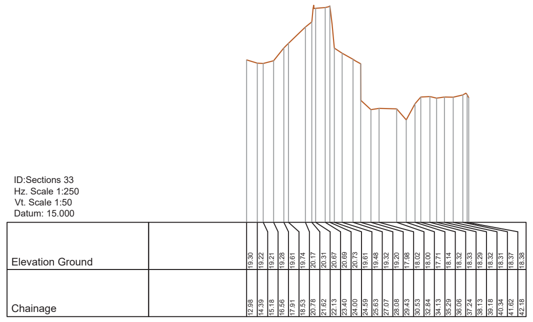


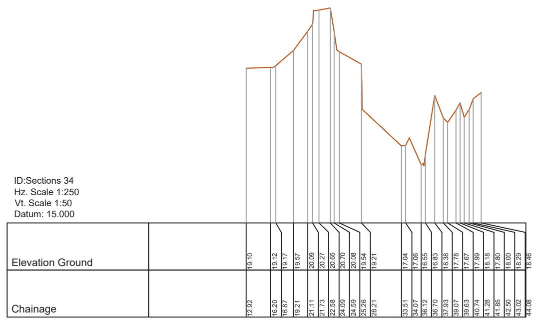


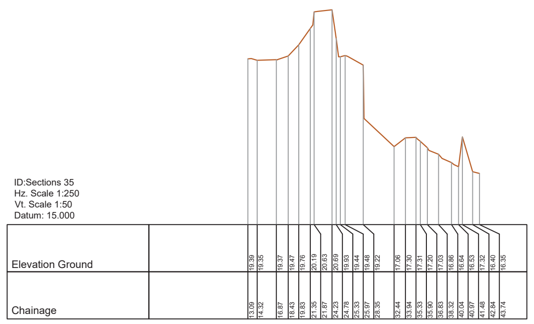


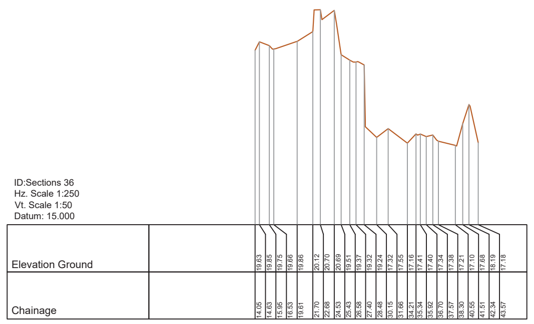


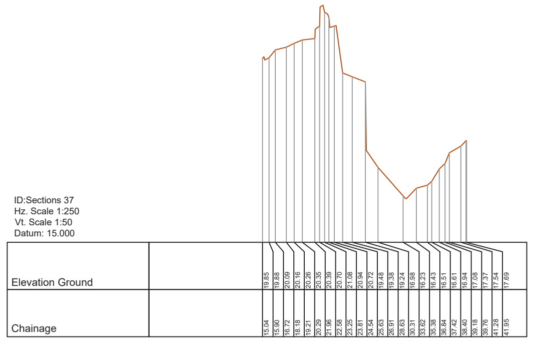


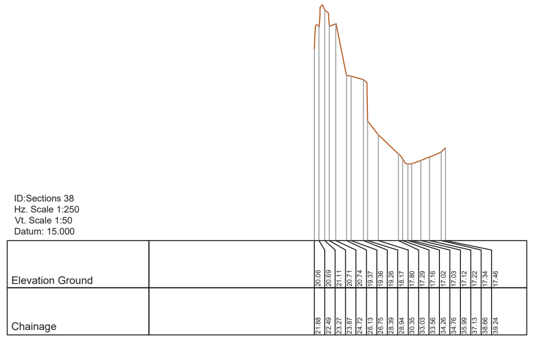


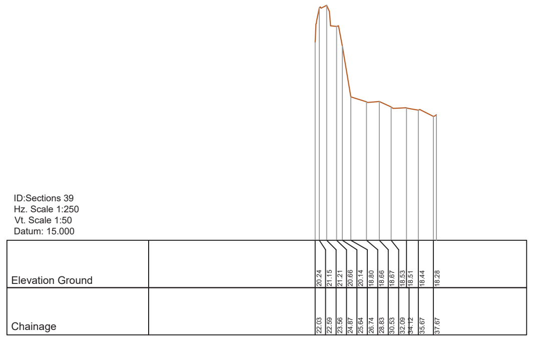


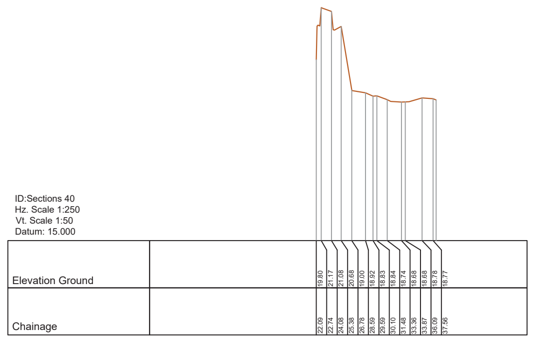












LEGEND

Street furniture & Services

Over Head Wires (LUAS) - Pylon ESB, Road Sign, Phone Box, Flowerbed, Bus Stop, Bench Seat, Duct, Pipe, Bollard, Kiosk, Gas Cover, Lift, Beacon, Gully, C P Box, Barrier, Coalhole Cover, U/G Car Park Vent, Pump, Bore Hole, Waste Bin, Trial Pit, Electricity Pole, Hydrant, Bus/Tram Shelter, Telegraph pole, Fire Hydrant, Postbox, OCS Pole, ESB Box, Valve - General, CCTV Camera Pole, ESB Inspection Cover, Water Valve, Lamp Post, Traffic Control Box, Gas Valve, Foul Manhole, LUAS Technical Cubicle, Sluice Valve, Surface Water MH, Ticket Vending Machine, Air Valve, Manholes, Water Meter Cover, Stop Cock, Air Conditioning Vents, Telecom Inspection Cover, C P Post, Services Inspection Cover, Monument / Toilets, Marker Post, Traffic Inspection Cover, Tank Storage, Traffic light, Cable TV Inspection Cover, Basement, MH, Cover & Pipe, Parking Meter, ESAT Inspection Cover, Dished Aerial Mark, Plane Aerial Mark, NTL Inspection Cover, Stay for pole, Smart Card Validator, Eircom Inspection Cover, Pipe Protection, Unknown Valve, Rodding Eye, Washout

Natural Features

Surface Change, Water Level, Land Drain, Crown Level, Bottom of Slope, Invert level, Top of Slope, Bed Level, Ditch, Spotheight, Water Edge / Lake / Pond, Top of Tree, Hedge / Trees Drip Line / Vegetation, Tree Coniferous, Tree Deciduous

Golf

Fair Way, Green, Tee Box

Other

Survey Station, Photo point, River Alignment

Built Features
Roads & Road Markings

Building, Fence, Floor Level, Edge of Road, Gate, Apex Height, Kerb Bottom, Road Centreline, Eaves Height, Kerb Top, Top of Wall, Parapet Height, Bridge Abutment, Hoarding, Soffit Elevation, Bridge Deck, Property Line, Step Level, Bridge Parapet, Road Scar, Concrete Pad, Building Façade, Top of Fence, Track, Footpath / Platform Train & Tram, Wall / Retaining Wall, Damp Proof Course / Verge, Railway / Tram Rail / Grating / Ramp, Bridge Pier / Wall & Gate Pillar / LUAS Trackbed, Building Canopy / Roof / Overhang, Cycleway / Private Landing Area

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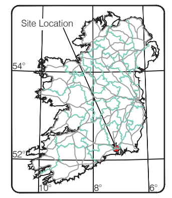

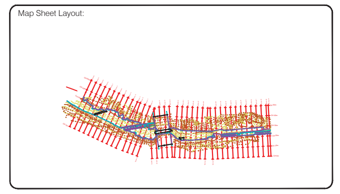

Surveyed by : MSL Date: Aug 2018 Datum : Malin Head
Drawn by : BK Date: Aug 2018 Grid System:
Checked by : KC Date: Aug 2018 Irish National Grid ☐ ITM ■

Revisions

No.	Date	Description
0	28.08.18	First Drawing

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Fax: (+353) 045 484004
Email: info@murphysurveys.ie

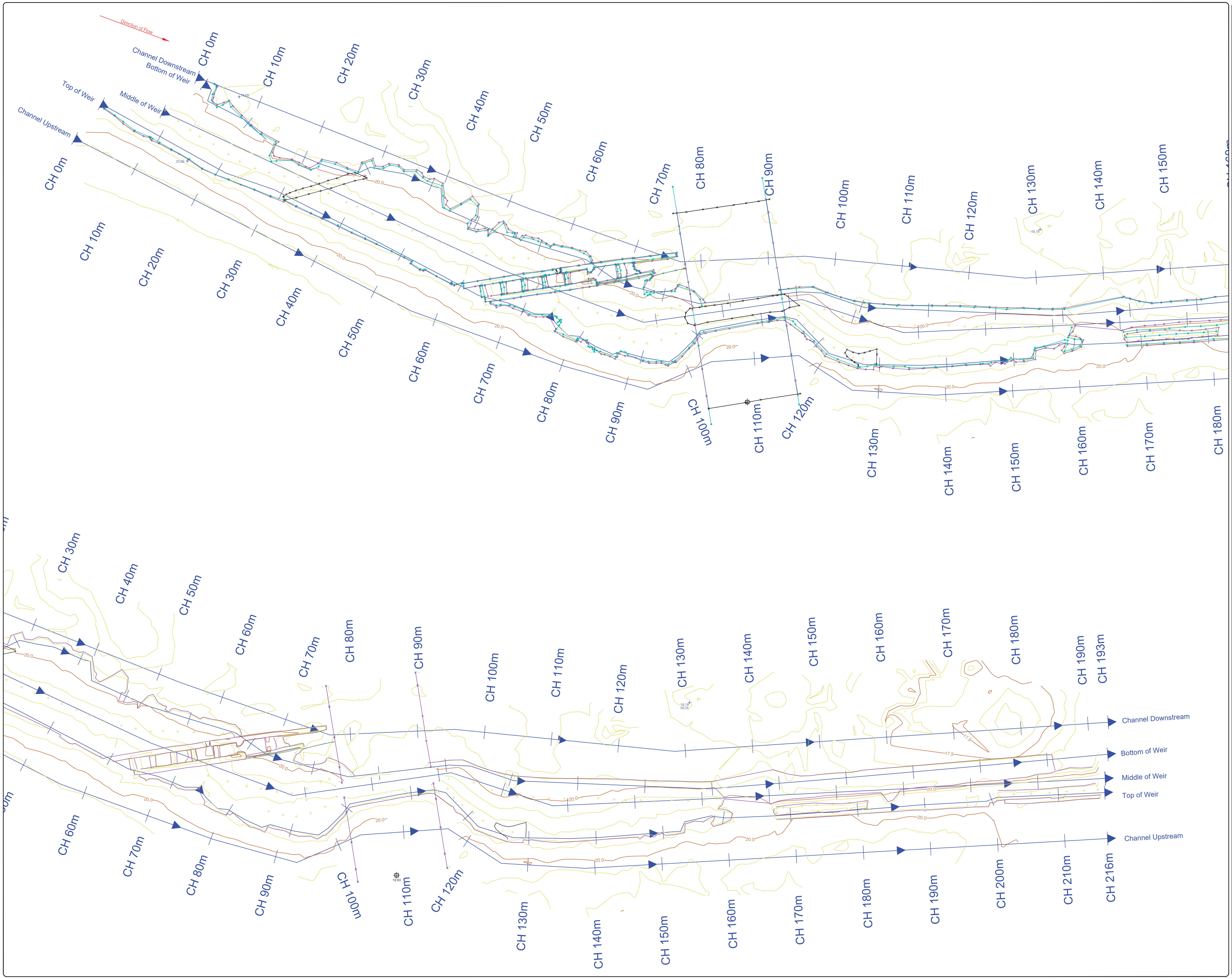
Client : TJ_O_Connor_&_Associates

Project : 27232 18024_Fermoy_Weir

Date : 28.08.18 **Scale :** AS SHOWN@A1

Description : Topographical Survey

Drawing Number : FERMOY WEIR_CROSS SECTIONS_PROFILE_02



LEGEND

Street furniture & Services

Natural Features

Golf

Other

Built Features

Roads & Road Markings

Bridge Deck
Property Line
Step Level
Bridge Parapet
Road Scar
Concrete Pad
Building Façade
Top of Fence
Track
Footpath / Platform Train & Tram
Wall / Retaining Wall
Damp Proof Course / Verge
Railway / Tram Rail / Grating / Ramp
Bridge Pier / Wall & Gate Pillar / LUAS Trackbed
Building Canopy / Roof / Overhang
Cycleway / Private Landing Area

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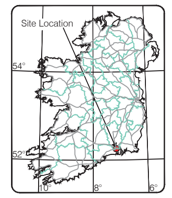
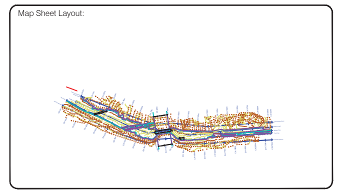
Site Location



Map Sheet Layout



Surveyed by : MSL Date: Aug 2018 Datum : Malin Head
Drawn by : BK Date: Aug 2018 Grid System:
Checked by : KC Date: Aug 2018 Irish National Grid ☐ ITM ■

Revisions

No.	Date	Description
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Fax: (+353) 045 484004
Email: info@murphysurveys.ie

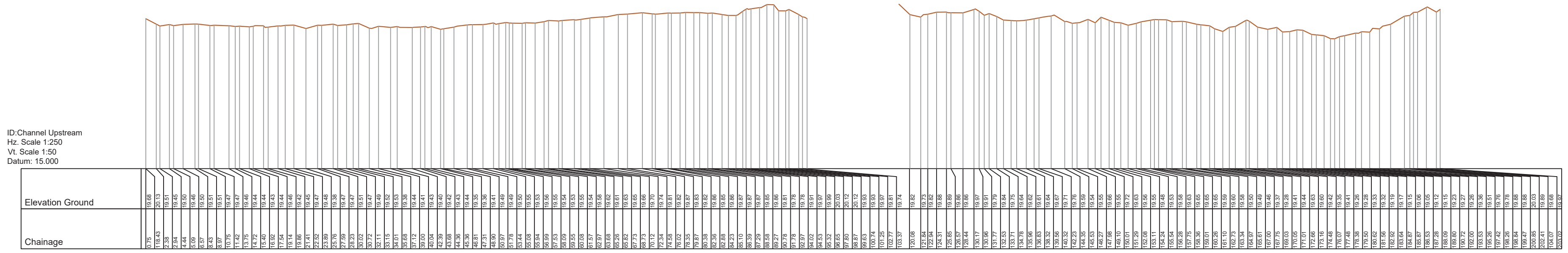
Client : TJ_O_Connor_&_Associates

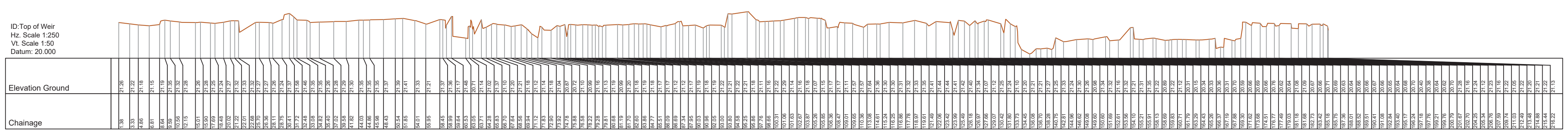
Project : 27232 18024_Fermoy_Weir

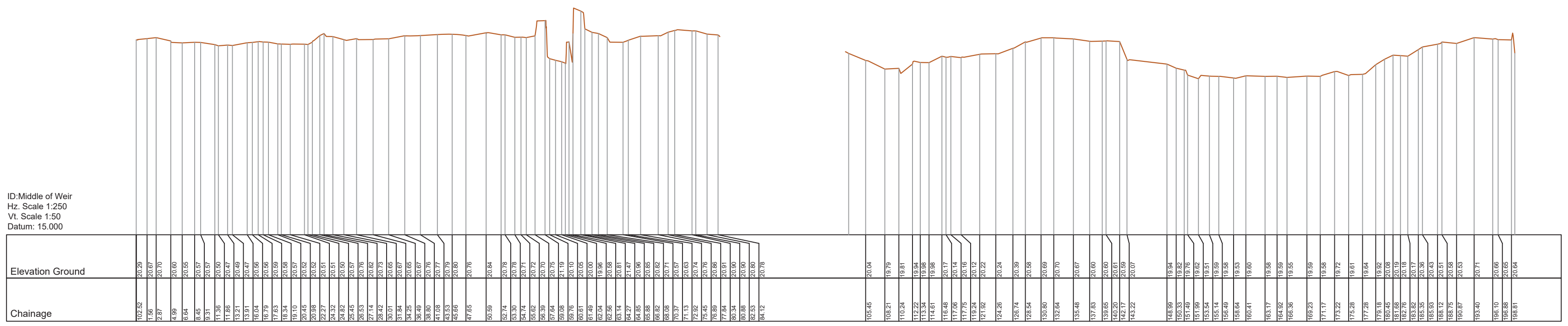
Date : 28.08.18 **Scale :** 1:250@A1

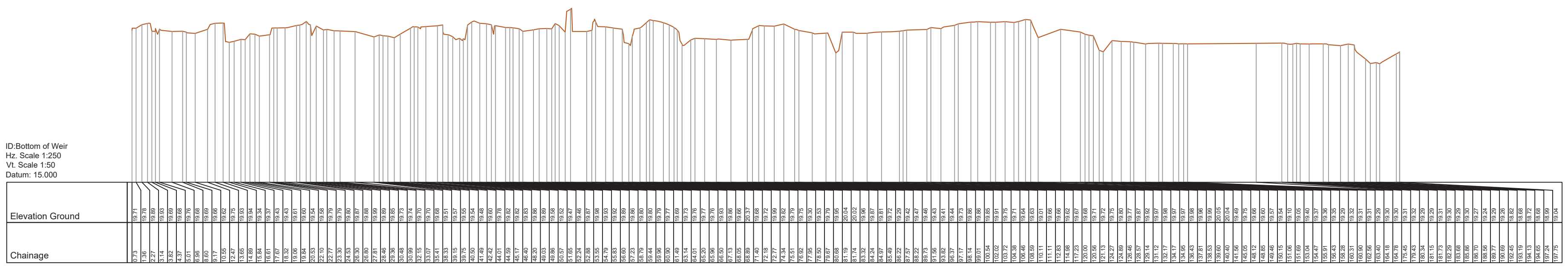
Description : Topographical Survey

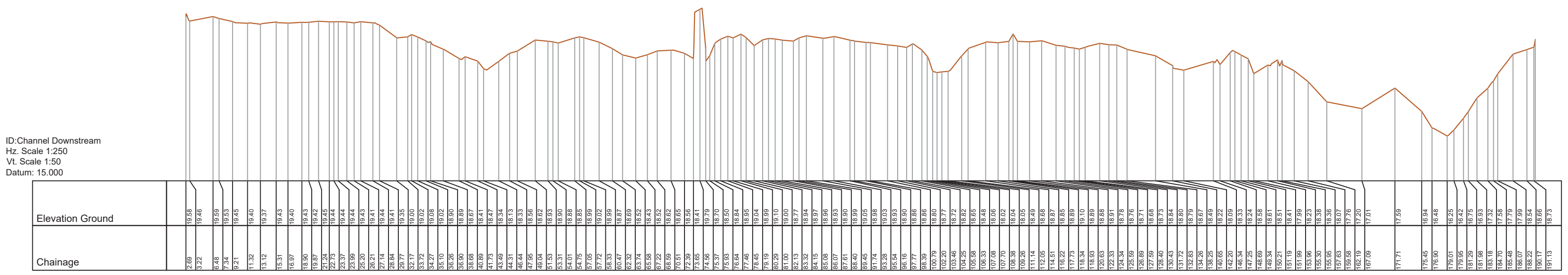
Drawing Number : FERMOY WEIR_LONG SECTION_PLAN

