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Project	**Natura Impact Statement (NIS) Emergency Maintenance Works Fermoy, Co. Cork**		
Client	OPW		
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1. Introduction

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 development at Fermoy, Co. Cork to impact on any European sites within its zone of influence.

This Natura Impact Statement 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.

2. Regulatory Context and the Appropriate Assessment Procedure

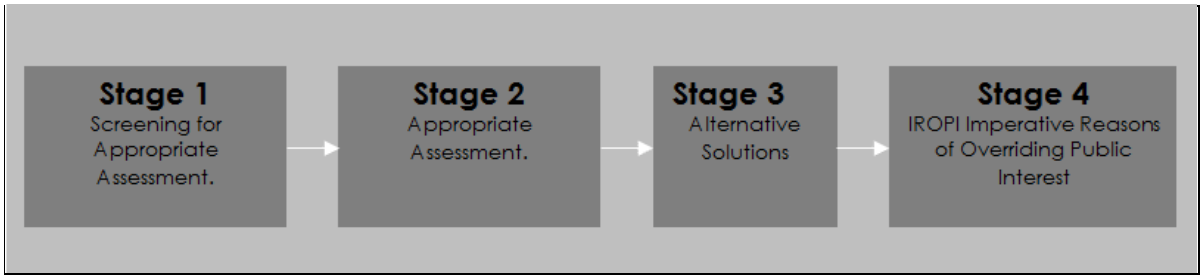
2.1 Regulatory Context

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.

The possibility of there being 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 European sites: methodological guidance on the provisions of Articles 6(3) and 6(4) of the Habitats Directive 92/43/EEC" (2001) and 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);



The stages are as follows:

Stage One: Screening — the process which identifies any appreciable impacts upon a European 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;

Stage Two: Appropriate assessment — the consideration of the impact on the integrity of the European 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 European site.

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).

Documentation/guidelines of relevance to this NIS include the following:

- European Commission, 2001. *Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC.* Office for Official Publications of the European Communities, Brussels (EC, 2001);
- European Commission, 2000a. *Communication from the Commission on the Precautionary Principle.*, Office for Official Publications of the European Communities, Luxembourg (EC, 2000a);
- *Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC* Office for Official Publications of the European Communities, Luxembourg (EC, 2018);
- *Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (EC, 2000)*
- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission; (EC, 2007);
- *Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities*. Department of the Environment, Heritage and Local Government, Dublin (DEHLG, 2010a);
- Department of Environment Heritage and Local Government Circular NPW 1/10 and PSSP 2/10 on Appropriate Assessment under Article 6 of the Habitats Directive – Guidance for Planning Authorities (DEHLG, 2010b);
- *Interpretation Manual of European Union Habitats. Version EUR 28*. European Commission (EC, 2013);
- Applications for approval for Local Authority Developments made to An Bord Pleanála under 177AE of the Planning and Development Act, 2000, as amended (Appropriate Assessment): Guidelines for Local Authorities. An Bord Pleanála, Dublin (ABP, 2013).

- CJEU Case C 164/17 Edel Grace Peter Sweetman v An Bord Pleanála

It is the responsibility of the competent authority, in this instance the OPW , to assess the proposed project taking into consideration any potential impact upon any European site within its zone of influence.

2.3 Screening of Proposed Development

In accordance with the Department of Environment Heritage and Local Government (DoEHLG) Guidelines screening is the process that addresses two tests of Article 6(3) of the Habitats Directive:

I. whether a plan or project is directly connected to or necessary for the management of the site, and

II. whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on a European site in view of its conservation objectives.

If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2. The screening assessment for the operations follows the following steps in accordance with the DoEHLG guidelines:

1. Description of plan or project, and local site or plan area characteristics.
2. Identification of relevant European sites, and compilation of information on their qualifying interests and conservation objectives.
3. Assessment of likely effects – direct, indirect and cumulative – undertaken on the basis of available information as a desk study or field survey or primary research as necessary.
4. Screening statement with conclusions**.**

2.4 Conclusions of Screening Report

An Appropriate Assessment Screening Report was previously prepared by DixonBrosnan in respect of this project (*AA Screening Report Emergency Works Fermoy, Co. Cork, DixonBrosnan, 2020*). The screening report concluded that the only European site for which potential impacts could occur was the Blackwater River SAC and this this is the only European site addressed by this NIS report. The QIs for the Blackwater River SAC which the screening report determined may give rise to potential effects are detailed below in **Table 1.** Further assessment of potential impacts on these QIs is provided below.

Table 1 Qualifying Interests for the Blackwater River Screened in for further assessment.

Natura 2000 Site	Qualifying Interest	Potential Impacts	Screened In/Out
Blackwater River (Cork/Waterford) SAC (site code 002170)	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]	Given the, the high level of dilution provided in the estuarine/marine environment, the distance of these habitats from the proposed works area and the robust nature of these habitats, no potential effect has been identified.	Screened Out
	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	This is a terrestrial habitat which was not recorded within the works area or in close proximity and thus no potential effects have been identified.	Screened Out
	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]	Changes in hydrology could have adverse effects on this habitat	Screened In
	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]	This habitat type is commonly distributed along the main Blackwater channel and within its tributaries and includes species such as Pond Watercrowfoot (Ranunculus peltatus), Water-crowfoot (Ranunculus sp.), Canadian Waterweed (Elodea canadensis), Broad-leaved Pondweed (Potamogeton natans) and Water Milfoil (Myriophyllum spp.). Impacts on water quality	Screened In

		could have adverse effects on this habitat.	
	Trichomanes speciosum (Killarney Fern) [1421]	Killarney Fern belongs to the Filmy Fern family (Hymenophyllaceae) and is the only European representative of the genus Trichomanes. The species can occur as either sporophyte or gametophyte generations or as both generations together. 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. No potential effect on this species has been identified.	Screened Out
	Alosa fallax fallax (Twaite Shad) [1103]	Twaite Shad spend their adult life at sea or in estuaries and spawn in freshwater in early summer. This species is known to exist in the Blackwater River and Cappoquin is the likely spawning area (NPWS, 2007e). Impacts on water quality could have adverse effects on this species	Screened In
	Margaritifera margaritifera (Freshwater Pearl Mussel) [1029]	The River Blackwater Catchment represents the largest Freshwater pearl Mussel catchment in Ireland. Siltation or direct loss of habitat could have adverse effects on this species	Screened In
	Austropotamobius pallipes (White-clawed Crayfish) [1092] Petromyzon marinus (Sea Lamprey) [1095] Lampetra planeri (Brook Lamprey) [1096]	Inhabit or migrate through freshwater and thus could be affected by impacts on water quality or loss of habitat.	Screened In