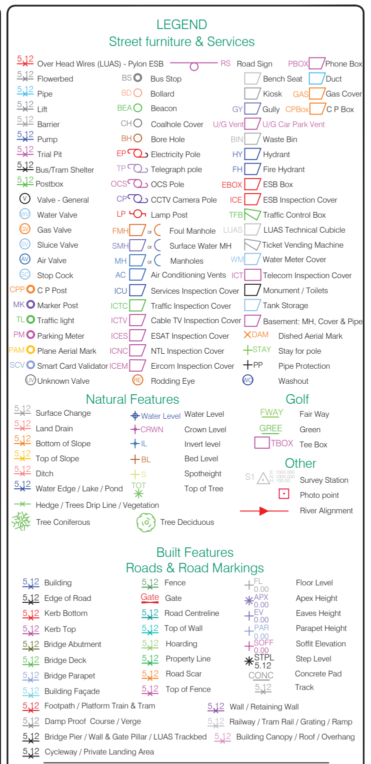












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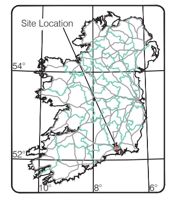

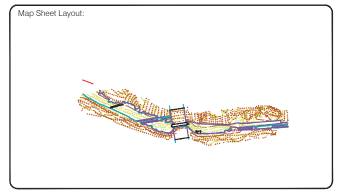

Surveyed by : MSL	Date: Aug 2018	Datum : Malin Head
Drawn by : BK	Date: Aug 2018	Grid System:
Checked by : KC	Date: Aug 2018	Irish National Grid ☐ ITM ■

Revisions

No.	Date	Description
0	28.08.18	First Drawing

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Email: info@murphysurveys.ie

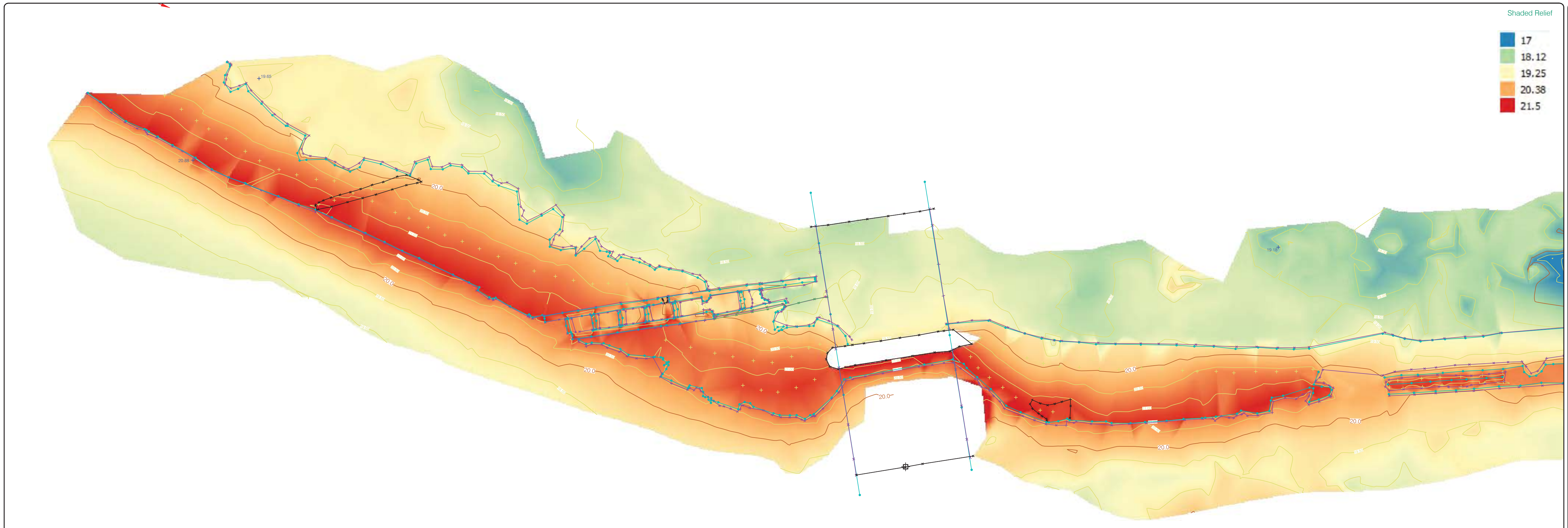
Client : TJ_O_Connor_&_Associates

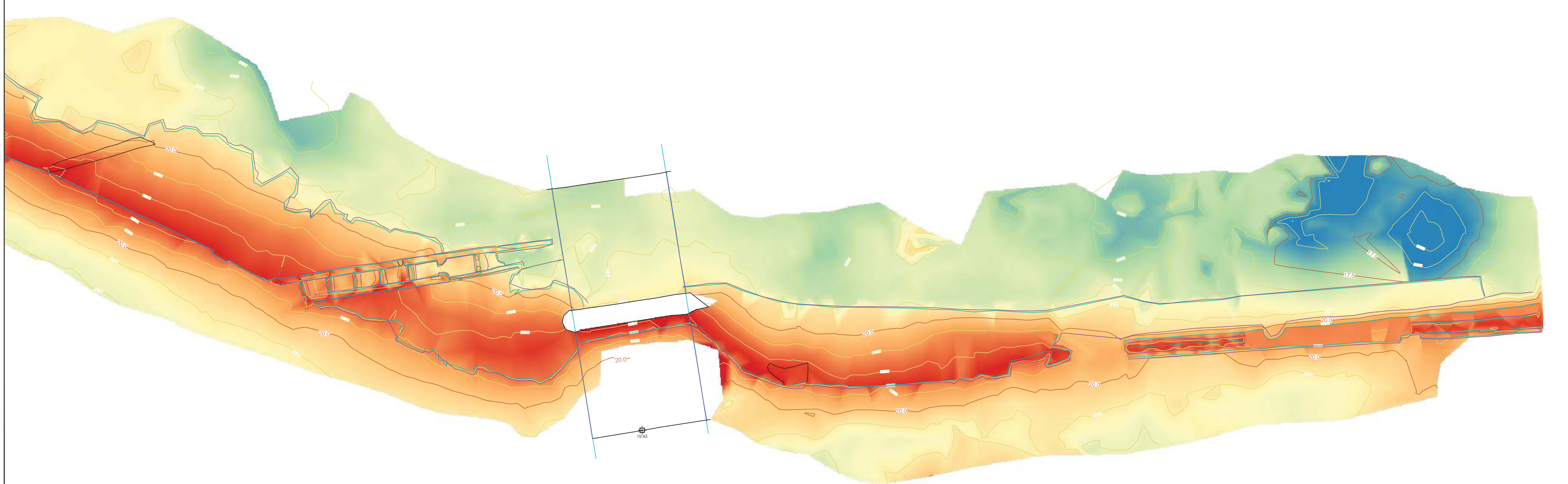
Project : 27232 18024_Fermoy_Weir

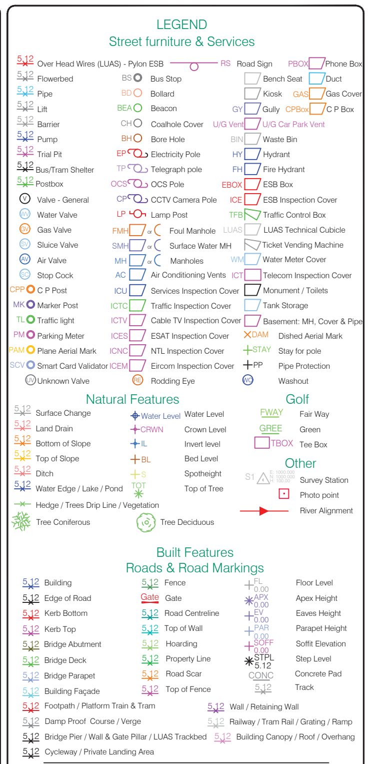
Date : 28.08.18 **Scale :** AS SHOWN@A1

Description : Topographical Survey

Drawing Number : FERMOY WEIR_LONG SECTION_01







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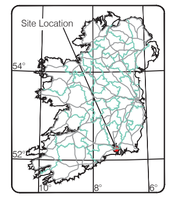

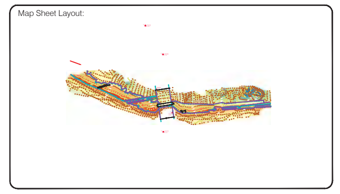

Surveyed by : MSL | Date: Aug 2018 | Datum : Malin Head
Drawn by : BK | Date: Aug 2018 | Grid System:
Checked by : KC | Date: Aug 2018 | Irish National Grid ☐ ITM ■

Revisions

No.	Date	Description
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Fax: (+353) 045 484004
Email: info@murphysurveys.ie

Client : TJ_O_Connor_&_Associates

Project : 27232 18024_Fermoy_Weir

Date : 28.08.18 **Scale :** 1:250@A1

Description : Topographical Survey

Drawing Number : FERMOY WEIR_DTM

LEGEND

Street furniture & Services

Natural Features

Golf

Other

Built Features

Roads & Road Markings

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North

Site Location

Map Sheet Layout

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Fax: (+353) 045 484004
Email: info@murphysurveys.ie

Client : TJ O connor & Associates

Project : Fermoy Mill Race River Bed Survey

Date : 11.08.20 **Scale :** 1:150@A0

Description : River Bed Survey

Drawing Number : MSL3□□□0_01

Appendix 3. NPWS Correspondence

Your Ref: 19011-TJOC-ZZ-XX-LT-C-3000
Our Ref: **G Pre00324/2019**
(Please quote in all related correspondence)

28/02/2020
Suite D,
Penrose House,
Penrose Quay,
CorkVia
email

Re: Fermoy Weir Remediation and Fish Bypass Project.

A chara

On behalf of the Department of Culture, Heritage and the Gaeltacht, I refer to correspondence received in connection with the above.

Outlined below are heritage-related observations/recommendations of the Department under the stated heading(s).

Archaeology

It is noted that it is intended to engage the services of an underwater archaeologist to carry out the necessary archaeological assessment for the proposed works. This is to be welcomed. The Underwater Archaeological Impact Assessment (UAIA) shall contain the following:

- A detailed underwater archaeological assessment of the weir structure, riverbed, river bank and bridge structure, should the latter also be included in the footprint of the proposed works. The UAIA shall also include assessing the potential impact on underwater cultural heritage of any proposed access and egress routes for plant and machinery into the river, including haul roads, etc.
- The assessment shall comprise visual assessment, including photographic survey of the structures and riverbed and shall be accompanied by a hand held metal detection survey.
- A measured, scaled and geo-referenced drawn and photogrammetric survey of the weir as it currently presents, accompanied by a detailed descriptive record.
- It shall be noted that timbers were identified in the riverbed previously in the proximity of the existing bridge that may form part of earlier structures, either for an earlier bridge or earlier weir or other, previously unidentified feature. The

location of the timbers shall be confirmed and if within the footprint of proposed works or any associated works (e.g. for vehicular access to river, etc.) then shall form part of the UAIA assessment.

- A detailed desktop assessment that consults with all known and relevant sources shall inform the UAIA from the outset and shall seek to identify potential for previously unknown underwater cultural heritage to be present in the riverbed so as to enable avoidance of any impact on heritage.
- The desktop study shall consult results of previous UAIAs and other relevant archaeological assessments and shall also include accessing the Topographical files in the National Museum of Ireland and also local sources to include artefactual finds from the River Blackwater in that area. Several finds have been recovered in the past by divers that indicated the potential for more material culture to be present in the underwater environment within the footprint of the proposed works.
- A detailed impact statement shall be included in the UAIA, addressing all propose options for the remediation and repair project, and shall put forward informed recommendations addressing each option to propose avoidance, as the preferred option, or archaeological mitigation of unavoidable impacts on the underwater cultural heritage.

The engaged underwater archaeologist shall comply with the following:

- Be suitably qualified and suitably experienced (have a track record in the assessment and recording of weir structures or similar structures).
- Shall submit a detailed method statement to accompany the applications for Dive Survey Licence and Detection Device Licences.
- Shall comply with all Health and Safety Authority Regulations pertaining to diving at work.

Nature Conservation

The proposed works are within and immediately adjacent to the following European site: the Blackwater River (Cork/Waterford) candidate Special Area of Conservation (cSAC) (2170). Conservation objectives for this site is available at https://www.npws.ie/protected-sites/sac/002170 and apply amongst others to the habitat type alluvial woodland and to the freshwater species salmon, sea lamprey, river lamprey, brook lamprey, Twaite shad, otter and white-clawed crayfish.

It is a conservation objective for both sea lamprey and Twaite shad to *restore* their favourable conservation condition in the Munster Blackwater River, by making more than 75% of the main channel length of the river accessible to these species from the Blackwater Estuary[1]. This means that repair of the Fermoy weir can only be permitted where the fish pass will allow upstream access to both Twaite shad and lamprey. The design requirements for shad will be more demanding in terms of design, because, unlike salmonids, they are unable to swim against any plunging water, and they swim in shoals rather than individually. Also the flow velocities will need to avoid circumstances where shad will swim back down the fish-pass and they can abandon an unsuitable fish-pass after entry[2]. Velocity barriers of 4.15 m/s for 6.1m or 4.5 m/s for 5m have been cited as passable by American shad[3]. Larnier and Travade (2002)[4] provide design recommendations for shad fish passways and large numbers of shad have successfully passed designs used in Bergerac (France)[5] for instance, but it is recommended to obtain site-specific advice from IFI in relation to the efficacy of the proposed fish-pass for Twaite shad and other fish species.

In order to fully assess alternatives, it is recommended that the impacts four other options on the above European site are also assessed in the NIS and ecological impact assessment, in addition to those proposed:

- 'Do-nothing' option.
- Complete or partial permanent weir removal.
- Stabilization of current breach.
- Construction of the fish pass in the breached weir area of the river channel.

Predictions of the effectiveness of fish pass options for each species based on monitoring evidence from other weir fish passes should be included.

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[1] NPWS (2012) *Conservation objectives: Blackwater River (Cork/Waterford) SAC 002170.* Version 1.0. https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002170.pdf

[2] Castros-Santos, T. (2012) Adaptive fishway design: a framework and rationale for effective evaluations. Pp. 76-90. In: Bundesanstalt für Gewässerkunde (Hrsg.): *Monitoring, Funktionskontrollen und Qualitätssicherung an Fischaufstiegsanlagen. 2. Kolloquium zur Herstellung der ökologischen Durchgängigkeit der Bundeswasserstraßen am 07./08. Juni 2011 in Koblenz*. – Veranstaltungen 7/2012, Koblenz, August 2012.

[3] Haro, A. and Castro-Santos, T. (2012) Passage of American shad: Paradigms and realities. *Marine and coastal fisheries: Dynamics, management and ecosystem science* **4**: 252-261.

[4] Larnier, M. and Travade, F. (2002) The design of fishways for shad. *Bulletin Français de la Pêche et de la Pisciculture* **364** (Supplement): 135-146.

[5] Travade, F. et al. (1998) Feedback on four fishpass instalations recently built on two rivers in southwest France. Pp. 146-170. ICES Annual Science Conference 1996.

It is recommended that the following conservation issues and questions are addressed in the Natura Impact Statement (NIS):

- The predicted velocity of water flow in the fish pass during lamprey and shad upstream migration, based on seasonal data.
- The predicted efficacy of the fish-pass design to allow upstream access to Twaite shad, lamprey species and eel (as an important prey of otter).
- The exact restored height of the proposed weir compared to that of the original (damaged) weir.
- Any OPW amendments to the works.
- In-combination assessment with changes to Condulane and other weirs in the cSAC, upstream and downstream.
- The need for regular downstream gravel removal as part of weir maintenance.
- Sediment deposition upstream of the weir.
- Effects on invasive species, such as dace.
- Potential for increased heron, cormorant or mink predation at the fish-pass.
- Creation of nest sites and roosting ledges on any new or replacement structures.
- Waste management plan for construction and excavation wastes.
- Mitigation measures to avoid silt release.
- Biosecurity precautions, particularly in relation to crayfish plague.
- Effects of lighting on fish-pass effectiveness.

Depending on the predicted changes in flow and velocity as a result of the preferred works option, it is recommended that the following be considered as part of survey work for the NIS and ecological impact assessment:

- Occurrence of alluvial woodland (up to 3km upstream and 2km downstream of weir) – please contact NPWS (regional ecologist) if there are any issues with the interpretation of this habitat type.
- Occurrence of water crowfoot / starwort community (up to 1 km below the weir).
- Presence of freshwater pearl mussel (up to 150m below the weir).
- Presence of white-clawed crayfish (up to 150m below the weir).
- Presence of breeding otter (up to 150m above and below the weir).