	Lampetra fluviatilis (River Lamprey) [1099] Salmo salar (Salmon) [1106]		
	Lutra lutra (Otter) [1355]	Impacts on prey availability and noise and disturbance could have adverse effects on this species	Screened in

3. NIS Methodology

3.1 Study Area and Scope of Appraisal

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

Considering the European sites present in the region, their Qualifying Interests (QIs) and conservation objectives, and any potential impact pathways that could link those sites to the proposed development area, were assessed.

The zone of influence of the proposed development extends beyond the boundaries of the proposed development site primarily due to the proximity of River Blackwater. Thus, any appreciable direct, indirect or cumulative impacts which could arise from the proposed development in relation to the designated sites within this zone were considered.

The screening report concluded that the only European site for which potential impacts could occur was the Blackwater River SAC and this this is the only European site addressed by this NIS report.

3.2 Desktop Study

A desktop review facilitates the identification of the baseline ecological conditions and key ecological issues relating to European 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 including qualifying interests and conservation objectives for European sites.

- Environmental Protection Agency (EPA) – www.epa.ie
- National Biodiversity Data Centre – www.biodiversityireland.ie
- Catchments.ie
- Information on the status of EU protected habitats in Ireland (National Parks & Wildlife Service, 2013a & 2013b)
- BirdWatch Ireland - http://www.birdwatchireland.ie/
- County Cork Biodiversity Action Plan 2009-2014
- NPWS (2012) Conservation objectives supporting document - marine habitats
- 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.

3.3 Author of Report for Screening and Appropriate Assessment

This report was prepared by Carl Dixon MSc. (Ecological Monitoring). Carl Dixon MSc (Ecology) is a senior ecologist who has over 20 years' experience in ecological and water quality assessments with particular expertise in freshwater ecology. He also has experience in mammal surveys, invasive species surveys and ecological supervision of large-scale projects. Projects in recent years include the Waste to Energy Facility Ringaskiddy, Shannon LNG Project, supervision of the Fermoy Flood Relief Scheme, Skibbereen Flood Relief Scheme, Douglas Flood Relief Scheme, Great Island Gas Pipeline etc.

4. Description of the Project
4.1 Introduction

Fermoy has a long history of flooding and a Flood Relief Scheme for the town was completed in 2017. The works involved the construction of both permanent and temporary demountable walls and embankments on both the northern and south banks of the river. As part of this project works new flood defences were put in place at O'Neill-Crowley Quay and at Mill Island.

However due to the deterioration of Fermoy Weir which is located alongside this quay and resultant changes in flow pattern, water is flowing towards this section of the flood defences at extremely high velocities. A hydrographical survey of the riverbed in Fermoy has indicated that significant scour has occurred in front of a number of the existing flood defence walls. It is evident from the survey that, since the east end of the original weir collapsed/breached, up to 4m (depth) of scour has occurred at the east end of the original weir. It is also evident that a section of the western end of Mill Island has eroded/collapsed into the river. From recent visual inspections, it is clear that the erosion of Mill Island is continuing. As such, there is a requirement for urgent emergency works to the river bed to maintain the stability of walls 19-21 of the Fermoy Flood Relief Scheme.

Therefore, emergency works are proposed to stabilize the situation. The extent of the erosion is shown below in **Figure 1** and **Figure 2.** It is noted that in the absence of works to stabilise the situation there is a high probability that there will be high levels of erosion over the winter period which will weaken the flood defences. This may lead to long-term closure of the road at O'Neill-Crowley Quay and in the absence of emergency works, more extensive remedial works are likely to be required in the future with the potential for more significant ecological effects.

The situation is now becoming critical with the risk of large scale ground collapse and erosion over the winter, leading to infrastructural failure, increased risk of flooding in the protected area in Fermoy town, and potential significant effects on qualifying interests and conservation objectives for the Blackwater River SAC from elevated silt levels.

As shown in **Appendix 2**, the estimated extent of ground that could be lost due to erosion if temporary/permanent remedial works are not carried out = 247m^3 to 413m^3 most of which would be deposited on the riverbed as fine/coarse sediment. This has the potential to have a significant effect on Brook Lamprey, River Lamprey, Sea Lamprey, Atlantic Salmon, Freshwater Pearl Mussel, White Clawed Crayfish (recorded in proximity to the weir during recent surveys) and Floating River Vegetation.

Figure 1: Showing weir breach and area of flood defences affected

Figure 2: Area affected showing extensive damage ground instability.

4.2 Proposed Emergency Maintenance Work

The proposed works are shown in **Appendix 2** and are summarised below.

- The proposed emergency works generally consists of reinstating the river bed level in front of the flood defence walls to a level that restores the stability required to these walls. This will typically consist of infilling the scour holes with selected stone material and placing scour protection material above the river bed to limit the reoccurrence of scour in these areas.

- Large 1-3 tonne temporary protection rocks to be placed on periphery of works area to direct main velocity of flow away from works area.

- Installation of scour protection using selected stone material and rock armour to protect river bed levels in front of wall 19. Installation of scour protection using selected stone material and rock armour to protect river bed. Reinstatement of river bed level to a minimum of 18.000 A OD using selected granular material

- Much of the scoured river bed material has been deposited in large gravel beds to the north of Mill Island, downstream of the breached weir. It is proposed where possible to utilise the material from these gravel beds as part of the emergency works to restore the river bed to its original level prior to placement of the scour protection material. It is proposed to take gravel from the larger gravel beds to the north of Mill Island only and not the smaller gravel beds that are immediately downstream of Fermoy Bridge. If necessary additional material of similar geological composition will be imported if insufficient gravel is available.