- Spawning and juvenile habitat of lamprey species (up to 150m below the weir) - the advice of IFI should be followed in relation to survey and impact assessment for these species.
- Salmon and Twaite shad: The advice of IFI should be followed as to whether these species need to be surveyed.
- Presence of breeding river birds: kingfisher (Birds Directive Annex 1 species), grey wagtail (amber listed species) and dipper (up to 100m above and below the weir).
- Presence of invasive species (e.g. Japanese knotweed, Himalayan balsam, giant hogweed) in works area.

It is recommended that proposals for the monitoring of the efficacy of the fish-pass, particularly in relation to Twaite shad access, are included in the NIS. The use of eDNA could be considered, as primers for Twaite shad have been developed by UCD[6].

You are requested to send further communications to this Department's Development Applications Unit (DAU) at **manager.dau@chg.gov.ie** (team monitored); if this is not possible, correspondence may alternatively be sent to:

The Manager
Development Applications Unit (DAU)
Department of Culture, Heritage and the Gaeltacht
Newtown Road
Wexford
Y35 AP90

Is mise, le meas

Connor Rooney
Development Applications Unit

[6] Aktinson, S., *et al.* (2017) Assessment of the extent and impact of obstacles on freshwater hydromorphology and connectivity in Ireland.
http://www.ucd.ie/reconnect/t4media/National_Water_Event_2017_S_Atkinson_FINAL.pdf

Appendix 4. Aquatic baseline report for Fermoy Weir, Fermoy, Co. Cork Prepared by Triturus Environmental Ltd

Aquatic baseline report for Fermoy Weir, Fermoy, Co. Cork

Prepared by Triturus Environmental Ltd. for

DixonBrosnan Environmental Consultants

May 2021

Please cite as:

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Triturus

Table of contents

1. Introduction

1.1 Background

Triturus Environmental Ltd. were contracted by DixonBrosnan Environmental Consultants (on behalf of Cork County Council) to undertake a baseline aquatic survey of the (Munster) River Blackwater in the vicinity of Fermoy Weir, Fermoy, Co. Cork.

The survey was undertaken to establish baseline aquatic and fisheries data used in the preparation of the Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) for the proposed instream works on the River Blackwater (EPA code: 18B02). Works included the construction of a new fish pass structure (rock ramp) and repairs to the existing weir. The survey area, both upstream and downstream of Kent Bridge and the existing weir, was located in the Blackwater River SAC (site code: 002170) and also within the River Blackwater *Margaritifera* sensitive area (**Figure 2.1**).

The baseline survey was undertaken to establish the importance of the River Blackwater at Fermoy Weir in supporting qualifying interest species and habitats for the Blackwater River SAC (site code: 002170) (NPWS, 2012). The ecological surveys included detailed assessments of fisheries (including both salmonid and lamprey habitat), white-clawed crayfish (*Austropotamobious pallipes*), freshwater pearl mussel (*Margaritifera margaritifera*) and biological water quality (macro-invertebrates). An otter (*Lutra lutra*) survey was undertaken to identify any breeding or resting areas for the species in the vicinity of the proposed works. The surveys also considered the importance of the survey area in supporting the qualifying interest Annex I habitat 'Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and *Callitricho-Batrachion* or aquatic mosses [3260]' and non-qualifying interest Annex I habitat 'Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]'.

1.2 Project description

A full description of the proposed works for the Fermoy Weir project are described in the accompanying EIAR for the project.

2. Methodology

2.1 Desktop review

A desktop review was undertaken to collate and review available information, datasets and documentation sources pertaining to the natural environment of the aquatic survey area. Records available on the National Biodiversity Data Centre (NBDC) website were reviewed.

A sensitive species data request for terrestrial and aquatic flora and fauna covering the 10km grid squares adjoining and containing the proposed River Blackwater works area (i.e. W79 & W89) was requested from the Department of Culture, Heritage and the Gaeltacht on Tuesday 28th July 2020 and received on 4th August 2020.

2.2 Walkover surveys

Site visits of the aquatic survey area were conducted on Tuesday 26th May, Monday 8th June, Thursday 9th and Sunday 26th July 2020 by Triturus Environmental Ltd. Survey sites were assessed in light of the proposed works, with survey effort focused on both instream and riparian habitats upstream and downstream of the existing weir. Aquatic surveys included a fisheries assessment (electro-fishing, see section 2.3 below and **Appendix A**), fisheries habitat appraisal, shad species eDNA analysis and a white-clawed crayfish assessment. A freshwater pearl mussel survey was also undertaken by Sweeney Consultancy in the vicinity of Fermoy Weir (see section 2.6 and **Appendix B).** A macrophyte survey was undertaken to establish the presence of the Annex I habitats 'Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and *Callitricho-Batrachion* or aquatic mosses [3260]' and ''Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]'. Additionally, biological water quality (Q-sampling) was undertaken at *n*=4 sites (two upstream and two downstream of Fermoy Weir, **Figure 2.2**). An otter survey was undertaken to identify any breeding or resting areas for the species in the vicinity of the proposed works, in addition to other signs (e.g. spraint) which would help to establish the species' utilisation of the area (i.e. foraging and commuting).

A broad aquatic habitat assessment was conducted at each site utilising elements of the methodology given in the Environment Agency's *'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003*' (EA, 2003) and the Irish Heritage Council's *'A Guide to Habitats in Ireland*' (Fossitt, 2000). All sites were assessed in terms of:

- Channel width, depth profile and other physical characteristics.
- Substrate type, listing substrate fractions in order of dominance, i.e. bedrock, boulder, cobble, gravel, sand, silt etc.
- Flow type, listing percentage of riffle, glide and pool in the sampling area
- In-stream macrophyte and aquatic bryophytes occurring and their percentage coverage of the river bed at the sampling sites
- Riparian vegetation composition

The River Blackwater was divided into discrete survey sections to help provide focus on the distribution of species and habitats of conservation value relative to the proposed works. In this respect, a total of *n*=5 sections were surveyed (A to E; **Table 2.1, Figure 2.1**).

Table 2.1 Aquatic survey site locations in the footprint of the Fermoy Weir works, Fermoy, Co. Cork.

Section	Watercourse	EPA code	Location	ITM (x)	ITM (y)
A	River Blackwater	18B02	100-200m upstream of Fermoy Weir	581014	598585
B	River Blackwater	18B02	0-100m upstream of Fermoy Weir	581117	598574
C	River Blackwater	18B02	0-100m downstream of Fermoy Weir	581202	598603
D	River Blackwater	18B02	100-200m downstream of Fermoy Weir	581313	598683
E	Mill-race channel	n/a	O'Neill-Crowley Quay	581300	598591

2.3 Aerial drone surveys

To further inform the walkover surveys and ensure the most contemporary mapping data was available for aquatic baseline surveys, an aerial fixed-wing drone survey was undertaken of the wider Fermoy Weir site in June 2020. A flight plan was specifically tailored to meet the needs of the project. The drone was programmed to fly at 120m elevation (Irish Aviation Authority regulated height), capturing high resolution imagery at a rate of 2cm per pixel with absolute accuracy of between 2-4cm (RTK activated). In order to capture a single ortho-mosaic, multiple images were taken and subsequently stitched together in post-processing to produce a single geo-referenced image of the entire study area (i.e. 100m upstream and downstream of the extent of the existing weir). Imagery was captured during calm, bright conditions (on the same day as the SONAR survey, see below) which allowed for the highest resolution and greatest level of detail.

2.4 SONAR survey

To determine the bathymetry and substrata-type (i.e. bottom hardness and rugosity[1]) within the survey sections of channel, a SONAR survey was undertaken during July 2020. Primarily, this approach helped to estimate the extent of and elucidate any potential (soft sediment) larval lamprey areas. The bottom hardness mapping also helped to inform the location of potential ammocoete burial habitat in poorly-accessible deeper water zones (i.e. >1.6m in depth). A Lowrance Elite 9HDS-Live SONAR unit was mounted on a 3m RIB equipped with a total-scan transducer to log bathymetry and bottom hardness and rugosity. Reefmaster v2.0 software was used to generate point clouds for map creation in ArcGIS v10.8.

[1] Rugosity is a 3-D measure of the topographic roughness or complexity of riverbed substrata (Brasington et al., 2012)

2.5 Fisheries assessment (electro-fishing)

Triturus Environmental Ltd. made an application under Section 14 of the Fisheries (Consolidation) Act, 1959 as substituted by Section 4 of the Fisheries (Amendment) Act, 1962, to undertake an electro-fishing survey (n=5 sites; see **Table 2.1, Figure 2.1**) in the footprint of the proposed Fermoy Weir works. Permission was granted on Monday 29th June 2020 and the survey was undertaken Thursday 9th July 2020 following notification to Inland Fisheries Ireland (Macroom).

A single anode Smith-Root LR24 backpack (12V DC input; 300V, 100W DC output) was used to electro-fish sites on the River Blackwater in the footprint of the proposed Fermoy Weir works on Thursday 9th July 2020, following notification to Inland Fisheries Ireland (Macroom) and under the conditions of a Department of Communications, Climate Action & Environment (DCCAE) licence. Both river and holding tank water temperature was monitored continually throughout the survey to ensure temperatures of 20°C were not exceeded, thus minimising stress to the captured fish due to low dissolved oxygen levels. A portable battery-powered aerator was also used to further reduce stress to any captured fish contained in the holding tank. Salmonids, European eel and other captured fish species were transferred to a holding container with oxygenated fresh river water following capture. To reduce fish stress levels, anaesthesia was not applied to captured fish. All fish were measured to the nearest millimetre and released in-situ following a suitable recovery period.

As three primary species groups were targeted during the survey, i.e. salmonids, lamprey, and eel, the electro-fishing settings were tailored for each species. By undertaking electro-fishing using the rapid electro-fishing technique (see methodology below), the broad characterisation of the fish community at each sampling reach could be determined as a longer representative length of channel can be surveyed. Electro-fishing methodology followed accepted European standards (CEN, 2003) and adhered to best practice (e.g. CFB, 2008).

2.5.1 Salmonids and European eel

For salmonid species and European eel, as well as other incidental species, electro-fishing was carried out in an upstream direction for a 10-minute CPUE, an increasingly common standard approach for wadable streams (Matson et al., 2018). A total of approx. ≥50-75m channel length was surveyed at each site, where feasible, in order to gain a better representation of fish stock assemblages.

Relative conductivity of the water at each site was checked in-situ with a conductivity meter and the electro-fishing backpack was energised with the appropriate voltage and frequency to provide enough draw to attract salmonids and European eel to the anode without harm. For the moderate conductivity waters of the River Blackwater, a voltage of 250-275v, frequency of 45Hz and pulse duration of 3.5ms was utilised to draw fish to the anode without causing physical damage.

2.5.2 Lamprey

Electro-fishing for lamprey ammocoetes was conducted using targeted box quadrat-based electro-fishing (as per Harvey & Cowx, 2003) in objectively suitable areas of sand/silt, where encountered (including three targeted areas within site E3). As lamprey take longer to emerge from silts and require a more persistent approach, they were targeted at a lower frequency (30Hz) burst DC pulse setting which also allowed detection of European eel in sediment, if present. Settings for lamprey followed those recommended and used by Harvey & Cowx (2003), APEM (2004) and Niven & McAuley (2013). Using this approach, the anode was placed under the water's surface, approx. 10–15 cm above the sediment, to prevent immobilising lamprey ammocoetes within the sediment. The anode was energised with 100V of pulsed DC for 15-20 seconds and then turned off for approximately five seconds to allow ammocoetes to emerge from their burrows. The anode was switched on and off in this way for approximately two minutes. Immobilised ammocoetes were collected by a second operator using a fine-mesh hand net as they emerged.

Lamprey species were identified to species level, where possible, with the assistance of a hand lens, through external pigmentation patterns and trunk myomere counts as described by Potter & Osborne (1975) and Gardiner (2003).

Table 2.1 *n*=5 electro-fishing survey site locations on the River Blackwater in the vicinity of Fermoy Weir, Co. Cork.

Site no.	Watercourse	EPA code	Location	X (ITM)	Y (ITM)
E1	River Blackwater	18B02	Upstream of Fermoy Weir – along weir face	581079	598606
E2	River Blackwater	18B02	Upstream of Fermoy Weir – along weir face	581118	598589
E3	River Blackwater	18B02	Downstream of Fermoy Weir – north bank channel	581189	598657
E4	River Blackwater	18B02	Downstream of Fermoy Weir – centre arch	581167	598609
E5	River Blackwater	18B02	Downstream of Fermoy Weir – downstream of weir pool	581248	598632

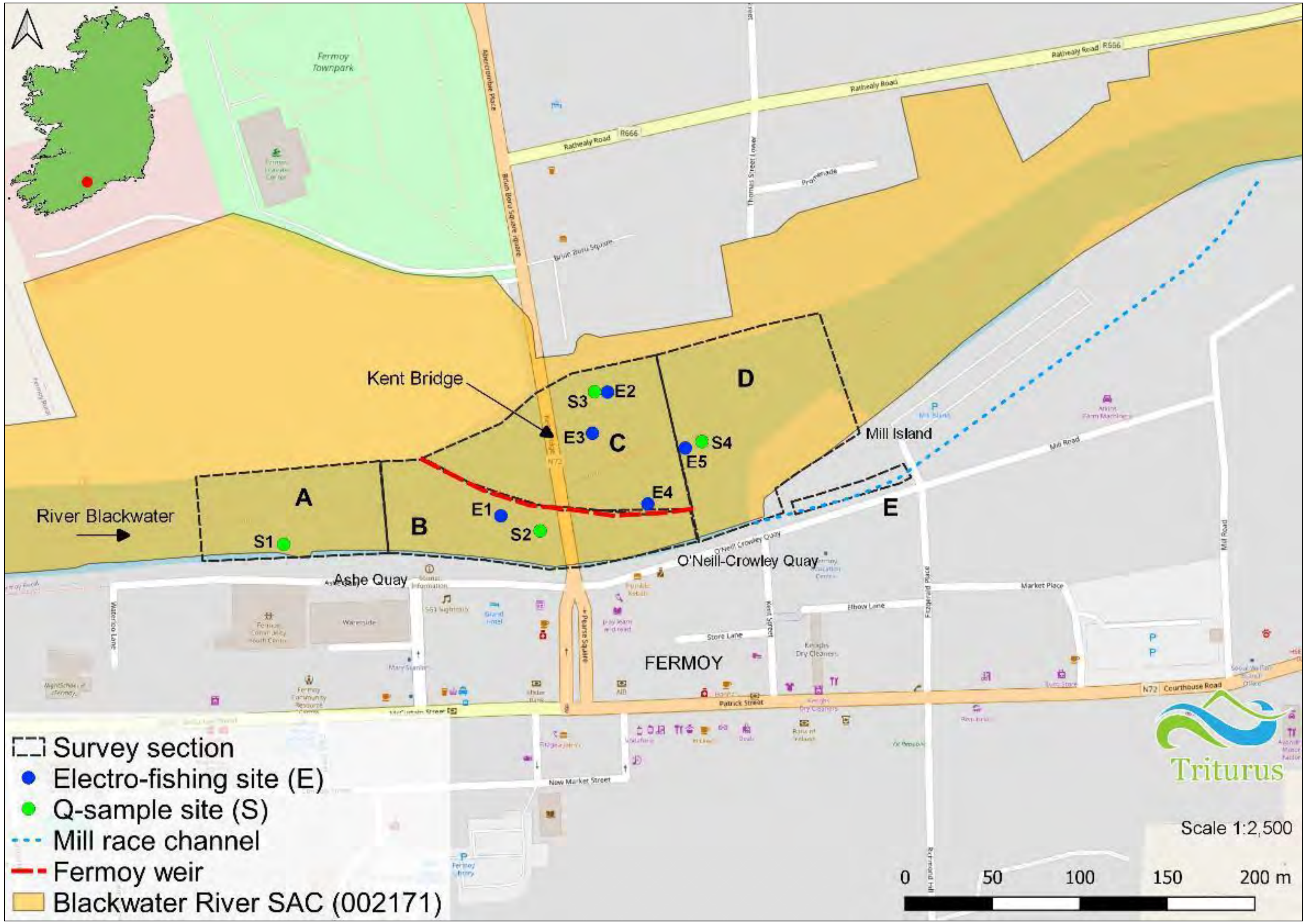

Figure 2.1 Location of aquatic survey sections in the vicinity of the proposed Fermoy Weir works, Fermoy, Co. Cork

2.6 eDNA analysis for shad species

Given limited knowledge in the known distribution and range of qualifying interest twaite shad (*Alosa fallax fallax*) within the Blackwater River SAC (002170), environmental DNA (eDNA) analysis was undertaken on water samples collected on Thursday 21st May 2020 (**Table 2.2**). Sample collection overlapped with the seasonal migration of anadromous twaite shad into Irish rivers and coincided with the known peak spawning period of the species (King & Linnane, 2004; Doherty et al., 2004). Analysis sought to elucidate the longitudinal distribution of shad species (*Alosa* spp.) within the River Blackwater, clarifying whether or not shad species could access and utilise the Fermoy Weir area. As twaite and the closely-related allis shad (*Alosa alosa*) readily hybridise, it is not feasible to use eDNA assays (which are based on mitochondrial DNA) to speciate shad. Thus, analysis could only determine the presence or absence of *Alosa* species (i.e. twaite shad and allis shad). The presence of shad species DNA in a given sample specified their presence at that location during the sampling period. A negative result indicated the species was present at undetectable densities or not present at the time of sampling.

Water samples were collected by Triturus Environmental Ltd. staff on 21st May 2020 from four areas on the River Blackwater, namely 1) upstream Fermoy Weir, 2) downstream Fermoy Weir, 3) downstream Clondulane Weir and 4) Kitchen Hole, Cappoquin (a known shad spawning site on the River Blackwater) (**Figure 2.2**). Furthermore, to act as a control, a fifth sampling site was added from the River Barrow at St. Mullin's, Co. Carlow. This site is accepted to be the most important *Alosa* spp. spawning site in Irish waters (King & Linnane, 2004; Rooney et al., 2013).

Each sample (2L sterile bottle) consisted of three biological replicates. The replicates were sampled from a cross-sectional transect at each location to account for possible intra-site fidelity demonstrated by shad species (e.g. holding in deeper areas or aggregations near spawning sites). In addition to analysis for the presence of *Alosa* spp. eDNA, samples were also analysed for the presence of brown trout (*Salmo trutta*) eDNA to ensure the genetic material in the collected water samples could be amplified successfully (i.e. positive control for all samples). Samples were kept on ice until delivery to the lab and then frozen for later analysis. All eDNA samples were analysed by BIO ID Ltd. (Dublin).