- To carry out the emergency works, it is proposed to form an access ramp from Mill Island down onto the gravel beds to the north of Mill Island. This will be constructed of imported material and removed once works are complete. From here, it is proposed to form a working platform in the river working in a western direction towards Wall 19.

The working platform will form the base of the final scour protection in this area. The scour holes in the river bed will be infilled and protected with scour protection as the works advance westwards.

- The working platform and emergency works will continue from Mill Island along Wall 20 (the flood defense wall across the Mill Race) and westwards along Wall 19. As the works approach the west end of the breach in the existing weir, the existing river channel between Wall 19 and the weir will need to be narrowed to facilitate the installation of the working platform and the scour protection.

- At this stage in the construction works, there may be a requirement, subject to confirmation from the works Contractor, to temporarily limit the flow of water between the Wall 19 and the existing weir to allow the final part of the emergency works to be installed.

- To limit the flow in this area, a temporary dam may be required upstream of Fermoy Bridge for a short period of time. We acknowledge that from an environmental viewpoint, it is preferable that this temporary dam is not installed, but given the constraints of the working area between Wall 19 and the weir, and the need to limit the velocity of the water in this area, we consider that the works Contractor is likely to require some temporary bunding of the area to place the stone fill/scour protection material and complete the emergency works which are critical to restore the stability of the flood defense wall.

- Should any bunding/temporary dam be installed, it will only remain in place for as short a period as is practicable in order to undertake and complete the emergency works. In these circumstances it is expected that for this period, fish passage upstream will be facilitated by water flow to the existing fish ladder, and/or to the area to the south of the fish ladder on the weir where there is a shallow trough type feature on the weir surface, which may facilitate fish passage during this short period. The timing for the installation of the temporary dam and the duration for which it remains in place will be agreed with Inland Fisheries Ireland

- The objective is to complete works by the end of October 2020 weather permitting, however taking a worst case scenario approach this report assumes that works may continue for the first three weeks of November.

- Construction works will largely be carried out within the standard day time only with standard working hours of 08:00-18:00 Monday to Friday and 08:00 – 13:00on Saturday. However, given the exceptional circumstances and limited timeframe for the completion of works it may be necessary to undertake works outside of these times including night working

5. Assessment Methodology

The proposed development is not directly connected with, or necessary for, the management of any Natura 2000 site. 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).

This methodology is based on source > pathway > receptor chain principles and involves assessing likely significant effects on Natura 2000 sites within the zone of influence of the proposed works in relation to the following pathways:

- Impacts on water quality
- Spread of invasive species and biosecurity risks
- Impacts on fish migration and spawning
- Loss of habitat
- Direct effects on qualifying species
- Prevention of ongoing erosion, damage to flood relief walls and siltation effects
- In-combination effects

The screening assessment involves assessing the impacts of the proposed works, and its zone of influence, in relation to each of these pathways individually. The results of each pathway are then combined in a concluding section to identify if/where likely significant effects may arise.

6. Consideration of Alternatives

The situation is now becoming critical with the risk of large-scale ground collapse and erosion over the winter and potential significant effects on qualifying interests and conservation objectives for the Blackwater River SAC. In the absence of emergency works to stabilise the current situation, more extensive works are likely to be required in the future which may lead to more severe impacts on the ecology of the river and on its qualifying interests. A do-nothing scenario is therefore not considered a viable alternative to the works as proposed. Given the limited timeframe available to complete the works and the nature of the site no other means of completing the works, other than that outlined here, is considered feasible.

7. Consultation

National Parks and Wildlife Service and Inland Fisheries Ireland were consulted in relation to the proposed development. Measures recommended by Inland Fisheries Ireland have been incorporated into the construction methodology for the project. Cork Co Co have also been kept informed of the risks associated with the erosion in front of the quay walls and have been consulted in respect of the proposals

8. Blackwater River SAC – Qualifying interests and conservation objectives

The proposed works will be located within a European site therefore, a source-pathway-receptor link exists between the source (Proposed works) and the receptor (River Blackwater (Cork/Waterford) SAC (site code 002170)). Overall, the River Blackwater is of considerable conservation significance for the occurrence of good examples of habitats and of populations of plant and animal species that are listed on Annexes I and II of the E.U. Habitats Directive. An overview of the proposed project in relation to the Blackwater River SAC is provided below in **Figure 3**. Detailed drawings are provided in **Appendix 2.**

Figure 3. Approximate location of River Blackwater SAC boundary (shaded or

8.1 Blackwater River (Cork/Waterford) SAC overview

This very large SAC drains a major part of County Cork and five mountain ranges. The site supports a high diversity of Annex I habitats and Annex II species of the E.U. Habitats Directive, including Atlantic salmon and otter. The site designated as the Blackwater River cSAC consists of the freshwater stretches of the River Blackwater as far upstream as Ballydesmond and as far downstream as the tidal stretches into Youghal Harbour as well as the many tributaries along the way. The designated site covers a total area of 15,048 ha.

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.

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

8.2 Natura 2000 sites – Qualifying 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 European 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 detailed 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. 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 European 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 habitats listed as qualifying interests for the Blackwater River (Cork/Waterford) SAC and specific conservation objectives are included in **Table 2** and **3**.

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

Species code	**Species**		***Conservation objective***	***Screened in for NIS***
1029	Freshwater Pearl Mussel	*Margaritifera margaritifera*	Restore	Yes
1092	White-clawed crayfish	*Austropotamobius pallipes*	Maintain	Yes
1095	Sea Lamprey	*Petromyzon marinus*	Restore	Yes
1096	Brook Lamprey	*Lampetra planeri*	Maintain	Yes
1099	River Lamprey	*Lampetra fluviatilis*	Maintain	Yes
1103	Twaite shad	*Alosa fallax*	Restore	Yes
1106	Atlantic Salmon	*Salmo salar*	Maintain	Yes
1355	Otter	*Lutra lutra*	Restore	Yes
1421	Killarney Fern	*Trichomanes speciosum*	Maintain	No

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

Habitat Code	Habitat	Conservation objective	Screened in for NIS
1130	Estuaries	Maintain	No
1220	Perennial vegetation of stony banks	Maintain	No
1140	Mudflats and sandflats not covered by seawater at low tide	Maintain	No
1310	Salicornia and other annuals colonizing mud and sand	Maintain	No
1330	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	Restore	No
1410	Mediterranean salt meadows (*Juncetalia maritimi*)	Maintain	No
3260	Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation	Maintain	Yes
91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (A*lno-Padion, Alnion incanae, Salicion albae*)	Restore	Yes
91J0	*Taxus baccata woods of the British Isles	Under Review	No
91A0	Old sessile oak woods with Ilex and Blechnum in British Isles	Restore	No

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

9. Ecological Surveys

The terrestrial and aquatic habitats within or 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 1 Habitats where required. No habitats listed as qualifying habitats for the Blackwater River SAC occur within the works area, however there is the potential for qualifying habitats outside the works boundary to be indirectly affected.

The habitat of highest ecological value within the works area is the River Blackwater. The River Blackwater is one of Munster's largest rivers. It rises in the Derrynasaggart Mountains and divides Co. Cork and Co. Kerry for many miles before entering Co. Cork near Rathmore. It flows eastwards through Mallow, widening out near Cappoquin, before heading south to enter the sea at Youghal Harbour. The Blackwater is fished extensively for Salmon, Brown Trout and Sea Trout.

The Blackwater River is a Class A River of International Importance. The section of the Blackwater which may be affected is within the Blackwater River Special Area of Conservation (SAC). The Blackwater River 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 3,310km². In total, the Blackwater is 120kms 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 km².

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 Blackwater is also known to contain populations of Brown Trout (*Salmo trutta*), Lamprey (*Lampetra sp. & Petromyzon sp*.), Freshwater Pearl Mussel (*Margaritifera margaritifera*) and European Eel (*Anguilla anguilla*). The River Blackwater is notable for being one of the best Salmon (*Salmo salar*) fishing rivers in the country. Other species known to occur include Dace (*Leuciscus leuciscus*), Gudgeon (*Gobio gobio*), Minnow (*Phoxinus phoxinus*), Stone Loach (*Barbatula barbatula*), Roach (*Rutilus rutilus*) and Twaite Shad (*Alosa fallax*).

The soluble nature of the limestone till, east of Fermoy and in particular between Ballyduff and Lismore, has resulted in a low-lying river plain, the Blackwater Callows, which, when flooded in winter attracts internationally important numbers 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. A large section of the Callows forms part of the Blackwater Callows SPA.

There are well-developed birch and oak woodlands in the tributary valleys of the Blackwater around Lismore and south of Cappoquin, on both sides of the estuary, with their associated plant and animal communities. 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

Near the mouth of the estuary, the mudflats support important concentrations of wintering waterfowl which is of high ornithological importance as it provides good quality feeding area for an excellent diversity of waterfowl species.

Terrestrial Habitats

None of the terrestrial habitats recorded within the proposed works area and within the SAC boundary correspond to qualifying habitats of the Blackwater River (Cork/Waterford) SAC. Habitats noted within the proposed works areas, or in immediate proximity to them, consist of the low value habitats BL3 Buildings & artificial surfaces and GA2 Amenity grassland. The vegetation on sections of the gravel islands/banks within the channel (Tall-herb swamps FS2) have links with the Annex 1 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.

The habitat Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) does not occur in proximity to the proposed works area. A small area of this habitat which is currently being re-surveyed to confirm the habitat classification is located approximately 800m upstream of the proposed works area as indicated below in **Figure 4.**

Figure 4. Potential alluvial woodland area upstream of Fermoy

The main channel of the Blackwater River downstream of the Fermoy Weir has a complicated morphology which was impacted by the Fermoy Flood Relief scheme works and by the current deterioration of the weir. Flow patterns are currently not stable and in the absence of remedial works will continue to change due to ongoing erosion and the continued deterioration of the weir structure. The channel consists of a mixed substrate with gravel islands and a complex flow pattern.

Aquatic Surveys

This section of the Blackwater River was surveyed as part of the ecological assessment of the Fermoy Weir Remediation Project (Triturus, 2020 unpublished report). Survey area C was located 0-100m of the weir and includes the proposed works area. It is noted that due to the the extremely high velocities downstream of the weir breach it was not possible to survey the proposed works area in detail.

The aquatic habitats within the Section C were described as follows:

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. This pool ranged from 2-3m in depth. The river along the south bank was considerably shallower (<1m, often <0.5m at the time of survey) and dominated by riffle and shallow glide habitat, with limited pool located in the vicinity of the bridge. Downstream of the large pool, fast glide and riffle dominated. Overall, the substrata was 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 (good lamprey potential. Unlike upstream sections, macrophyte cover was high with growth dominated by stream water crowfoot (Ranunculus penicillatus var. penicillatus) (30% cover overall). Spiked water milfoil was also present locally, with islands/gravel shoals and river channel margins colonised by small stands of reed canary grass. Small, localised stands of unbranched bur-reed (Sparganium emersum) were also present in the main channel (south bank). The south (town) bank was bound by retaining walls (site of proposed scour repairs).

In terms of fisheries, Section C offered excellent salmonid nursery habitat (both brown trout and Atlantic salmon), with some locally excellent spawning substrata. The large pool along the south bank offered excellent holding habitat for adult salmonids (locally, a known 'salmon 'lie'). European eel habitat was good overall, with the deeper pool areas and macrophyte beds offering very good foraging opportunities and refugia. Good eel habitat was present underneath the bridge structure (three southernmost arches) and in the downstream vicinity of the weir structure given the presence of ample boulder/cobble refugia and crevices. Dace were frequent in fast glide habitat, in addition to stone loach, brown trout and minnow.