Table 2.2 Shad species (*Alosa* spp.) eDNA sampling locations on the River Blackwater and control site at St. Mullin's, River Barrow, May 2020

Replicate	Watercourse	Location	ITM (x)	ITM (y)
1A	River Blackwater	Upstream of Fermoy Weir	580934	598578
1B	River Blackwater	Upstream of Fermoy Weir	581103	598582
1C	River Blackwater	Upstream of Fermoy Weir	581139	598568
2A	River Blackwater	Downstream of Fermoy Weir	581157	598599
2B	River Blackwater	Downstream of Fermoy Weir	581232	598610
2C	River Blackwater	Downstream of Fermoy Weir	581345	598700

Replicate	Watercourse	Location	ITM (x)	ITM (y)
3A	River Blackwater	Downstream of Clondulane Weir	584983	599845
3B	River Blackwater	Downstream of Clondulane Weir	585026	599816
3C	River Blackwater	Downstream of Clondulane Weir	585079	599749
4A	River Blackwater	Kitchen Hole, Cappoquin	608567	599717
4B	River Blackwater	Kitchen Hole, Cappoquin	608799	599825
4C	River Blackwater	Kitchen Hole, Cappoquin	609818	599393
5A	River Barrow	St. Mullin's, Co. Carlow	580934	598578
5B	River Barrow	St. Mullin's	581103	598582
5C	River Barrow	St. Mullin's	581139	598568

2.7 White-clawed crayfish survey

White-clawed crayfish (*Austropotamobius pallipes*) surveys were undertaken at the aquatic survey sites in May 2020 under a National Parks and Wildlife (NPWS) open licence (no. C79/2020), as prescribed by Sections 9, 23 and 34 of the Wildlife Act (1976-2012), to capture and release crayfish to their site of capture, under condition no. 5 of the licence. As per Inland Fisheries Ireland recommendations, the crayfish licence sampling moved in a downstream direction to minimise the risk of transfer invasive propagules (including crayfish plague, *Aphanomyces astaci*) upstream.

Hand-searching of instream refugia and sweep netting was undertaken according to Reynolds et al. (2010). A broad appraisal of white-clawed crayfish habitat in each survey section (A-E) was also carried out. Furthermore, a desktop review of the known distribution of crayfish within the wider River Blackwater catchment was also completed.

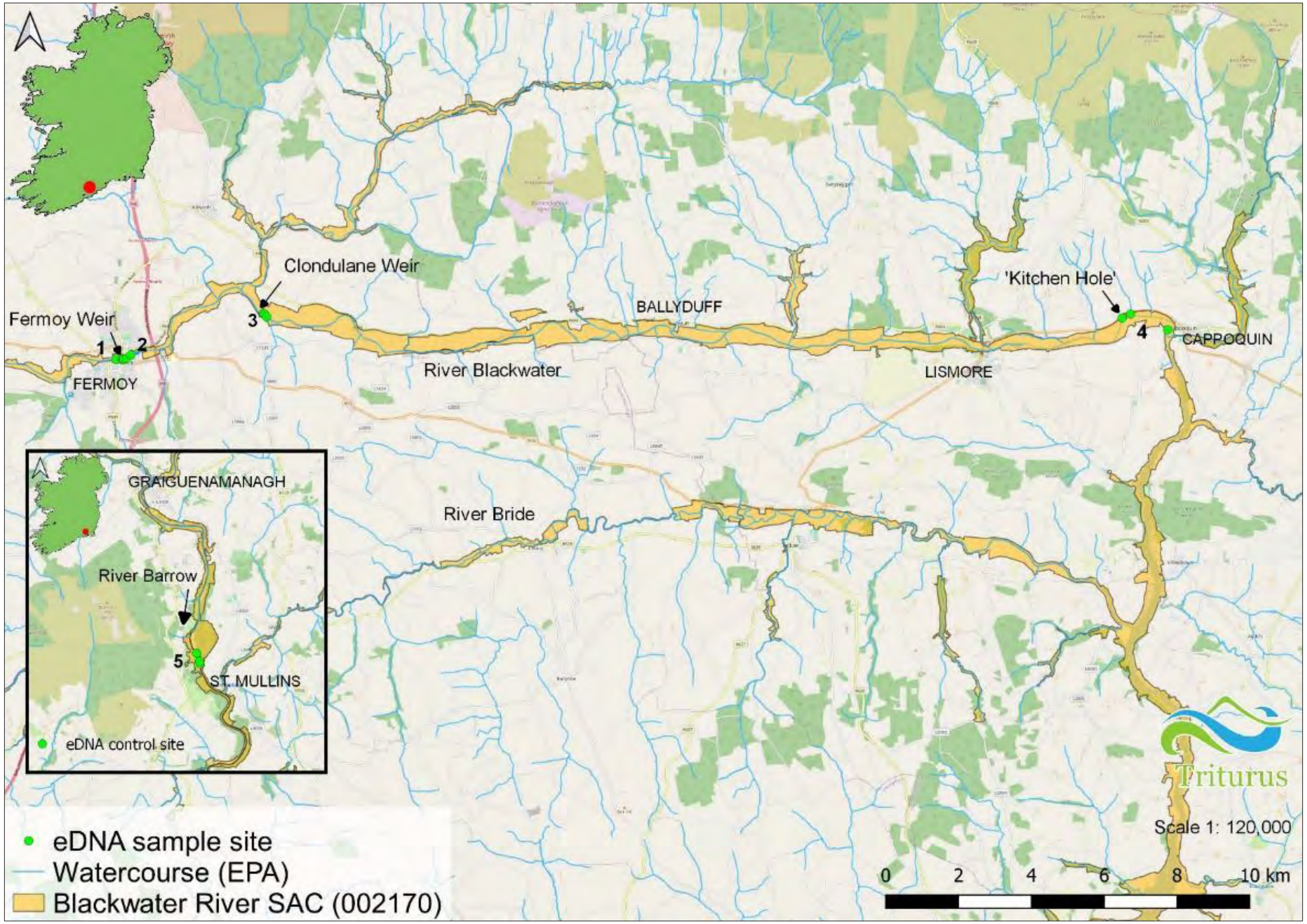

Figure 2.2 Shad species (*Alosa* spp.) eDNA sampling sites on the River Blackwater (1-4) and control site on the River Barrow (5), July 2020

2.8 Freshwater pearl mussel survey

A freshwater pearl mussel (*Margaritifera margaritifera*) survey of the River Blackwater in the vicinity of Fermoy Weir (100m upstream and 100m downstream of Kent Bridge) was completed by Pascal Sweeny of Sweeny Consultancy on Friday May 29th 2020 (**Appendix A**). Conditions were suitable, with bright, sunny weather and good water visibility under base flow conditions. This helped to maximise visibility of pearl mussel against dark substrata and also improved chances of detection when mussels were filter feeding in brighter conditions. Pearl mussel surveys were carried out under a national open licence (licence no. C15/2020), issued by the National Parks and Wildlife Service (NPWS). The survey methodology used was in accordance with the Stage 1 & 2 guidelines given in Irish Wildlife Manual No. 12, NPWS (Anon., 2004).

For a more detailed methodology please refer to **Appendix A** (freshwater pearl mussel survey).

2.9 Otter survey

An otter (*Lutra lutra*) survey was undertaken for the River Blackwater in the vicinity of the proposed works area (i.e. 250m upstream and 250m downstream of Fermoy Weir). Survey methodology followed the novel total channel otter survey (TCOS) methodology as developed by Macklin et al. (2019). Otter signs (including spraints, prints, slides and latrines) in addition to the breeding and resting places of otters (i.e. holts and couches) were searched for. This was undertaken along all bankside areas on foot and by boat, in addition to mid-channel gravel shoals and islands located downstream of Kent Bridge. Notes on the age and location (ITM coordinates) were made for each otter sign recorded, in addition to the quantity and visible constituents of spraint (i.e. remains of fish, crayfish, molluscs etc.).

2.10 Biological water quality (macro-invertebrates)

To evaluate biological water quality within the survey area, Q-sampling was carried out at n=4 sites in the vicinity of Fermoy Weir (S1-S4; **Figure 2.1**). Macro-invertebrate samples were converted to Q-ratings as per Toner et al. (2005). All samples were taken with a standard kick sampling hand net (250mm width, 500µm mesh size) from areas of riffle/glide utilising a two-minute sample, as per ISO standards for water quality sampling (ISO 10870:2012). Large cobble was also washed at each site, where present, and samples were elutriated and fixed in 70% ethanol for subsequent laboratory identification. Any rare invertebrate species were identified from the NPWS Red List publications for beetles (Foster et al., 2009), stoneflies (Feeley et al., 2020), mayflies (Kelly-Quinn & Regan, 2012) and other relevant taxa (i.e. Byrne et al., 2009; Nelson et al., 2011).

Table 2.3 Reference Categories for EPA Q-Ratings (Q1 to Q5)

Q Value	WFD Status	Pollution Status	Condition
Q5 or Q4-5	High Status	Unpolluted	Satisfactory
Q4	Good Status	Unpolluted	Satisfactory
Q3-4	Moderate Status	Slightly polluted	Unsatisfactory
Q3 or Q2-3	Poor	Moderately polluted	Unsatisfactory
Q2, Q1-2 or Q1	Bad	Seriously polluted	Unsatisfactory

2.11 Aquatic ecological evaluation

The evaluation of ecological receptors contained within this report uses the geographic scale and criteria defined in the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009).

2.12 Biosecurity

A strict biosecurity protocol following the Check-Clean-Dry approach was employed during the survey. Equipment and PPE used was disinfected with Virkon® between survey sites to prevent the transfer of pathogens and/or invasive species between survey areas. Particular cognisance was given to the risk of spreading or introducing crayfish plague (*Aphanomyces astaci*), given the presence of white-clawed crayfish within the River Blackwater (including within the survey area). Equipment was disinfected and thoroughly dried (through UV exposure) prior to survey commencement. As per best practice, surveys were undertaken at sites in a downstream order (i.e. uppermost site surveyed first etc.) to prevent the upstream mobilisation of invasive propagules and pathogens. Any invasive species recorded within or adjoining the survey area were geo-referenced.

3. Results

The following section summarises each aquatic survey site in terms of aquatic habitats, physical characteristics and overall value for fish, macrophyte communities and macro-invertebrates. Biological water quality results are also summarised. Habitat codes are according to Fossitt (2000). Scientific names are provided at first mention only. An evaluation of the aquatic ecological importance of the survey areas based on the aquatic surveys is provided in **section 3.10**

3.1 Desktop review

A sensitive species data request for terrestrial and aquatic flora and fauna covering the 10km grid squares adjoining the proposed works area (i.e. W79 & W89) revealed records for a number of protected (freshwater) aquatic species in the vicinity of the proposed works area, as did data from the National Biodiversity Data Centre (NBDC).

Otter (*Lutra lutra*) records were widespread throughout the respective grid squares, on the River Blackwater and several tributaries (NBCD & NPWS data). Although no records overlapped the survey area, otter were known locally in the vicinity of Fermoy Weir (pers. obs.) see **section 3.8** below for otter survey results.

Numerous records for freshwater pearl mussel (*Margaritifera margaritifera*) were available for the respective grid squares, confined to the River Blackwater main channel. Whilst most records were for the river in the vicinity of Ballyhooly (upstream of Fermoy), two historical records were available for the Blackwater upstream (1917) and downstream (1987) of Fermoy town, respectively (NPWS data). Four live mussels were recorded at Fermoy Weir in 2011 but these are no longer present (see **Appendix A**).

A low number of records for white-clawed crayfish (*Austropotamobius pallipes*) were available for the River Blackwater near Ballyhooly (W79) but none overlapped with the survey area (NBDC & NPWS data). However, records compiled during the current study are presented in **section 3.6** below.

Numerous sea lamprey (*Petromyzon marinus*) records were available for the River Blackwater in the downstream vicinity of Fermoy Weir (c.50-400m downstream of weir during 2003; NPWS data). Numerous records were also available for the area downstream of Clondulane Weir (Careysville) also from 2003. Upstream of Fermoy, a known sea lamprey spawning site was present at Ballyhooly Bridge, with an additional record available for Castlehyde area in the vicinity of Fermoy town (2003 records; NBDC data). Whilst river lamprey (*Lampetra fluviatilis*) were known from the River Blackwater, only a single historical record which overlapped the survey area was available (approx. 50m downstream Fermoy Weir, no date provided; NPWS data).

Although no shad species records were available for the Fermoy area, two allis shad (*Alosa alosa*) records were available for the area c.1km downstream of Clondulane Weir (from 2003 & 2005; NPWS data; King & Linnane, 2004). Both twaite and allis shad are known from the lower reaches of the River Blackwater.

3.2 Summary of results by survey section

3.2.1 Section A – >100-200m upstream Fermoy Weir

Section A was located >100-200m upstream of the existing Fermoy Weir structure (**Figure 2.1; Plate 3.1**). This section was dominated by homogenous deep glide habitat, with the River Blackwater (lowland depositing watercourse, FW2)) averaging 40-50m wide and 2-3m in depth. The river flowed through a deep U-shaped channel, with steep marginal sloping areas. The river channel was highly modified along the south bank, being bound by built land (BL3) and retaining walls approx. 2m above the surface of the river at the time of survey (note: extremely low water levels at the time of survey, May-June 2020). The substrata were dominated by boulder and cobble (60% overall), with patches of coarse gravels. Some sand and silt accumulations were present along the littoral zone of steep river margins. Generally, the substrata were relatively highly bedded with moderate siltation. Instream macrophytes were limited given the mean depth, with sparse marginal growth of spiked water milfoil (*Myriophyllum spicatum*) and hemlock water dropwort (*Oenanthe aquatica*). Instream bryophytes were limited to occasional *Fontinalis antipyretica* on larger boulders. Filamentous algal cover was particularly high at the time of survey, especially in marginal slope areas. Given the paucity of macrophytes upstream of the weir, no good examples of the Annex I habitat 'Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and *Callitricho-Batrachion* or aquatic mosses [3260]' was recorded. No vegetation representative of 'Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]' was recorded.

The north bank featured a scattered mature riparian treeline comprised of sycamore (*Acer psuedoplatanus),* elder (*Sambucus nigra*), ash (*Fraxinus excelsior*), aspen (*Populus tremula*), hawthorn (*Crataegus monogyna*), hazel (*Corylus avellana*) and occasional alder (*Alnus glutinosa*) and wych elm (*Ulmus glabra*). The scrubby understorey was dominated by bramble (*Rubus fruticosus* agg.) and nettle (*Urtica dioica*). Reed canary grass (*Phalaris arundinacea*) was common along channel margins, more so on the north bank. The river was bordered by improved agricultural grassland (GA1) to the north.

Section A was too deep to electro-fishing utilising backpack equipment (mostly >2m) and, therefore, no results were available. However, in terms of fisheries habitat, the deep glide habitat of section A offered good salmonid holding habitat, with nursery and spawning habitat much improved downstream of the weir. The river upstream of the weir offered very good European eel (*Anguilla anguilla*) habitat given the presence of deep water and frequent boulder/cobble refugia. Observably, the section also supported a large population of non-native dace (*Leuciscus leuciscus*), non-native roach (*Rutilus rutilus*) and other species such as minnow (*Phoxinus phoxinus*). Lamprey habitat was poor given the high average depth, slower flow and bedded substrata, resulting in a general lack of suitable sediment accumulations for ammocoetes and poor spawning habitat. White clawed crayfish habitat was of moderate quality with suitability mainly in the channel margins under boulder and large woody debris. However, only very low densities were recorded (see **section 3.5**). Freshwater pearl mussel habitat was poor given bedded substrata, seasonally low flows and evident siltation/enrichment. None were recorded present (**Appendix A**).

A biological water quality rating of **Q3-4**, corresponding to WFD **moderate status,** was assigned for this survey section (i.e. site S1, **section 3.9** & **Table 3.1**). No rare or protected macro-invertebrate species were recorded in the sample.

Plate 3.1 Representative image of section A >100m upstream of Fermoy Weir, July 2020 (facing downstream towards bridge).

3.2.2 Section B – 0-100m upstream of Fermoy Weir

As per section A, Section B (located <100m upstream of the existing weir face) was dominated by homogenous deep glide habitat, with the River Blackwater averaging 40-50m wide and 2-2.5m in depth (**Plate 3.2, Figure 3.3**). The existing Fermoy Weir structure bisected the section immediately upstream of Kent Bridge. The structure was approx. 150m in length and ran from a NW to SE direction. Significant structural damage was evident along the weir face. The river in section B flowed through a deep U-shaped channel, with steep marginal sloping areas. The channel was highly modified along the south bank, being bound by built land (BL3) and retaining walls approx. 2m above the surface of the river at the time of survey (note: very low water levels at the time of survey, May-June 2020). The substrata were dominated by boulder and cobble (70% overall), with frequent patches of coarse gravels. Some sand and silt accumulations were present along the littoral zone of steep river margins. Generally, the substrata were bedded with moderate siltation. Instream macrophytes were limited given the deeper water and predominance of hard substrata, with sparse marginal growth of spiked water milfoil and yellow water lily (*Nuphar lutea*) and occasional small stands of hemlock water dropwort on exposed gravel shoals (often inundated at higher water levels). The weir structure supported sparse growth of hemlock water dropwort in addition to the aquatic mosses *Cinclidotus fontinaloides* and *Fontinalis antipyretica* on the wetted faces. Filamentous algal cover was particularly high at the time of survey, especially in marginal slope areas. Given the paucity of macrophytes upstream of the weir, no good examples of the Annex I habitat 'Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and *Callitricho-Batrachion* or aquatic mosses [3260]' was recorded. No vegetation representative of 'Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]' was recorded.

The north bank featured a scattered mature riparian treeline comprised of sycamore, elder, ash, aspen, hawthorn, hazel and occasional alder and wych elm. The scrubby understorey was dominated by bramble and nettle. The river was bordered by improved agricultural grassland (GA1) to the north.

Electro-fishing was undertaken at one site within (E1) within survey section B (**Figure 2.1**). A total of *n*=4 fish species were recorded (section 3.3). Atlantic salmon (*Salmo salar*) and brown trout (*Salmo trutta*) dominated, with low numbers of European eel and dace captured (see section 3.3).

White clawed crayfish habitat was of moderate quality, particularly in the vicinity of the weir structure where low densities were recorded (section 3.6). Freshwater pearl mussel habitat was poor given bedded substrata, seasonally low flows and evident siltation/enrichment. None were recorded present (see **Appendix A**).

A biological water quality rating of **Q3-4**, corresponding to WFD **moderate status**, was assigned for this survey section (i.e. S2, **section 3.9** & **Table 3.1**). No rare or protected macro-invertebrate species were recorded in the sample.