In general, the high water velocities within the proposed works area make it unsuitable for Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation which was recorded close to the northern bank of the river and which will not be affected. There are no sediments of value for juvenile lamprey within the fast water however the edges of gravel banks where there is sediment build up, to provide nursery areas for juvenile lamprey and for European Eel. There is potential spawning habitat for lamprey species within the works area although this is dependent on water velocity. Within the proposed works area there is a mixture of spawning and nursery habitat for Atlantic Salmon and the large pool provides a holding area for adult salmon. Notwithstanding the high water velocities, and assuming a worst case scenario, white clawed crayfish may be present within the proposed works area. In a survey carried out on 29/05/2020, no live freshwater pearl mussels were found in the section of the River Blackwater within 100m upstream and downstream of Fermoy Bridge. A few empty shells, washed down from upstream were found in gravel/cobble deposits.

10. Status of qualifying species and habitats for the Blackwater River SAC for which a potential impact pathway has been identified.

10.1 Otter (*Lutra lutra*)

Otters, along with their breeding and resting places are protected under the provisions of the Wildlife Act 1976, as amended by the Wildlife (Amendment) Act, 2000. The calculated area for this species within the Blackwater River SAC along riverbanks 599.54km. The river length calculated and included in the conservation objective was calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters. Overall it is noted that although rare in parts of Europe, they are widely distributed in the Irish countryside in both marine and freshwater habitats. This species is a qualifying interest for the Blackwater SAC which is one of the most important sites in Ireland for this species.

An otter 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 unpublished report). Survey methodology followed the novel total channel otter survey (TCOS) methodology as devised by Macklin et al. (2019). Otter signs (including spraints, holts, couches, prints, slides and latrines) were searched for along both banks of the river (on foot and by boat), in addition to mid-channel islands and gravel shoals located downstream of Kent Bridge. Notes on the

visible constituents, age and location (ITM coordinates) were made for each otter sign recorded

Otter (*Lutra lutra*) 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 *n* =11 otter signs were recorded from the survey area in the vicinity of Fermoy Weir (Figure 3.2). 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 approx. 180m downstream of the proposed works area as indicated in **Figure 5.**

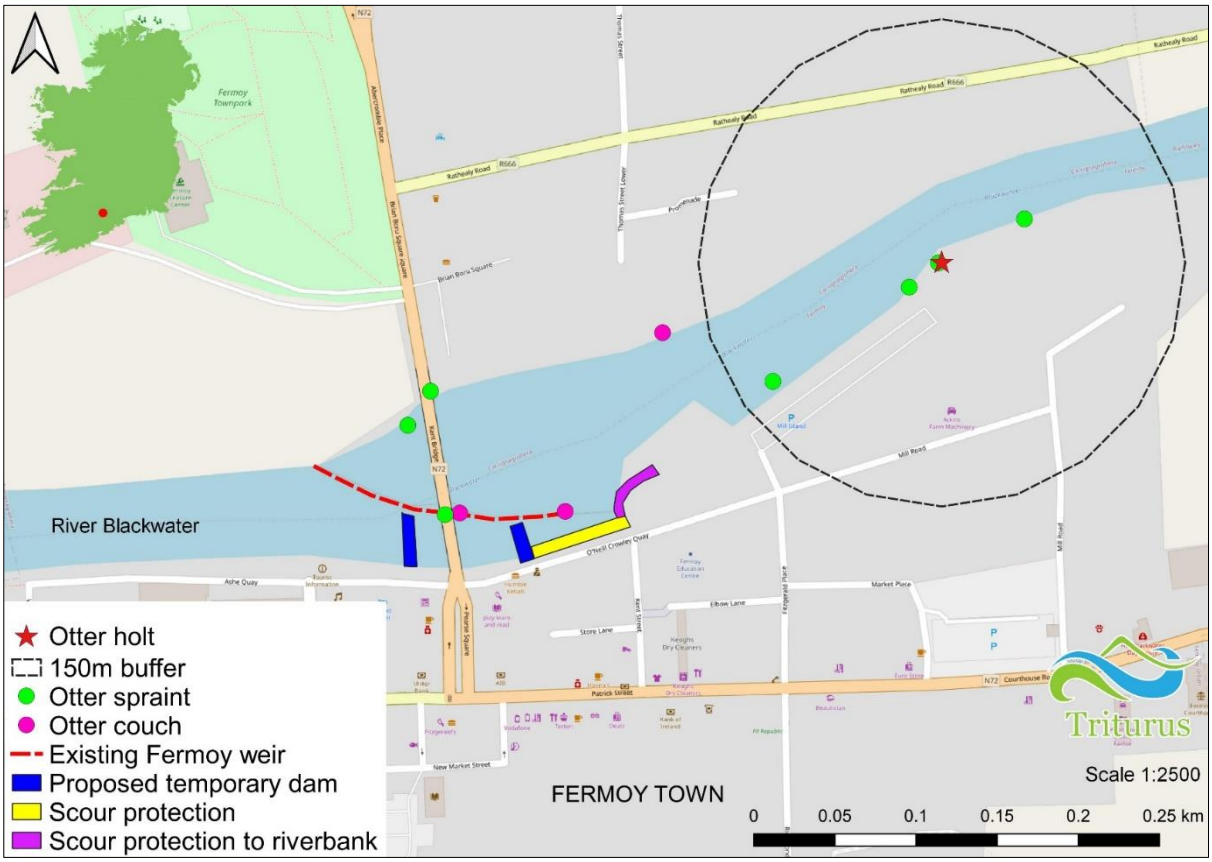


Figure 5. Otter survey results.

Otters utilise the habitats along the riverbank adjacent to the proposed development area for resting and forage within the River Blackwater in this area. A otter couch, holt and signs of otter were recorded within 180m of the works area during site surveys and noise and disturbance could potentially impact on otter behaviour. Any deterioration in water quality could potentially impact on this species by reducing the availability of prey. No direct impacts on the otter couch or holt will occur and both sites will be monitored during site works. A derogation licence for otter has been issued by the NPWS and is attached as **Appendix 3.**

10.2 White clawed Crayfish (*Austropotamobius pallipes*)

This species was recorded from six sites on the Awbeg River in the 1960's and surveys undertaken between 1990 and 2003 also confirmed a population of White-clawed Crayfish in the Awbeg (Demers et al. 2005). NS (2010) notes that this species was recorded in the

Blackwater for the first time in September 2009. The NBDC has records of this species from Longfields Bridge in 2015. There is evidence that this species is currently expanding its range within the Blackwater with reports of this species occurring along the main channel upstream of Mallow and downstream of the confluence of the Awbeg and main Blackwater River channel (Sweeney, N. and Sweeney, P. (2017).

As part of the studies for the Fermoy Weir remediation project a survey for White-Clawed Crayfish was carried out upstream and downstream of the existing weir. White-clawed crayfish habitat was classified as good in the vicinity of Kent Bridge, where frequent cobble/boulder substrata and crevices associated with the bridge and weir structure offered some excellent refugia. Moderate densities of juvenile and adult crayfish were recorded via sweep netting and snorkelling during the site visits. Crayfish habitat (i.e. boulder refugia) was also present locally in the deeper pool area along the south bank. Regular otter spraint sites present along the existing weir structure contained abundant crayfish remains. Although the proposed works area was not specifically surveyed for crayfish due to high water velocities, taking a worst-case scenario approach it is assumed that they are present within the works area and therefore works could have an adverse effect on this species.

10.3 Lamprey species (*Petromyzon marinus, Lampetra planeri, Lampetra fluviatilis*)

The distribution of Lamprey species in the Blackwater River cSAC is detailed in King & Linnane (2004). Juvenile River/Brook and Sea Lamprey have been recorded from the main Blackwater channel and from the following watercourses: Licky, Bride, Araglin, Clyda, Allow, Owenkeal, Finnow, Owentaraglin, Awanaskirtaun River, Crooked River and Awbeg 2. Relatively high numbers of all three lamprey species were recorded from the main channel. Petit (2004) noted that "*The sea lamprey is commonly seen as far upstream as Mallow, where it has been observed spawning. River lamprey has been commonly encountered in the R. Blackwater, and brook lamprey adults have been caught in the upper reaches of the river."*

King & Linnane (2004) noted the following in relation to surveys of the Blackwater River:

Direct observation was used to observe and record locations and extent of sea lamprey spawning Long segments of the main channel between Mallow and Cappoquin were examined by boat over the period 3-16th July 2003. A number of areas with suitable bed type for sea lamprey, based on observations in other channels, were observed. A single redd was recorded opposite Mallow castle, 7 downstream of Killavullen and 3 downstream of Ballyhooly. The majority of sea lamprey spawning sites recorded by boat were observed downstream of Fermoy Bridge and weir. A further 18 redds were observed in small clusters of twos and threes between Careysville and Cappoquin. A total of 65 redds were counted by boat along the entire stretch.

The majority of sea lamprey spawning sites were observed downstream of Fermoy Bridge and weir. Maitland and Campbell (1992) list the threats to lamprey as water pollution, barriers to migration and habitat degradation. In Ireland the single biggest factor limiting the distribution of anadromous lamprey are upstream barriers. Although the data available to date are limited, the impact of artificial barriers on the distribution of lampreys on a number of major rivers is evident.

Typically, the substrate for juveniles, which is similar for all three species, varies in depth from a few centimetres to 30 cm or more; it often contains a relatively high organic content and has been variously described as composed of mud, silt, or silt and sand (Hardisty & Potter 1971). Especially in slow-flowing stretches, the more favourable habitats include, in addition to sand and silt, a clay fraction forming an open-structured sediment (Potter 1970).

Stream flow, water temperature and streambed composition can have a major effect on the distribution of spawning sea lamprey (Haro & Kynar 1997). Physical barriers can impact on sea lamprey and river lamprey which are anadramous. The distribution of larvae is affected most by the location of spawning sites, stream flow, water temperature, streambed pollution and downstream migrations.

Given the nature of the substrate within the works area which is dominated by hard, gravel substrate and velocity flows juvenile lamprey will not be present. The margins/littorals of mid-channel islands downstream of the weir are of value for *Lampetra* sp. ammocoetes. However, gravel will only be removed above the waterline and therefore no impact on these juvenile lamprey will occur.

It is noted the due to the breach in the weir the works area has been highly modified by the increased flow velocities in this area. The habitats in this area are not stable and are of recent origin. This area was not surveyed in detail due to the high water velocities however taking a worst case scenario there here is potential lamprey spawning habitat within the works area although its value is limited by the high velocities resulting from the breach in the weir. No lamprey spawning will take place during the works period. Therefore, although the habitat is some optimal and taking a worst case scenario, there may be a temporary loss of potential spawning habitat for lamprey species outside of the spawning period.

10.4 Shad (*Alosa fallax*)

Twaite Shad spend their adult life at sea or in estuaries and spawn in freshwater in early summer. This species is known to exist in the Blackwater River and Cappoquin is the likely spawning area (NPWS, 2007e). A recent eDNA study, which was carried out in relation to the Fermoy Weir remediation project ((Aquatic baseline report for Fermoy Weir, Fermoy, Co. Cork Triturus, 2020 unpublished report) found that Shad do not occur above Clondulane Weir. Therefore, this species does not occur in proximity to the proposed works and in the absence of significant impacts on water quality no effect on this protected species will occur.

10.5 Atlantic salmon (*Salmo salar*)

Salmon are anadromous migratory fish. Adult fish migrate from the sea to river/stream spawning areas, where the young fish live out their juvenile life stages before migrating as adults to the sea. The Blackwater system is considered one of the most important and prolific salmon rivers in Ireland and the main channel is a designated salmonid water (European Communities (Quality of Salmonid Waters) Regulations, 1988. Tributaries including relatively minor watercourses provide important spawning and nursery habitat. Within the proposed works area there is potentially some spawning and nursery habitat for Atlantic Salmon and the large pool provides a holding area for adult salmon. Recent scour holes within the works area which may be used by adult salmon will be filled with gravel. It is noted the due to the breach in the weir the works area has been highly modified by the increased flow velocities in this area. The habitats in this area are not stable and are of recent origin. This area was not surveyed in detail due to the high water velocities however taking a worst case scenario there will be a loss of potential adult holding pool and small areas of spawning/nursery habitat for salmon.