Plate 3.2 Representative image of section B (0-100m upstream of Fermoy Weir), June 2020 showing old fish pass, facing downstream towards bridge.

3.2.3 Section C – 0-100m downstream Fermoy Weir

Section C, located downstream of the existing weir structure, featured faster and more heterogeneous flows than upstream. Structural damage to the weir in recent years had resulted in accelerated deep (>1.5m) fast glide habitat along the south bank (main flow), feeding a large, deep pool approx. 30m downstream of Kent Bridge, along O'Neill-Crowley Quay (section D, **Plate 3.3).** The river along the south bank was considerably shallower (<1m, often <0.5m) and dominated by riffle and shallow glide habitat, with pool-like/eddy habitat pool located in the vicinity of the bridge (i.e. between weir face and islands). Overall, the substrata were dominated by well-mixed gravels and small cobble in most areas. Fine sediment (silt and clay) accumulations were associated with instream macrophyte beds and had caused some local bedding of substrata. However, overall, the substrata were generally mobile and free from sedimentation. At low water levels, numerous small islands of exposed gravel and cobble were present immediately downstream of the bridge. The lee of these islands supported fine sediment accumulations ranging from 1-10cm in depth and offered good lamprey potential (see **section 3.3**).

The river channel was bordered to the north by a mature treeline comprising alder, ash and sycamore with elder, willow and hawthorn adjoining improved agricultural grassland (pasture). The south (town) bank along O'Neill-Crowley Quay was bound by retaining walls. The north bank of the river immediately downstream of the bridge featured muddy paludal areas supporting localised great yellow-cress (*Rorippa amphibia*), hemlock water dropwort (*Oenanthe crocata*), pink water speedwell (*Veronica catenata*) and water-forget-me-not (*Myosotis scorpioides*). These littoral species graded into more extensive swards of reed canary grass on drier ground (including islands). Muddy areas below the water line supported occasional stands of flowering rush (*Butomus umbellatus*) (one large 10m^2 stand) and infrequent branched bur-reed (*Sparganium erectum*). The upper drier gravel areas of instream islands supported great willowherb (*Epilobium hirsutum*), marsh willowherb (*Epilobium palustre*), ribwort plantain (*Plantago lanceolata*), common figwort (*Scrophularia nodosa*), charlock (*Sinapis arvensis*), vetch (*Vicia* sp.), creeping yellowcress (*Rorippa sylvestris*), bittercress (*Cardamine* sp.) and marsh woundwort (*Stachys palustris*). Exposed gravel and cobble littorals of such instream islands also supported frequent redshank (*Persicaria maculosa*), water pepper (*Persicaria hydropiper*) and fat hen (*Chenopodium album*) with less frequent patches of hemlock water dropwort. Curled dock (*Rumex crispus*) and creeping yellowcress were more localised. The muddy margins of these islands supported water plantain (*Alisma plantago-aquatica*) and water mint (*Mentha aquatica*). Himalayan balsam (*Impatiens glandulifera*) was occasional. Given the presence of ≥3 indicator species (see Devaney et al., 2013), the Annex I habitat 'Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]' was also recorded in association with mid-channel islands and along the north bank of the river (downstream of Kent Bridge).

In contrast to upstream, macrophyte cover was high with growth dominated by water crowfoot (*Ranunculus* subspecies *Batrachion* agg.) vegetation, which formed large stands along the shallow fast glide of the north bank, downstream of the bridge (30% cover overall). Spiked water milfoil was also locally frequent with occasional *Callitriche* sp. between islands/gravel shoals and along muddy river margins. Small, localised stands of unbranched bur-reed (*Sparganium emersum*) were also present. *Fontinalis antipyretica* was recorded very locally on large cobble. The moss species *Cinclidotus fontinaloides* was very abundant along the dry weir faces. Given the presence of ≥3 indicator species (see EC, 2013), the macrophyte community recorded was considered representative of the Annex I habitat 'Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and *Callitricho-Batrachion* or aquatic mosses [3260]'.

Electro-fishing was undertaken at three sites (E2, E3 and E4) within survey section C (**Figure 2.1**). A total of *n*=10 fish species were recorded across the three sites (i.e. Atlantic salmon, brown trout, minnow, roach, dace, European eel, three-spined stickleback (*Gasterosteus aculeatus*), gudgeon (*Gobio gobio*), stone loach (*Barbatula barbatula*) and *Lampetra* sp. (see section 3.3). Three discrete 2m^2 areas (i.e. A, B & C) in the vicinity of mid-channel islands were targeted for lamprey ammocoetes (i.e. site E5, **Figure 2.1**). All of these areas supported *Lampetra* sp. ammocoetes, with equivalent densities of 10.5, 12 and 15 ammocoetes per m^2 recorded, respectively (section 3.3).

Section C offered some excellent salmonid nursery habitat, with some locally excellent spawning substrata and holding habitat present also. European eel habitat was good overall. White-clawed crayfish habitat was good in the vicinity of Kent Bridge (particularly the northern half of the river) with moderate densities of juvenile and adult crayfish were recorded via sweep netting and snorkelling during the site visit (see **section 3.6**). Despite some improved suitability compared to upstream areas, no freshwater pearl mussel were recorded present in section C. Pearl mussel habitat was sub-optimal given seasonally low flows and evident siltation/enrichment (**Appendix A**).

A biological water quality rating of **Q4**, corresponding to WFD **good status**, was assigned for this site (i.e. site S3, **section 3.9** & **Table 3.1**). No rare or protected macro-invertebrate species were recorded in the sample.

Plate 3.3 Representative image of the downstream extent of section C (0-100m downstream of Fermoy Weir), June 2020.

Plate 3.4 Representative image of section C (0-100m downstream of Fermoy Weir), July 2020 showing existing wall (right) and mid-channel islands (left).

Plate 3.5 Representative image of section C (0-100m downstream of Fermoy Weir), July 2020 facing upstream towards Kent Bridge from the O'Neill Crowley Quay retaining wall (large weir pool located in the right foreground was located within section D).

3.2.4 Section D - >100-200m downstream Fermoy Weir

Section D, located ≥100m downstream of the existing weir structure, was dominated by very fast glide and pool habitat, invariably <1m in depth. Deeper glide and pool was present >200m downstream (i.e. towards the downstream extent of Mill Island). The large pool associated with the existing weir, along O'Neill-Crowley Quay (**Plate 3.3**), ranged from 2-2.5m in depth at the time of survey (i.e. low water levels). Standing water/ponding (<0.3m max. depth) was present on and to the south of the large exposed gravel island (usually mostly inundated at normal water levels). In the river channel the substrata were dominated by cobble and coarse gravel. Large cobble and limited large boulders were present in the weir pool. Given high flow rates, the substrata were generally mobile and free from sedimentation although some shallow silt/sand accumulations were present in marginal slacks and in association with macrophyte beds.

The river channel was bordered to the north and south by a mature treeline comprising alder, ash and sycamore with elder, willow and hawthorn. Reed canary grass formed large stands on island centers with inundation zones colonised by annuals of exposed gravel. The upper drier gravel areas of instream islands supported great willowherb, marsh willowherb, ribwort plantain, common figwort, charlock, vetch (*Vicia* sp.), creeping yellowcress, bittercress (*Cardamine* sp.) and marsh woundwort. Exposed gravel and cobble littorals of such instream islands also supported frequent redshank, water pepper and fat hen with less frequent patches of hemlock water dropwort. Curled dock and creeping yellowcress were more localised. The muddy margins of these islands supported water plantain and water mint. Himalayan balsam was occasional. Given the presence of ≥3 indicator species (see Devaney et al., 2013), the river islands supported good examples of the Annex I habitat 'Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]'.

In terms of macrophytes, *Ranunculus* subspecies *Batrachion* agg. vegetation was present but was localised in the main channel downstream of the pool and island (10% cover). Some limited spiked water milfoil and *Callitriche* sp. was present at the section C-D interface. *Fontinalis antipyretica* was recorded very locally on larger cobble and boulder. Given the presence of ≥3 indicator species (EC, 2013), the macrophyte community recorded was considered representative of the Annex I habitat 'Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and *Callitricho-Batrachion* or aquatic mosses [3260]'.

Electro-fishing was undertaken at one (E5) within survey section D (**Figure 2.1**). A total of *n*=3 fish species were recorded, with low numbers of dace, stone loach and three-spined stickleback present (see **section 3.3**). Section D offered excellent salmonid habitat overall, with high-quality spawning, nursery and holding habitat present. Lamprey spawning habitat was also present (including for sea lamprey) with some good European eel habitat associated with deeper pool areas. Good-quality white-clawed crayfish habitat was limited to the vicinity of the weir face and associated deep pool. Low numbers were recorded via sweep netting along the weir face adjoining this pool (see **section 3.6**). Despite some improved suitability compared to upstream areas, no freshwater pearl mussel were recorded present in section D. Pearl mussel habitat was sub-optimal given seasonally low flows and evident siltation/enrichment (**Appendix A**).

A biological water quality rating of **Q3-4**, corresponding to WFD **moderate status**, was assigned for this survey section (i.e. S4, **section 3.9** & **Table 3.1**). No rare or protected macro-invertebrate species were recorded in the sample.

Plate 3.6 Representative image of section D (>100-200m downstream of Fermoy Weir), June 2020, facing downstream from the largest mid-channel island near Kent Bridge.

Plate 3.7 Representative image of section D, July 2020, facing upstream towards Kent Bridge.

3.2.5 Section E – Mill-race channel

Site E represented the uppermost 100m of a disused mill race channel, that averaged 7-8m and 0.3-0.5m in depth at the time of survey. The channel was not located within the Blackwater River SAC site (**Figure 2.1**). Held between 2-3m-high retaining walls, the channel diverged from the River Blackwater through a flood wall (formerly sluice gates) near the weir pool along O'Neill-Crowley Quay/Mill Road. The channel rejoined the main river approx. 400m downstream. The channel supported standing water only at the time of survey (100% pool habitat), although it was known to convey significantly higher water volumes, seasonally. The channel substrata were dominated by deep silt, often >0.5m in depth. Otter prints (recently made) were recorded in the muddy paludal under the road bridge to the Mill Island car park (ITM 581346,598612).

The site was heavily-vegetated and supported a diverse macrophyte and riparian plant community. Instream, unbranched bur-reed was abundant, with frequent Canadian pondweed (*Elodea canadensis*), broad-leaved pondweed (*Potamogeton natans*) and common duckweed (*Lemna minor*). *Callitriche* sp. and water plantain were occasional. Given the presence of only two indicator species (*Potamogeton* sp. and *Callitriche* sp.; EC, 2013), the macrophyte community did not correspond to the Annex I habitat 'Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and *Callitricho-Batrachion* or aquatic mosses [3260]'.

The margins of the channel, exposed to occasional inundation, supported abundant reed canary grass with flowering rush, fool's watercress (*Apium nodiflorum*), water mint, blue water speedwell (*Veronica anagallis-aquatica*), bittersweet (*Solanum dulcamara*) and redshank. Given the good species diversity, the plant community of the upper reaches of the mill-race channel was considered representative of the Annex I habitat 'Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]'.

Electro-fishing was not undertaken in section E. Due to poor connectivity with the main river, the survey reaches of the channel were of little fisheries value apart from for European eel. However, fisheries value improved considerably in the downstream reaches, where some good value as a coarse fish nursery was present.

Biological water quality was not assessed in survey section E due to Q-sampling unsuitability (i.e. non-flowing canal habitat) and no macro-invertebrate sweep sample was taken.

Plate 3.8 Representative image of site E, the heavily vegetated mill-race channel downstream of the proposed works area, July 2020.

Plate 3.9 Representative image of marginal vegetation including flowering rush representative of the Annex I habitat ‘Hydrophilous tall herb [6430]’, July 2020.

Figure 3.1 Drone ortho-mosaic image of the Fermoy Weir survey area, June 2020

3.3 SONAR survey

As anticipated, the boat-based SONAR survey revealed a clear differential in the bathymetric profile upstream and downstream of the weir (**Figure 3.2**). Upstream of the existing weir (i.e. survey section A and most of section B) featured deeper glide habitat averaging 1.5-2.5m, while downstream the average depth of the areas dominated by faster-flowing glide habitat averaged 0.5-<1.5m. Although some locally deeper pool areas were present, the majority of survey sections C and D (downstream of the weir) were ≤1m in depth.

The plots of river hardness (**Figure 3.3**) and river bed rugosity (**Figure 3.4**) illustrated the dominance of softer substrata in the shallower areas, such as those in the vicinity of mid-channel islands downstream of Kent Bridge. These areas are indicated by higher relative scores in both the river hardness and rugosity maps (**Figures 3.3 & 3.4**). In this respect silt dominated areas are softer and smoother as reflected in the scores and concentrated in the northern half of the River Blackwater channel downstream of the weir. The deeper glide and pool areas (e.g. sections A and D) supported harder substrata with higher rugosities (greater substrata complexity/ roughness) with very localised lamprey ammocoete habitat (as illustrated by the dark red banding on **Figures 3.3 & 3.4**).

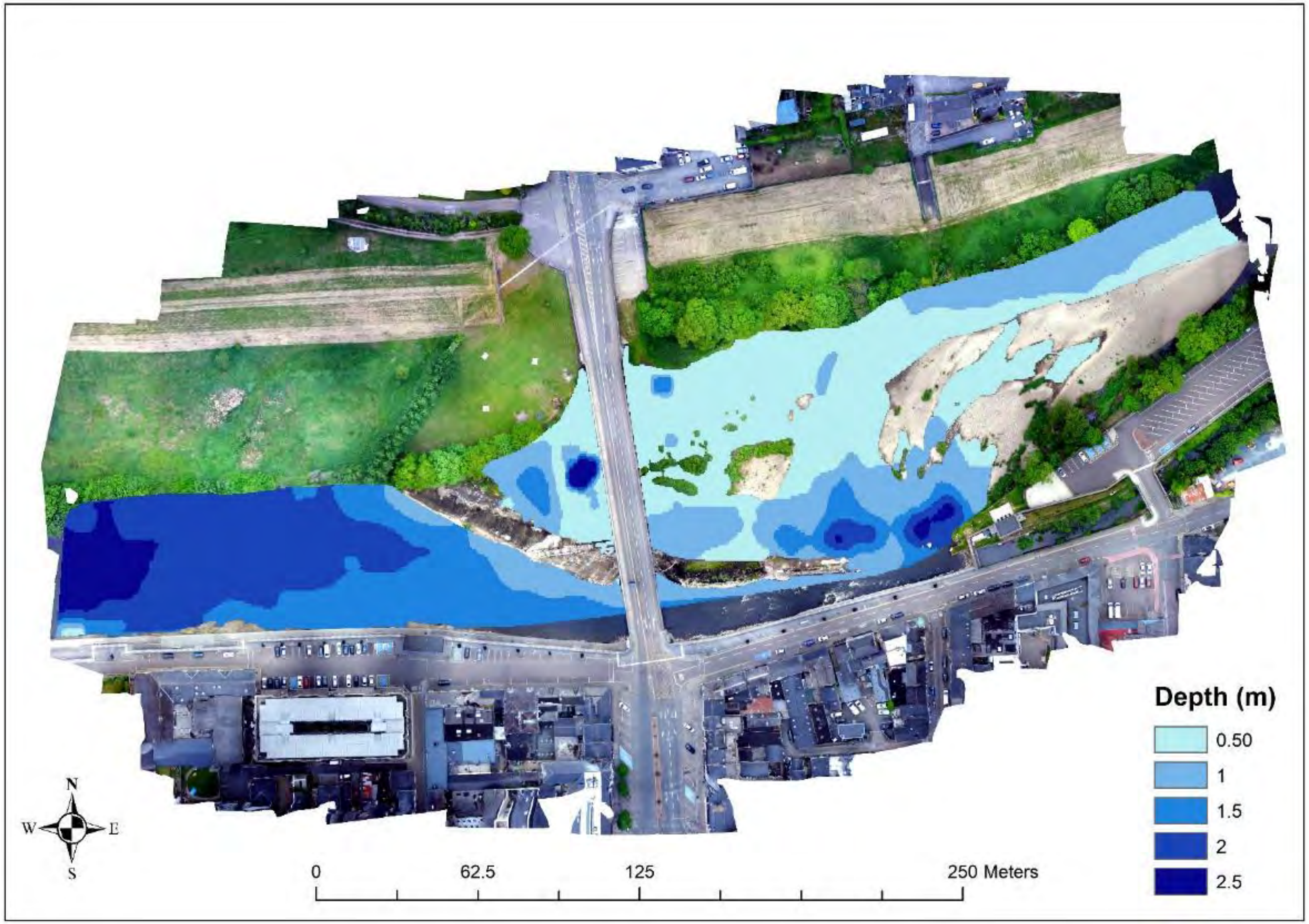

Figure 3.2 Bathymetry map of the survey area, July 2020 (darker shading indicates deeper water)

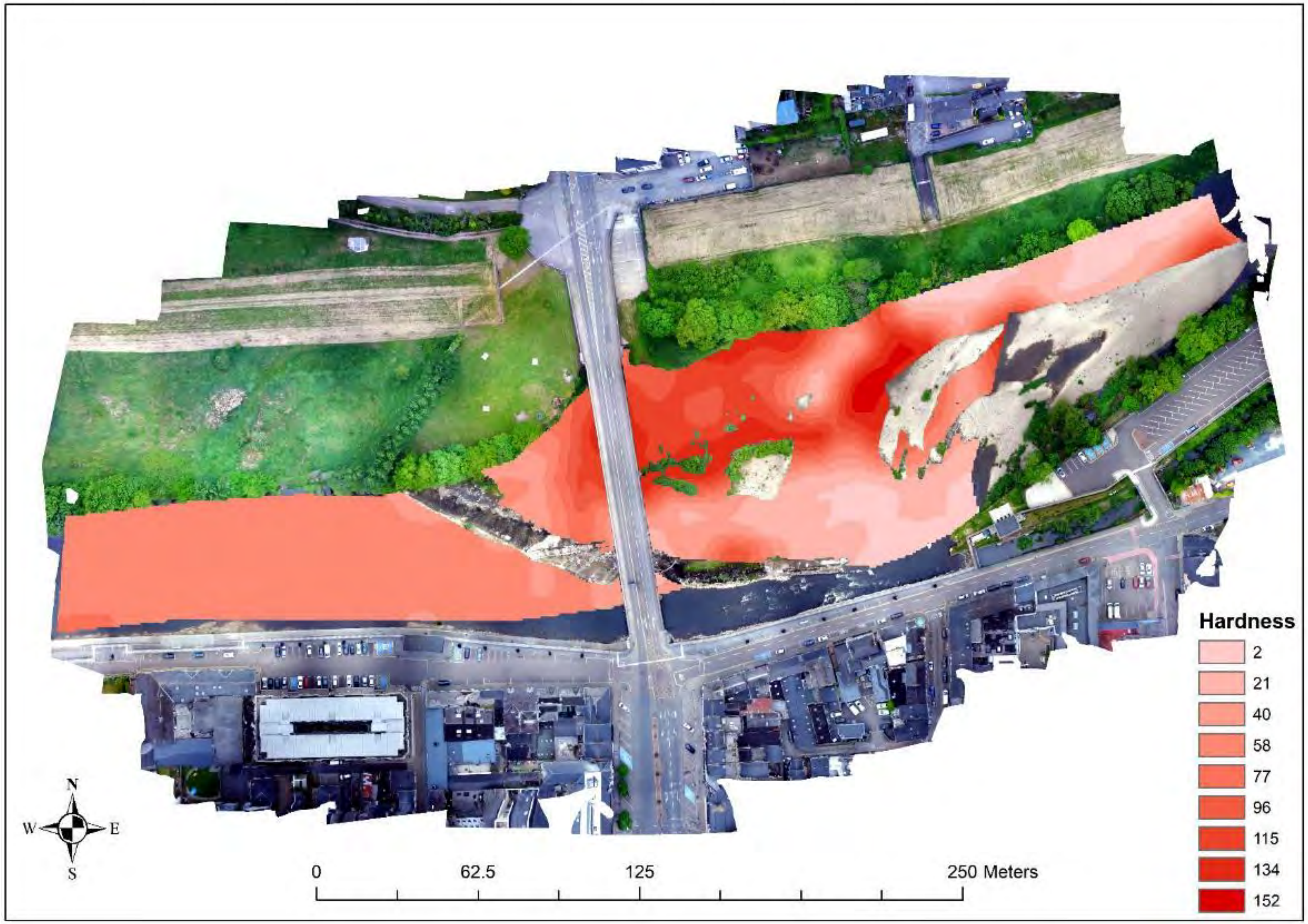

Figure 3.3 Relative river bed hardness map of the survey area, July 2020 (darker shading indicates softer substrata)

Figure 3.4 Relative river bed rugosity (roughness) map of the survey area, July 2020 (darker shading indicates areas of smoother substrate complexity)

3.4 Fisheries assessment (electro-fishing survey)

3.4.1 Site E1

A total of four fish species were recorded from site E1 (**Figure 3.5**), located along the existing weir face upstream of Kent Bridge. Atlantic salmon and brown trout parr dominated, with a low number of European eel also recorded. A single juvenile dace was captured although large shoals of juveniles and adults were observed during electro-fishing in the adjoining deep glide habitat (i.e. survey section B).

The area of river along the existing weir face (upstream of the bridge) was evidently of good value as a salmonid nursery. The abundant large cobble and boulder habitat provided valuable refugia from the main flow of the channel for both Atlantic salmon and brown trout. Similarly, the boulder-dominated areas and scoured weir face also provided some very good European eel refugia. The section along the weir face was not of value as a salmonid spawning habitat but did provide some localised holding habitat for migrating adults. The area was not of value for lamprey (no sediment accumulations or suitable spawning substrata).

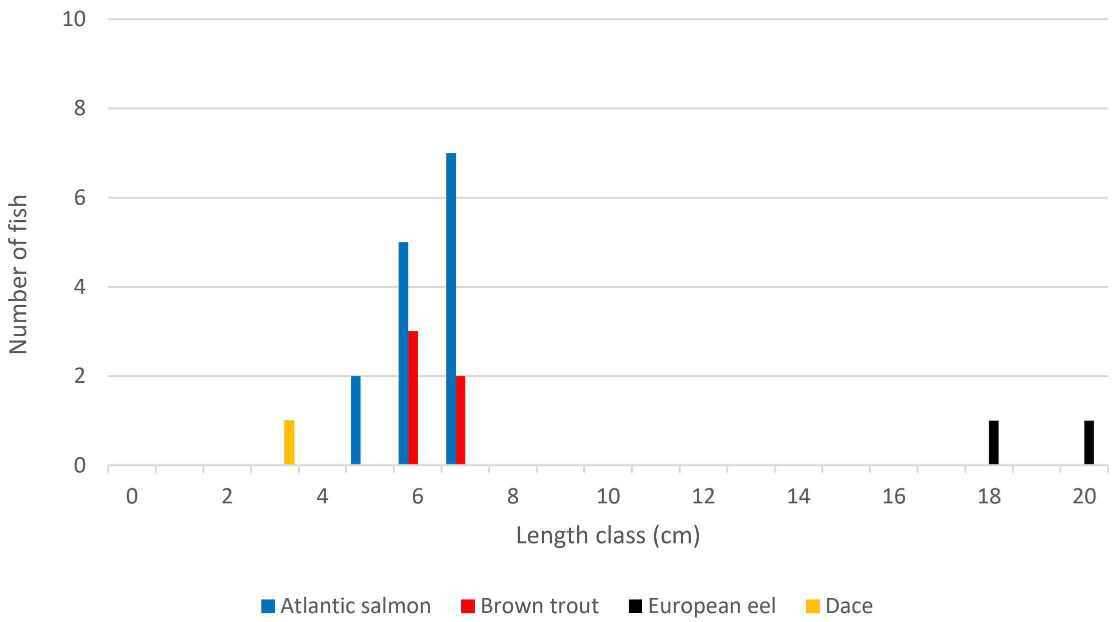

Figure 3.5 Fish length frequency distribution recorded via electro-fishing from site E1 on the River Blackwater, Fermoy Weir, July 2020

3.4.2 Site E2

A total of eight fish species were recorded from site E2 (**Figure 3.6**), located along the north bank of the river downstream of Kent Bridge. Atlantic salmon parr (*n*=10) and minnow (*n*=12) were the most frequently recorded species. A single adult brown trout (FL 24.2cm) and juvenile roach was recorded in addition to low numbers of European eel, gudgeon and stone loach. A single *Lampetra* sp. ammocoete was also captured.

The north channel of the river downstream of Kent Bridge was a very good salmonid nursery habitat, supporting moderate densities of Atlantic salmon parr and low numbers of brown trout. The fast, shallow glide presented good salmonid spawning habitat (mobile, clean gravels/cobbles) whilst instream macrophytes (water crowfoot, spiked water-milfoil etc.) provided valuable refugia for juveniles. Holding habitat was largely absent in this area although was abundant downstream and adjoining the existing weir structure (south bank of river). *Lampetra* sp. spawning habitat was good overall, particularly adjoining mid-channel islands where finer gravel substrata were frequent. Although a single ammocoete was recorded, burial habitat was restricted to very small patches of shallow, soft sediment associated with instream macrophyte beds. However, excellent ammocoete habitat was present adjoining the mid-channel islands adjacent to the site (see section 3.4.3 below). European eel habitat was good in vicinity of the bridge structure, where frequent boulder and large cobble provided suitable diurnal refugia (**Plate 7.2**).

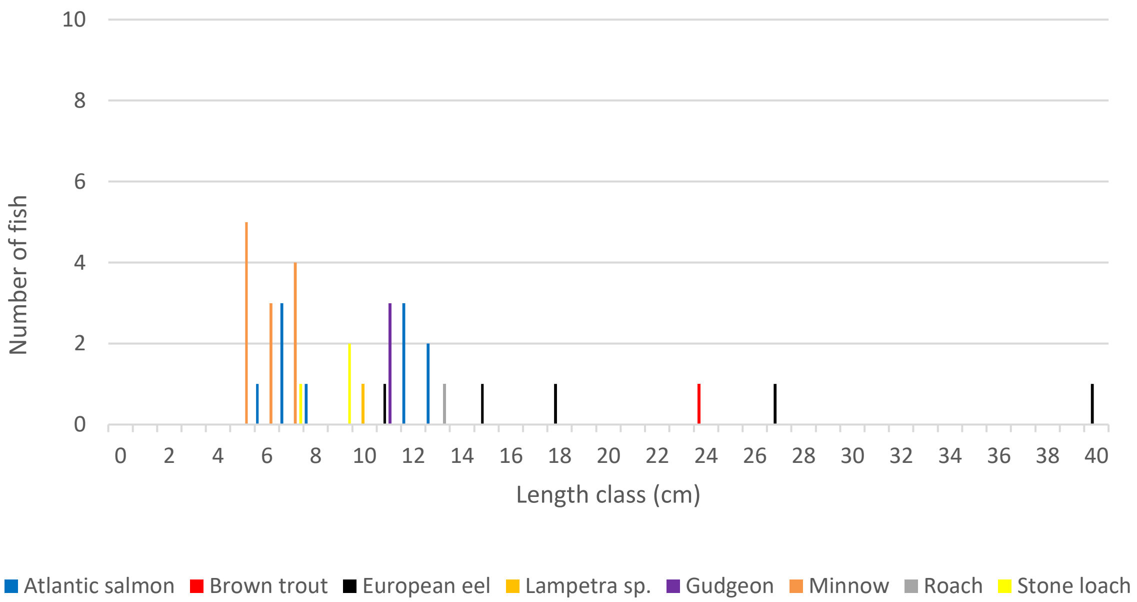

Figure 3.6 Fish length frequency distribution recorded via electro-fishing from site E2 on the River Blackwater, Fermoy Weir, July 2020.

3.4.3 Site E3

Three discrete 2m^2 areas (i.e. A, B & C) in the vicinity of mid-channel islands within survey section C were targeted for lamprey ammocoetes (**Figure 2.1**). All of these areas supported *Lampetra* sp. ammocoetes, with equivalent densities of 10.5, 12 and 15 ammocoetes per m^2 recorded, respectively (**Figure 3.7, 3.8**). A range of size/age classes were present with ammocoetes ranging from 3.3-11.1cm total length (e.g. **Plate 7.4**). A low number of European eel elvers were also recorded from the sediment in area A (data not shown; 8.9-14.3cm TL; **Plate 7.5**).

Evidently, all three targeted areas were of high value to larval lamprey. These were located in areas adjoining shallow glide habitat (0.15-0.4m deep) and featured fine, organic-rich soft sediment accumulations of ≥5cm in depth. All three areas also adjoined fine gravel substrata suitable for *Lampetra* sp. spawning.

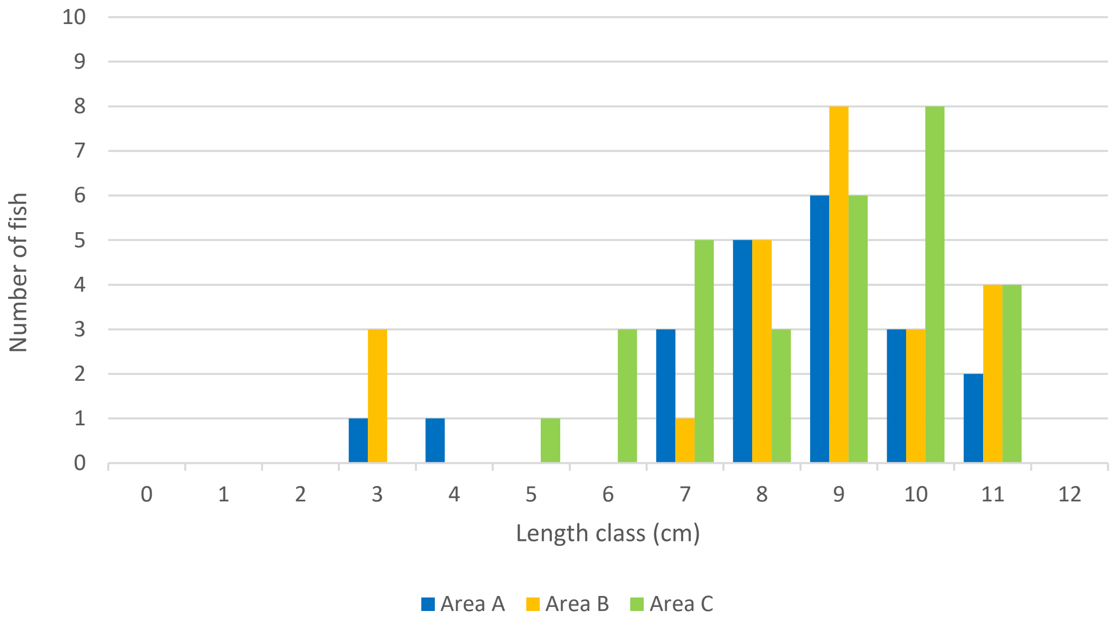

Figure 3.7 *Lampetra* sp. ammocoete length distribution recorded via electro-fishing in areas A, B and C of site E3 on the River Blackwater, July 2020

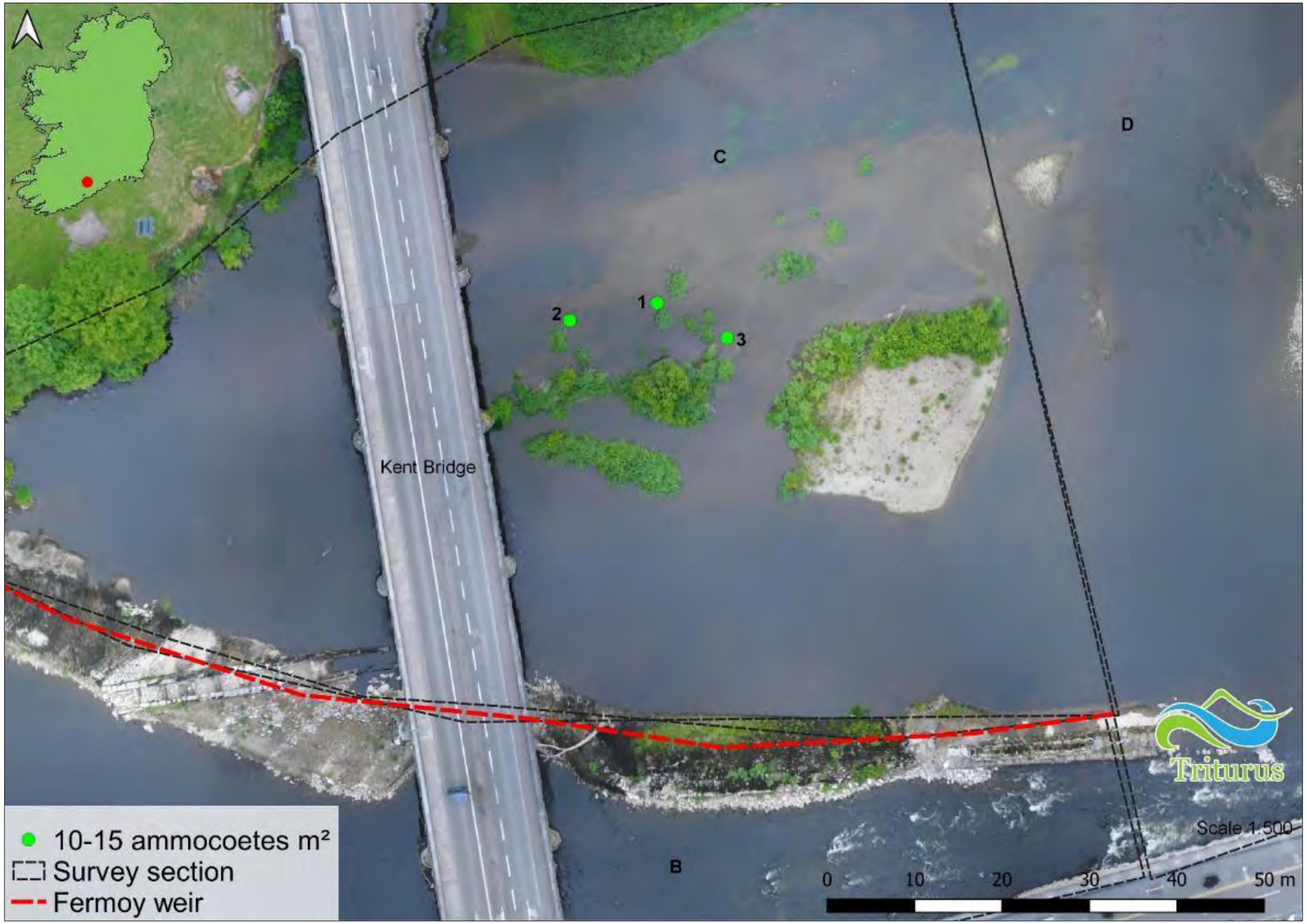

Figure 3.8 Density of *Lampetra* sp. ammocoetes recorded from the three 2m^2 targeted areas within site E3, July 2020

3.4.4 Site E4

A total of five fish species were recorded from site E4 (**Figure 3.9**), located along the existing weir face downstream of Kent Bridge. Low numbers of Atlantic salmon parr, stone loach, juvenile dace and minnow were recorded, in addition to two juvenile European eel.

Site E4 was dominated by slow-flowing glide/pool at the time of survey (basal summer flows). As a result, the area supported only low densities of fish. Salmonid habitat was moderate overall, with the area of most value as a salmonid nursery and (particularly at higher water levels), holding habitat for adults. However, salmonid habitat was significantly improved in adjoining downstream areas (i.e. weir pool and main channel of the river). European eel habitat was good overall given the frequency of boulder refugia as well as scouring of the existing weir face which also offered diurnal refugia. The area was of little value as a lamprey spawning or nursery habitat given the typically low flows (mostly pool habitat). The area was of high value as a coarse fish nursery (e.g. dace, roach etc.).