10.6 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation.

The EU (2003) definition of the habitat water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation is very boad. There is no satisfactory definition of the habitat and its sub-types or their distribution in Ireland and a lack

of relevant monitoring data concerning the habitat. This habitat can occur over a wide range of physical conditions, from acid, oligotrophic, flashy upland streams dominated by bryophytes to more eutrophic, slow flowing streams dominated by *Ranunculus* and *Callitriche* species. While the former will be sensitive to diffuse pollution the latter, especially in shallow streams, will be relatively more resistant.

This habitat type is commonly distributed along the main Blackwater channel and within tributaries and includes species such as Pond Watercrowfoot (*Ranunculus peltatus*), Water-crowfoot (*Ranunculus sp.),* Canadian Waterweed (*Elodea canadensis*), Broad-leaved Pondweed (*Potamogeton natans*) and Water Milfoil (*Myriophyllum spp.).*

The NPWS conservation objectives for the Blackwater River SAC (NPWS 2012) notes the following in relation to this habitat:

The full distribution of this habitat and its sub-types in this site are currently unknown. The basis of the selection of the SAC for the habitat was the presence of plant species listed in the Interpretation Manual (European Commission, 2007), recorded during the Natural Heritage Area (NHA) survey of the river (internal NPWS files). Further records of these and other aquatic plant species in the Blackwater can be found in Green (2008) and O'Mahony (2009). The dominant floating leaved species appears to be the common and widespread stream water-crowfoot (Ranunculus penicillatus subsp. penicillatus). No high conservation value subtypes are known to occur in the SAC and further survey is required to determine whether any such are present. Only one rare/threatened vascular plant species is known to occur in the SAC, the protected opposite-leaved pondweed (Groenlandia densa), which is abundant in the tidal stretches around Cappoquin.

As the proposed development will impact directly on the Blackwater River this habitat could be potentially affected where it occurs downstream of the proposed development. No significant examples of this habitat type will be directly affected by the proposed works however this habitat was recorded along the northern bank of the Blackwater River which is not within the zone of influence of the works.

10.7 Freshwater Pearl Mussel (*Margaritifera margaritifera*)

The habitat of *Margaritifera margaritifera* in Ireland is restricted to near natural, clean flowing waters, often downstream of ultra-oligotrophic lakes. A small number of records are from the lakes themselves. The pearl mussel requires stable cobble and gravel substrate with very little fine material below peasized gravel. Adult mussels are two-thirds buried and juveniles up to five to ten years old are totally buried within the substrate. The lack of fine material in the riverbed allows for free water exchange between the open river and the water within the substrate. The free exchange of water means that oxygen levels within the substrate do not fall below those of the open water. This is essential for juvenile recruitment, as this species requires continuous high oxygen levels.

The clean substrate must be free of inorganic silt, organic peat, and detritus, as these can all block oxygen exchange. Organic particles within the substrate can exacerbate the problem by consuming oxygen during the process of decomposition. The habitat must be free of filamentous algal growth and rooted macrophyte growth. Both block the free exchange of water between the river and the substrate and may also cause nighttime drops in oxygen at the water-sediment interface.

The open water must be of high quality with very low nutrient concentrations, in order to limit algal and macrophyte growth. Nutrient levels must be close to the reference levels for the river

they inhabit. Phosphorus must never reach values that could allow for sustained, excessive filamentous algal growth. The presence of sufficient salmonid fish to carry the larval glochidial stage of the pearl mussel life cycle is essential.

The conservation targets for sustainable mussel populations include maintenance of free water exchange between the river and the substrate and minimal coverage by algae and weed. The particular emphasis is on maintenance of recruitment i.e. the riverbed structure required to breed the next generation.

Table 4 shows the sustainable pearl mussel habitat attributes, with ecological quality objectives for freshwater pearl mussel sites as set out in the draft European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. (The targets set out in these Regulations are interim targets that may be revised in line with the results of monitoring programmes).

Table 4. Ecological Quality Objectives for Freshwater Pearl Mussel Sites

Element Notes	Objective	Notes
Macroinvertebrates	EQR ≥0.90	High status
Filamentous algae (Macroalgae)	Trace or Present (<5%)	Any filamentous algae should be wispy and ephemeral and never form mats.
Phytobenthos (Microalgae)	EQR ≥0.93	High status
Macrophytes - rooted higher plants	Trace or Present (<5%)	Rooted macrophytes should be absent or rare within the mussel habitat.
Siltation	No artificially elevated levels of siltation	No plumes of silt when substratum is disturbed

Ecological quality ratio" (EQR) is an expression of the relationship between the values of the biological parameters observed for a given body of surface water and the values for those parameters in the reference conditions applicable to that body. The ratio is expressed as a numerical value between zero and one, with high ecological status represented by values close to one and bad ecological status by values close to zero.

Status of Freshwater Pearl Mussel in River Blackwater SAC

The Blackwater [Munster] River (MBW) catchment is the largest FPM catchment in Ireland, totalling 2,333.83km2. It is located in the South-Western River Basin District (SWRBD). The MBW River flows through the counties Kerry, Cork and Waterford. The Blackwater River (Cork/Waterford) Special Area of Conservation (SAC) encompasses the entire length of the

catchment and part of the Galtee Mountains. The catchment contains 103 river water bodies, along 2,232.07km. Twelve of these 103 rivers are listed in the draft Munster Blackwater Sub-Basin Management Plan, as having a population of Freshwater Pearl Mussel. The MBW River has many tributaries including the Allow, Awbeg and the Owentaraglin and incorporates the Allow FPM catchment.