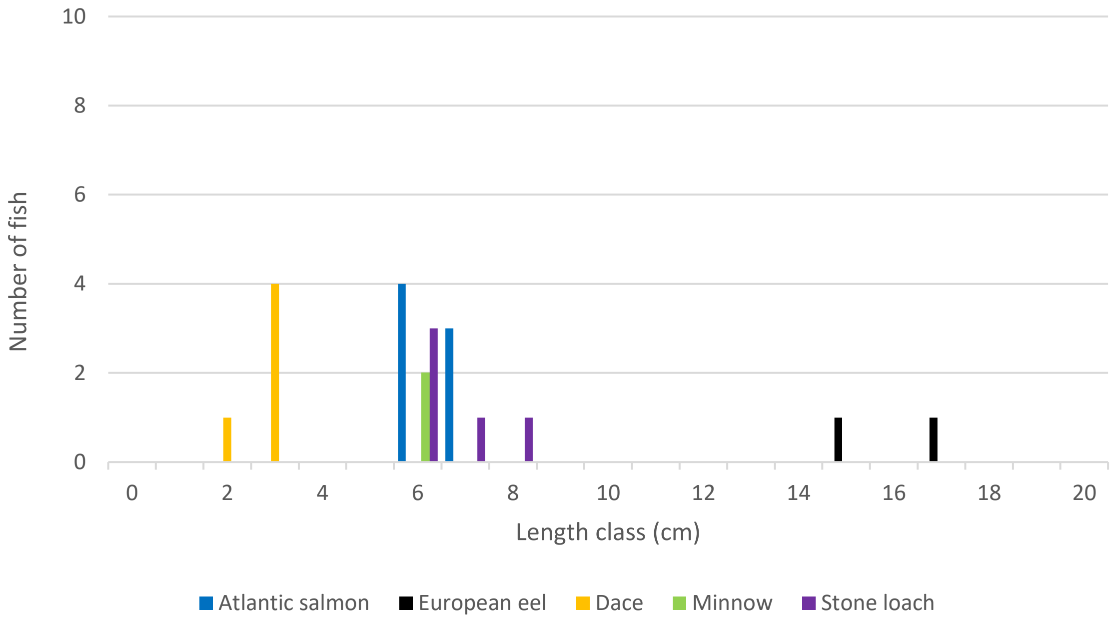

Figure 3.9 Fish length frequency distribution recorded via electro-fishing from site E4 on the River Blackwater, Fermoy Weir, July 2020

3.4.5 Site E5

A total of three fish species were recorded from site E5 (**Figure 3.10**), located downstream of the largest island, downstream of Kent Bridge. Dace were the most frequently recorded species in this area (juveniles and adults), with low numbers of stone loach and three-spined stickleback also recorded.

Site E5 represented fast glide habitat adjoining the main flow of the river (deeper and faster glide/pool where electro-fishing was not possible). Although the area presented some excellent quality salmonid spawning habitat (clean and mobile gravel/cobble), as well as good nursery habitat downstream, no salmonids were recorded (these were likely present in adjoining deeper pool and glide areas). Dace were frequent in the shallower areas of fast glide adjacent to the main flow, with low numbers of stickleback and stone loach present in association with instream macrophytes located at the downstream extent of the section. The site was unsuitable for larval lamprey although some good spawning was present locally (no sediment accumulations present although some downstream near macrophyte beds). However, this area was more suited to larger lamprey species (e.g. sea and river lamprey) and Atlantic salmon. European eel habitat was poor in the shallow, fast glide but was considered very good in adjacent pool/deep glide areas.

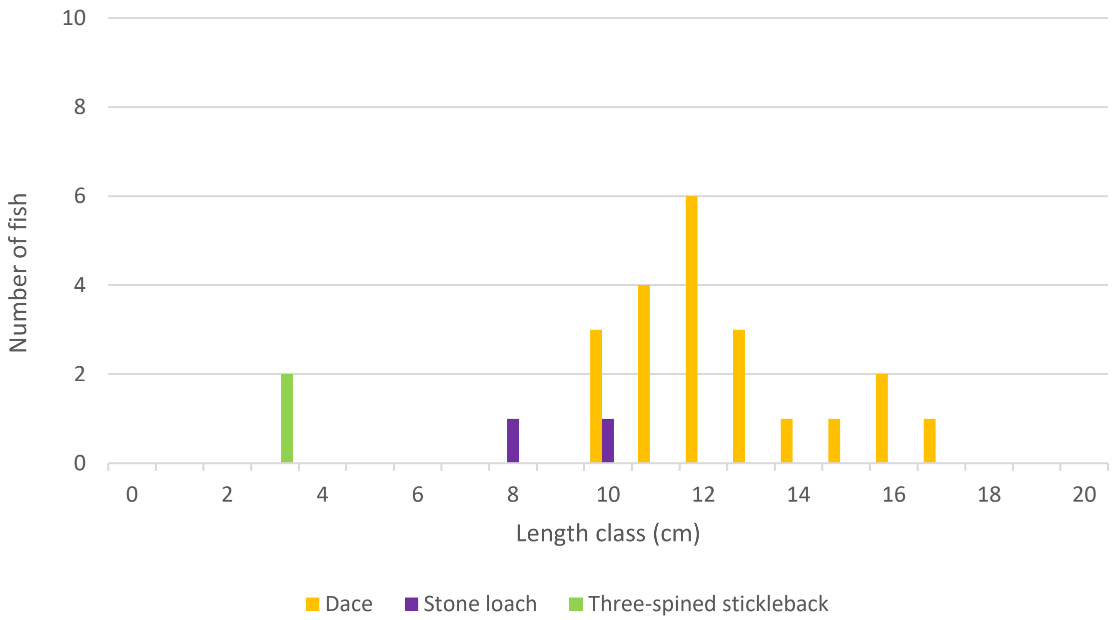

Figure 3.10 Fish length frequency distribution recorded via electro-fishing from site E5 on the River Blackwater, Fermoy Weir, July 2020.

3.5 eDNA analysis for shad species

Shad (*Alosa* spp.) eDNA was detected from water samples collected from the 'Kitchen Hole' site on the River Blackwater at Cappoquin on Thursday 21st May 2020 (all replicates from sites 4A, 4B & 4C; **Figure 3.11**). However, no detectable concentrations of shad eDNA were recorded in water samples taken on the same day upstream of Fermoy Weir (samples 1A, 1B, 1C), downstream of Fermoy Weir (2A, 2B, 2C) or downstream of Clondulane Weir (3A, 3B, 3C) on the River Blackwater. This indicated the absence of *Alosa* spp. from these locations during the peak spawning migration sampling period (**Figure 3.12**). The positive control samples from St. Mullin's on the River Barrow (sites 5A, 5B & 5C) all contained *Alosa* spp. DNA (**Figure 3.11**). All samples from all sampling locations yielded detectable brown trout (*Salmo trutta*) eDNA qPCR reactions (data not shown), demonstrating that all samples contained DNA that could be amplified successfully.

The concentrations of eDNA ranged from the lowest of 0.054ng/L in sample 5A at St. Mullin's to the highest of 1.442ng/L in the 4C sample from Kitchen Hole, Cappoquin. Average eDNA concentrations (across biological replicates) ranged from the lowest at in St. Mullin's (0.233 ng/L ±SD 0.152) to the highest at Kitchen Hole, Cappoquin (1.351, ±SD 0.079) ng/L). There was a significantly higher concentration of *Alosa* spp. eDNA in the Munster Blackwater (Kitchen Hole, Cappoquin) than in the samples from River Barrow (St. Mullin's) (**Figure 3.11**).

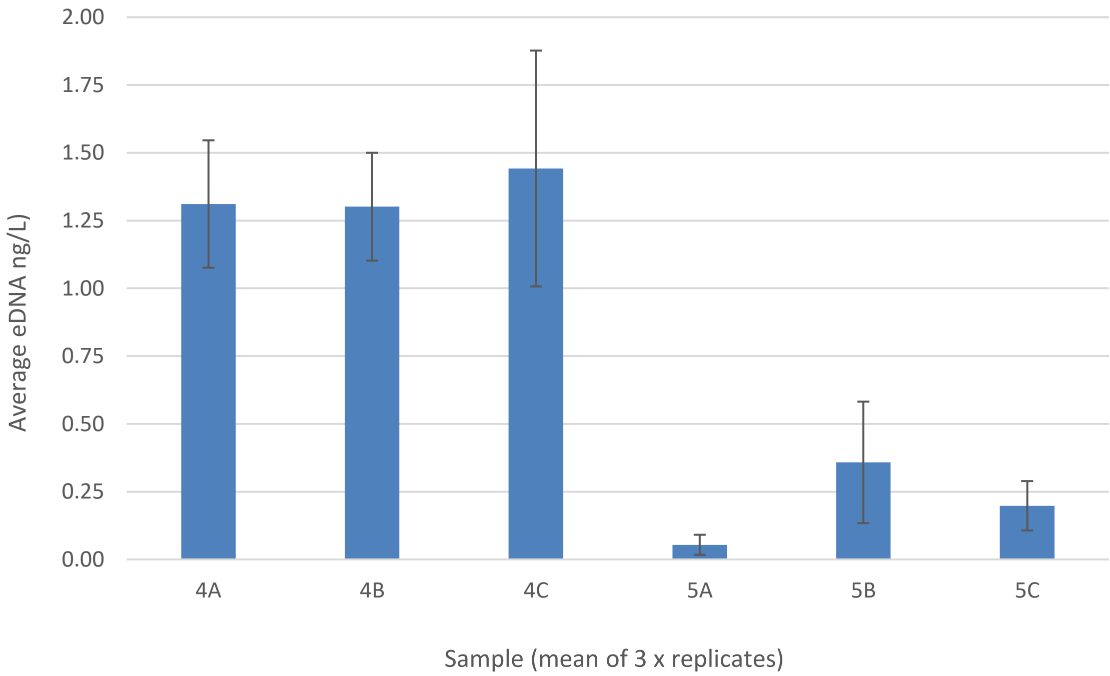

Figure 3.11 Average eDNA concentrations (ng/l) ±SD of *Alosa* spp. eDNA recorded in water samples from 'Kitchen Hole', River Blackwater and control site at St. Mullin's, River Barrow, May 2020

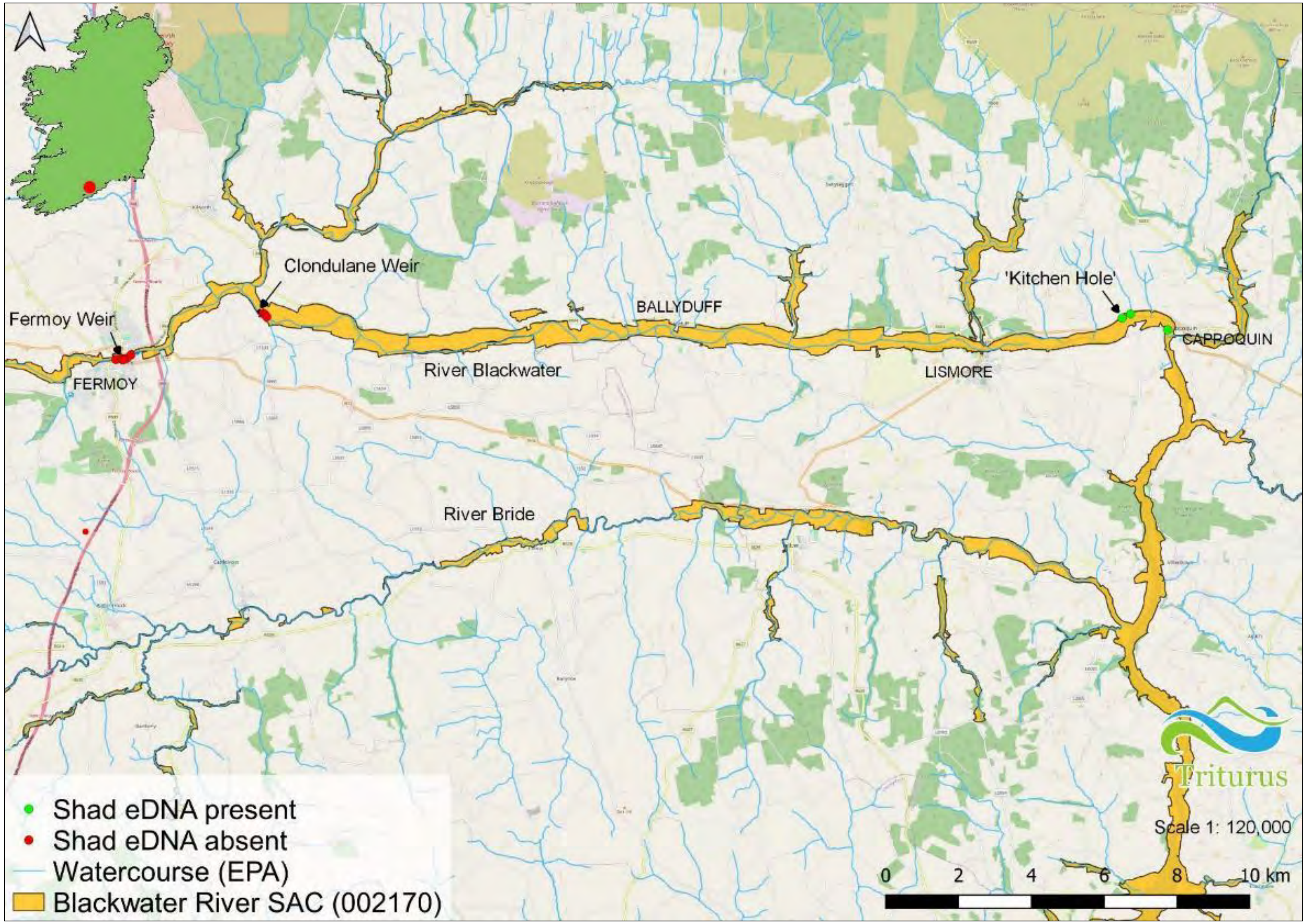

Figure 3.12 Shad species (*Alosa* spp.) eDNA presence/absence in the River Blackwater samples, May 2020 (River Barrow positive control site not shown)

3.6 White-clawed crayfish survey

A total of *n*=32 white-clawed crayfish were recorded from the survey area in May 2020 via sweep netting and hand searching (**Figure 3.13**). Furthermore, abundant crayfish remains were identified in numerous otter spraints in the vicinity of the weir. The majority of captured crayfish were adults although the presence of a low number of juveniles indicated a local breeding population.

The best quality crayfish habitat within the survey area was present in section C in the vicinity of Kent Bridge (particularly in the vicinity of the northernmost arches), where frequent cobble/boulder substrata and crevices offered good quality refugia. The areas downstream of the weir face and underneath Kent Bridge supported the greatest numbers of crayfish, as recorded by sweep netting/hand-searching and snorkelling (*n*=21). Low numbers of crayfish were recorded from survey sections A (*n*=2) and B (*n*=4), respectively, where boulder, large woody debris and the weir face provided suitable refugia (upstream of the weir). Low numbers of crayfish (*n*=5) were also captured from the downstream extent of the weir face in survey section D, with low densities also observed via snorkelling the deep weir pool.

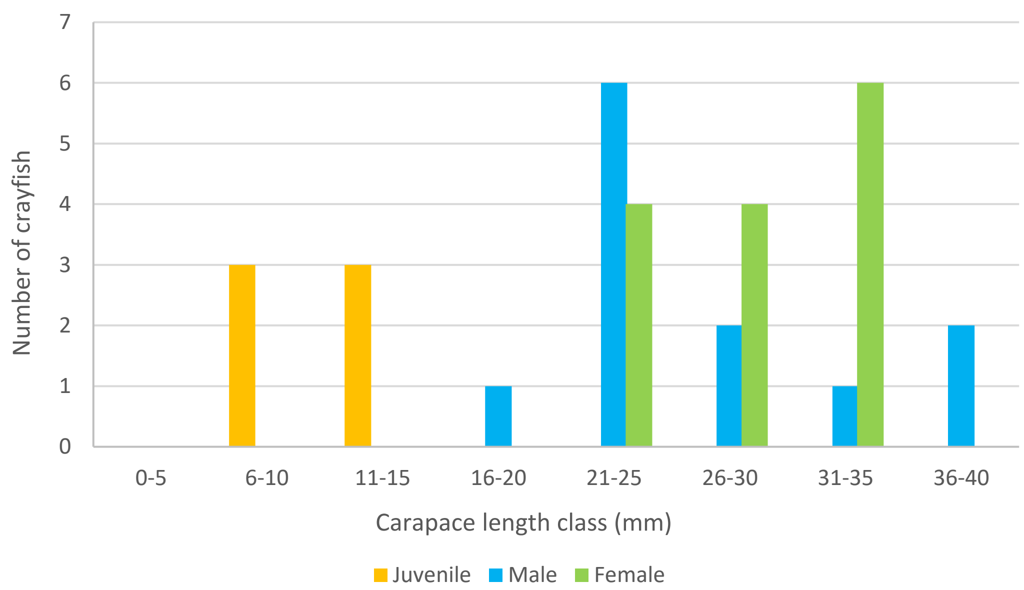

Figure 3.13 Carapace length class and sex distribution of *n*=32 white-clawed crayfish recorded in the vicinity of Fermoy Weir, 2020

Plate 3.10 White-clawed crayfish recorded via hand searching from survey section C, downstream of Fermoy Weir in the vicinity of Kent Bridge, May 2020

Plate 3.11 Dead freshwater pearl mussel (*Margaritifera margaritifera*) shell recorded on mid-channel island, downstream of Kent Bridge in May 2020

3.7 Freshwater pearl mussel survey

No live freshwater pearl mussels were found in the section of the River Blackwater within 100m upstream and downstream of Kent Bridge. Several empty shells, likely washed from upstream areas, were found in gravel/cobble deposits (**Plate 3.11**). Please refer to **Appendix A** for the accompanying freshwater pearl mussel survey report.

3.8 Otter survey

A total of *n*=11 otter signs were recorded from the survey area in the vicinity of Fermoy Weir during June-July 2020 (**Figure 3.14**). The majority of signs were spraints although three couch sites and a holt were also recorded. The existing weir structure was evidently an important resting/feeding area for otter, with very regular spraint sites present in addition to couch areas. The holt was located along the heavily-vegetated south bank of the River Blackwater, approx. 180m downstream of the weir face.

Plate 3.12 Very regular otter sprainting site (showing abundant white-clawed crayfish remains) recorded on the weir face downstream of Kent Bridge, July 2020

Figure 3.14 Otter sign distribution recorded in the vicinity of the proposed works area at Fermoy Weir, July 2020.

3.9 Biological water quality

A total of *n*=31 species across *n*=28 families were recorded in the *n*=4 Q-samples collected in July 2020. The samples S1 and S2 were collected upstream of the weir and S3 and S4 downstream of the weir. A summary of results is presented in **Table 3.1** and **Figure 3.15** below.

Following the methodology of Toner et al. (2005), the Environmental Protection Agency (EPA) group invertebrates into classes whereby pollution intolerant species are denoted class A, and species with greater pollution tolerance fall into successive classes (B through E, respectively). As such, the presence or absence of these groups and their relative abundance facilitates an assessment of biological river health. Good status (Q4) unpolluted water quality is achieved according to the EPA if at least one Group A taxon is present in, at least, fair numbers (5-10% total sample composition). Group B taxa may be common or absent and *Baetis rhodani* (large dark olive mayfly) is often dominant. Other Group C taxa are never excessive and group D / E taxa are present in small numbers or absent (Toner et. al., 2005). Our results are discussed in this context in order to interpret potential changes in the macroinvertebrate community composition.

The invertebrate samples (S1 & S2) collected upstream of the weir in addition to S4 downstream had moderate status (Q3-4) biological water quality. The recorded water quality was assigned due to small numbers of clean water indicator group A, Heptageniidae mayfly species and a dominance of EPA group B and C invertebrates (moderate water quality indicators). These included the group B mayfly species *Centroptilum luteolum*, and group C mayfly species, *Seratella ignita* and *Caenis rivulorum*.

A single sample (S3) had Q4 (good status), unpolluted water quality. The sample was well represented by EPA group A clean water indicator species with the stonefly species, *Isoperla grammatica* and two mayfly species present from the group (i.e. *Ecdyonurus insignis* and *Ephemera danica*).

No invertebrate species of higher conservation value than 'least concern' were recorded in the invertebrate assemblage when compared to national red lists (Feely et al. 2020; Kelly-Quinn & Regan, 2012; Byrne et al. 2009; Foster et al. 2009).

Table 3.1 Macro-invertebrate species composition and Q-ratings recorded on the River Blackwater in the vicinity of Fermoy Weir, July 2020

Family	Species	S1	S2	S3	S4	EPA group
Perlodidae	*Isoperla grammatica*			1		**A**
Heptageniidae	*Heptagenia sulphurea*	1				**A**
Heptageniidae	*Ecdyonurus insignis*		2	2		**A**
Ephemeridae	*Ephemera danica*			3	2	**A**
Baetidae	*Centroptilum luteolum*	5	6		3	**B**
Baetidae	*Baetis rhodani*			1		**C**
Ephemerellidae	*Serratella ignita*	9	8	10	2	**C**
Caenidae	*Caenis rivulorum*	14	4	16	3	**C**
Leptoceridae	*Athripsodes cinereus*	2		2	5	**B**
Limnephilidae	Not speciated - early instar	1				**B**
Hydropsychidae	*Hydropsyche siltalai*	4		2	14	**C**
Hydropsychidae	*Cheumatopsyche lepida*				4	**C**
Polycentropodidae	*Polycentropus flavomaculatus*	2	1	2		**C**
Dytiscidae	*Nebrioporus depressus*		1			**C**
Elmidae	*Limnius volckmari* larva			2	1	**C**
Elmidae	*Elmis aenea* larva	2				**C**
Neritidae	*Theodoxus fluviatilis*	5				**C**
Bithyniidae	*Bithynia tentaculata*	2	7	1		**C**
Planorbidae	*Planorbis planorbis*		2			**C**
Valvatidae	*Valvata piscinalis*	3	3			**C**
Physidae	*Physa fontinalis*		2			**D**
Sphaeriidae	*Pisidium* sp.	1				**D**
Lymnaeidae	*Radix balthica*	6	1	3	1	**D**
Sphaeriidae	*Sphaerium corneum*		2			**D**
Hirudinidae	*Pisciola geometra*			2		**C**
Gammaridae	*Gammarus duebeni*	2	8	4	8	**C**
Assellidae	*Asellus aquaticus*	5	1	4	9	**D**
Simulidae	Not speciated				2	**C**
Chironomidae excl. *Chrionomus* sp.	Not speciated	5	6		6	**C**
Hydrachnidiae	Not speciated	1		1		**C**
Oligochaeta	Not speciated			2	2	**n/a**
Taxon richness		**18**	**15**	**17**	**14**	
Total abundance		**70**	**54**	**58**	**62**	
Q Rating		**Q3-4**	**Q3-4**	**Q4**	**Q3-4**	
WFD Status		**Mod**	**Mod**	**Good**	**Mod**	

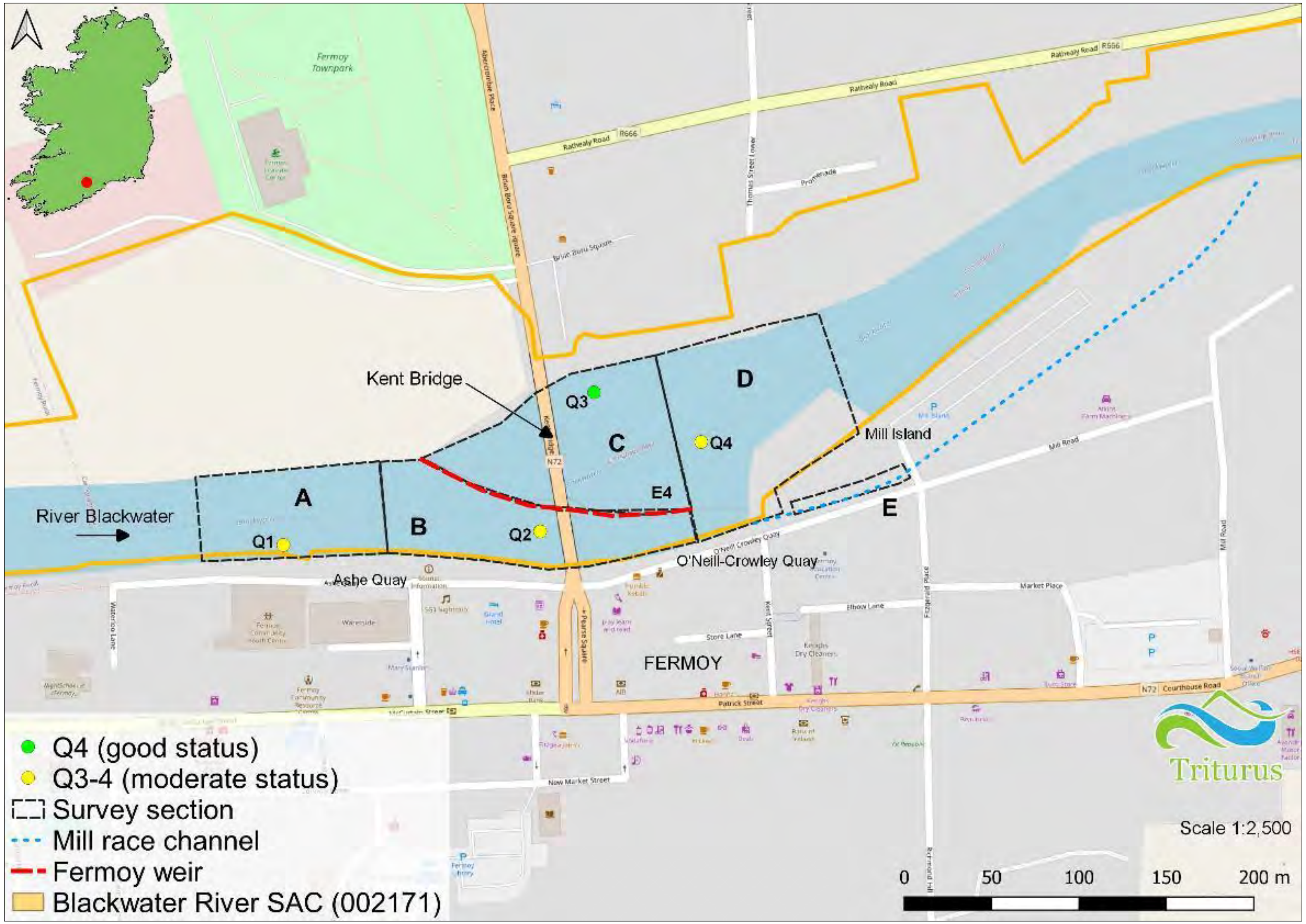

Figure 3.15 Biological water quality (Q-ratings) recorded in the vicinity of Fermoy Weir, July 2020.

3.10 Aquatic ecological evaluation

An ecological evaluation of the survey area was based on the results of the aquatic surveys. All aquatic survey areas on the River Blackwater (i.e. sections A-D) were considered of **International importance** given they formed part of the Blackwater River SAC (002170). These survey sections were also considered of high value given the presence of qualifying interest *Lampetra* sp. ammocoetes, Atlantic salmon, white-clawed crayfish and otter in addition to the Annex I habitats 'Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and *Callitricho-Batrachion* or aquatic mosses [3260]' (sections C and D) 'Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]' (sections C and D).

The mill race channel (survey section E) was located outside of the Blackwater River SAC boundary. However, given that the channel supported otter and herbaceous vegetation representative of the Annex I habitat 'Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]', survey section E was considered of **local importance (high value)**.

4. Discussion

The baseline surveys focused on aquatic habitats in relation to Blackwater River SAC qualifying interest Atlantic salmon, twaite shad, lamprey species, white-clawed crayfish, freshwater pearl mussel, otter and floating river vegetation habitat, in addition to biological water quality (macro-invertebrates) and general aquatic ecology. The Fermoy Weir survey area was found to be of high value for Atlantic salmon, European eel and lamprey species (downstream of the weir in particular) and evidently supported otter, white-clawed crayfish and two Annex I aquatic habitats. No freshwater pearl mussels were recorded from the survey area.

4.1 Most valuable areas

4.1.1 Atlantic salmon

Although Atlantic salmon (and brown trout) were recorded upstream (site E1) and downstream (E2, E4) of Fermoy Weir, the best-quality salmonid habitat was present downstream (i.e. survey sections C and D). The northern extent of these sections (along the north bank of the river) was a particularly good nursery for salmonids (*Ranunculus*/macrophyte zone) and also offered some good-quality spawning substrata. Likewise, spawning habitat was good throughout much of the main channel in both sections C and D. Some excellent quality adult salmonid holding habitat was present in the large weir pool in addition to the deeper glide habitat downstream of the pool. Upstream of the weir (slower-flowing deep glide) also provided good holding habitat for migrating adults although this area was more suited to a range of coarse fish species such as dace, roach and minnow. The quality of salmonid habitat was very good overall although three of the four biological water quality samples were not meeting 'good status' WFD targets (i.e. Q3-4, moderate status, slightly polluted).

4.1.2 Lamprey

Survey sections C and D (downstream of Fermoy Weir) were of high value for *Lampetra* sp. lamprey, with both suitable spawning and ammocoete habitat present. The margins and littoral area of river islands downstream of Kent Bridge were provided the most suitable ammocoete habitat within the study area. Here, accumulations of fine, organic-rich soft sediment required by both larval river/brook and sea lamprey (Goodwin et al., 2008; Aronsuu & Virkkala, 2014) were present, varying in sediment depths of 5-15cm. Three such areas targeted for lamprey ammocoetes in close proximity to these islands (site E3), supported densities of 10.5, 12 and 15 *Lampetra* sp. ammocoetes per m^2, respectively. These densities compared favourably with the conservation objective of "Mean catchment juvenile density of brook/river lamprey at least $2/m^2$" for *Lampetra* sp. in the Blackwater River SAC (NPWS, 2012). Some suitable (though sub-optimal) ammocoete habitat was also present in association with macrophyte beds in these survey sections, although this was more limited in extent than the aforementioned island margins. Suitable lamprey spawning areas (ranging from finer gravels to larger cobbles) were present throughout survey sections C and D, with the slow, deeper glide upstream of the weir less suitable. A known historical sea lamprey and river lamprey spawning site was present in survey section D (tailing of large weir pool; NPWS data).

4.1.3 Twaite shad

Analysis of water samples for *Alosa* spp. eDNA during the species' known peak spawning migration (21st May 2020) supported the absence of shad from the River Blackwater upstream and downstream of Fermoy Weir and downstream of Clondulane Weir (**Figure 3.12**). However, *Alosa* spp. eDNA was detected from water samples collected from the 'Kitchen Hole' site on the lower (tidal) River Blackwater at Cappoquin. Our genetic results support the suspected distribution of shad species (majority considered to be twaite shad, *Alosa fallax*) within the River Blackwater, i.e. present to the tidal limit (King & Linnane, 2004; King & Roche, 2008).

Two records exist for allis shad (incidental rod and line captures) on the River Blackwater at Careysville (below Clondulane Weir) in 2003 and 2005, some 25km upstream of the tidal limit (King & Linnane, 2004; NPWS data) - the furthest upstream record for shad species in the River Blackwater SAC. Whilst allis shad are known to penetrate further up river catchments compared to twaite shad (Maitland & Hattin-Ellis, 2003; Jolly et al., 2012), the Clondulane Weir would appear to be an impassable barrier to both shad species in the River Blackwater, based on eDNA analysis. Unlike salmonids, weaker-swimming shad species are unable to traverse many instream barriers (Larinier & Travade, 2002). However, given their propensity for spawning in the lower (tidal) reaches of rivers, irrespective of upstream passage issues, twaite shad populations are often less impacted by barriers than other anadromous species (van Puijenbroek et al., 2018).

4.1.4 White-clawed crayfish

Despite being historically present in only the Awbeg River within the Munster Blackwater catchment, current white-clawed crayfish distribution is known from several other tributaries as well as the Blackwater main channel, both upstream and downstream of Fermoy (Smiddy & Saich, 2015). Moderate numbers of white-clawed crayfish were recorded from the vicinity of Fermoy Weir during the 2020 survey (*n*=32 total), including both adults and juveniles. The areas of channel underneath Kent Bridge (section C) represented the best quality crayfish habitat within the survey area, with ample boulder/cobble refugia present. These areas also supported the highest density of crayfish recorded. However, areas along the existing weir face (boulder-dominated habitat with frequent crevices) also provided valuable refugia for the species. The low densities of crayfish recorded from survey sections A, B and D reflected the difficulty in surveying these areas (deeper/faster water) rather than poor suitability. This was supported via snorkelling surveys of these areas which observed crayfish in deeper areas.

4.1.5 Freshwater pearl mussel

No live freshwater pearl mussels were found in the section of the River Blackwater within 100m upstream and downstream of Kent Bridge. The only habitat within 100m of the bridge that could be considered suitable for freshwater pearl mussels was located in survey section D, downstream of the large weir pool along the north bank of the river (i.e. fast glide with clean, cobble-dominated substrata) (**Appendix A**). Several empty shells, likely washed from upstream areas, were found in gravel/cobble deposits (**Plate 3.11**). Four live individuals recorded in 2011 were not present given changes in substrata and local hydrology (i.e. partial weir collapse). A reproducing population at this location was not considered possible given water quality issues (i.e. ≤Q4; **Table**

3.1). The changing morphology of the channel due to breaching of the weir and significant movement of gravels may also have impacted the small residual historical population.

Please refer to **Appendix A** for the accompanying freshwater pearl mussel survey report.

4.1.6 Otter

The Fermoy Weir survey area was evidently of high-value for otter, with a total of *n*=11 signs recorded during June-July 2020 (**Figure 3.14**). A single holt was located within the survey area approx. 180m downstream of the weir, on the heavily-vegetated south bank of the River Blackwater. The existing weir face was a regularly used feeding and resting area (i.e. couches). The presence of abundant white-clawed crayfish remains in multiple recorded spraints (e.g. Plate 3.12) indicated the prevalence of this prey species in the diet of local otter population. In turn, this highlighted the importance of areas with ample crayfish refugia (such as the weir face and underneath Kent Bridge) in supporting foraging otter. The highly-seasonal dietary link between white-clawed crayfish and otter has been frequently noted elsewhere in Ireland (pers. obs.; Kyne et al., 1989; Breathnach et al., 1993; Ottino & Giller, 2004; Reid et al., 2013) including within the Blackwater River SAC (Smiddy & Caich, 2015).

4.1.7 Floating river vegetation

Macrophyte communities representative of the Annex I habitat ''Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and *Callitricho-Batrachion* or aquatic mosses [3260]' ('floating river vegetation', FRV) were present within the River Blackwater survey area. Sections C and D, downstream of Fermoy Weir, supported frequent *Ranunculus* subspecies *Batrachion* agg. in addition to other indicator species (EC, 2013) including Callitriche sp., *Myriophyllum spicatum* and the moss *Fontinalis antipyretica*. The better-quality areas of FRV habitat could be considered as those featuring an overall higher percentage cover, i.e. survey section C downstream of Kent Bridge, along the north bank. Given the paucity of macrophytes, no good examples of this Annex I habitat were present upstream of the weir (survey sections A and most of B).

4.1.8 Hydrophilous tall herb habitat (non-qualifying interest)

Of note, several vegetated gravel islands located in the River Blackwater downstream of Fermoy Weir supported the non-qualifying interest Annex I habitat 'Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]'. A number of positive indicator species (EC, 2013; Devaney et al., 2013) were recorded on exposed gravel shoals and their margins including *Epilobium hirsutum*, *Lythrum salicaria*, *Mentha aquatica*, *Myosotis scorpioides, Stachys palustris* and *Alisma plantago-aquatica*. River gravel islands (bars) are classified as vulnerable in the European Red List of Habitats, based on the criterion of a large reduction in the habitat area over the last 50 years (about 35%; Janssen et al., 2016). Such islands are ephemerally inundated at higher flows and subject to wetting and drying processes with changing water levels, thereby alternately offering terrestrial, wet and aquatic habitats (Zeng et al., 2015). Gravel bars and partially vegetated islands, such as those found downstream of Fermoy Weir, are key components of gravel-bed rivers (Edwards et al., 1999; Tockner et al., 2006) and are naturally highly dynamic and morphologically complex systems. Therefore, gravel islands represent important instream habitat at the aquatic-terrestrial interface. In having an ecotonal position between aquatic and terrestrial environments, bars have the potential to support a varied and rich biota (Kalníková et al., 2020; Gilvear et al., 2007).

Good examples of the Annex I hydrophilous tall herb habitat was also present in the mill race channel (survey section E), located outside of the Blackwater River SAC boundary, as well as along the northern river margins of survey section C (downstream of the bridge) and to the south of the large gravel island near Mill Island (section D).

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6. Appendix A – freshwater pearl mussel survey report

* Report attached separately

7. Appendix B – assorted survey images

Plate 7.1 Juvenile brown trout (top) and Atlantic salmon parr (bottom) recorded from electro-fishing site E1 on the River Blackwater upstream of Fermoy Weir, July 2020

Plate 7.2 European eel observed in boulder habitat underneath Kent Bridge (electro-fishing site E2) on the River Blackwater, July 2020

Plate 7.3 Targeted lamprey ammocoete survey in area A of site 5 on the River Blackwater downstream of Kent Bridge, July 2020

Plate 7.4 Different age classes of *Lampetra* sp. ammocoetes recorded from area B of site E3 on the River Blackwater, July 2020

Plate 7.5 European eel elver captured from sediment accumulation in area A of site E3

Plate 7.6 Atlantic salmon parr recorded from site E4 on the River Blackwater, July 2020

Plate 7.7 Juvenile and adult dace recorded from site E5, July 2020

Plate 7.8 River island vegetation representative of the Annex I habitat ‘Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]’, located downstream of Fermoy Weir

Triturus Environmental Ltd.

42 Norwood Court,

Rochestown,

Co. Cork,

T12 ECF3.