The Munster Blackwater is ranked 24 out of the 27 for the status of its FPM SAC population in Ireland. This rank is based on population status, habitat condition and current pressures, culminating in the Blackwater FPM population being classed in an "unfavourable" conservation status (Anon, 2010a) However, population density and distribution data gathered from ongoing FPM monitoring could alter the FPM status in the Upper Blackwater (Igoe & Murphy, 2015). The Blackwater catchment fails to meet all five Environmental Quality Objectives (EQOs) listed in **Table 4.**

The Munster Blackwater population of Freshwater Pearl Mussel was reported to be in unfavourable conservation status. The Blackwater population is believed to be composed entirely of aged adults, with no evidence of recruitment for at least 20 years (DEHLG, 2010a). Several surveys to establish the population status of the FPM have been carried out in the MBW catchment, however, to date there has been no detailed or systematic surveys undertaken. It is generally considered that a scattered population exists over a wide area from upstream of Mallow to Fermoy. The findings of surveys are given in DoEHLG (2010a) and are summarised as follows:

• Two living mussels and 300 dead mussels from a 500m stretch of river, 2km upstream of Mallow in 2004. Siltation of the mussels attributed to instream works was believed to be the cause of the mussel kill

•No mussels were recorded in these tributaries of the Blackwater catchment between 1997 and 2005; Glenlara, Brogeen, Dalua, Owenbaun, Glen, Nadd, Awanaskirtaun, Finnow, Rathcool, Corrigduff/Ivale, Grinaloo, Glashawee, Owenkeal, Cregg, Ross, Clyda, Duvglasha, Glen, Rahan, Ogeen and Bride

• A small number of adult mussels were found in gravels under willows upstream of Keale Bridge in 2008 in a short section of the Blackwater River (approx. 250m)

• In a presence/absence non-continuous survey of the Blackwater River 6km upstream and 6km downstream of Mallow in 2008, 19 out of the 38 sites examined had mussels. All sites upstream of Mallow town had mussels, some in relatively high density and only one site downstream had M. margaritifera present. At a location along the north bank of the river adjacent to the former Sugar Factory, an estimated density of up to 50-60 individuals per m2 were found beneath overhanging trees

• At the 38 EPA sites in the catchment, 18 had live mussels and 12 had dead shells. These sampling sites were located on the main River Blackwater channel between Lisheen Bridge (Cork) to Lismore Bridge (Waterford). Living mussels were also found in the Owentaraglin, Allow and the Licky River tributaries.

• A survey was undertaken in August of 2009 to check the status of FPMs in parts of the upper Blackwater catchment found no evidence of mussels between the town of Ballydesmond and the village of Knocknagree.

• Ross (2013) found small numbers of mussels near Scrahan, or 8.79rkm downstream of the Ballydesmond WWTP.

Furthermore, two more surveys were carried out in 2014. Ross (2014a) carried out FPM surveys on the upper Blackwater River (Munster) in Mallow in 2014. The survey covered the area directly downstream of Mallow Bridge. One live mussel was found in this area approximately 20m downstream from the concreted bridge apron of the bridge and 7m out from the southern bank. The report noted that the habitat was sub-optimal for FPM due to mobile and unstable substrate. A survey on the stretch of river downstream from the existing effluent pipe 520m downstream of Mallow Bridge was also carried out (Ross 2014b). The first 100m were effectively surveyed. No live mussels were found in this area. The 70m directly downstream were also surveyed and 5 live mussels were found approximately 150m downstream of the outfall. There were suitable areas of FPM habitat in this stretch however heavy siltation was noted along with eutrophication which make this area unsuitable for the survival of juvenile mussels.

An aquatic survey of the Blackwater River at Mallow was carried out by Ecofact in late-September /early October 2018. Only one live freshwater pearl mussel was found at the most downstream point of the study area, downstream of the existing outfall for the Mallow WWTP.

The decline of FPM populations in Ireland is primarily related to the continuous failure to produce new generations of mussels because of the loss of clean gravel beds, which have become infiltrated by fine sediment and/or over-grown by algae or macrophytes. Macrophytes smother the juvenile habitat even further, and trap more sediment, exacerbating the problem in the long term. Filamentous algae can lead to the death of juvenile mussels, through blocking oxygen exchange with the sediment (DoEHLG, 2010). The survival rates for glochidia in salmonid gills has been found to be in the region of 5%; with a further 5% survival rate for juvenile mussels in gravels in rivers capable of supporting recruitment (DoEHLG, 2010). If the river water remains strongly turbid for a number of days, mussels can die from oxygen starvation, either from remaining clammed, or from ingesting contaminated water while stressed. During a time of year when water temperatures are high, oxygen depletion in the body occurs more rapidly, and mussels die more quickly (DoEHLG, 2010).

Juvenile mussels require well-oxygenated and silt-free substrate and riffled habitats in low gradient watercourses frequently provide a suitable mix of rock, cobble and sand substrates. The typical substrate preference is small sand patches stabilised amongst large stones or boulders in fast-flowing streams and rivers (Skinner et al., 2003). Riverbed substratum characteristics appear to be the best physicochemical parameters for describing FPM habitat and for explaining their highly aggregated, non-random spatial dispersion (Hastie, Boon & Young, 2000). Average redox potential loss within the substrate at 5cm at 20% has been shown to be required for juvenile survival by Geist & Auerswald (2007). This is severely affected by siltation, algal growth and decomposition of organic material. The key improvements needed for the Munster Blackwater Catchment are to restore juvenile habitats to appropriate condition by simultaneously reducing nutrient and silt inputs to the river (DEHLG, 2010).

As part of the assessment for the Fermoy Weir Remediation Project a survey for Freshwater Pearl Mussel was carried out upstream and downstream of the weir (A Survey of The

Freshwater Pearl Mussel (Margaritifera margaritifera) at Fermoy Bridge on the Munster Blackwater River, Co. Cork, Sweeney Consultancy,2020). This report concluded the following:

In 2011, Sweeney Consultancy was involved in survey work additional to the EIS for the Munster Blackwater River (Fermoy) Drainage Scheme for OPW. Four live freshwater pearl mussels were recorded, along the right bank adjacent to the Plomeur car park, approximately 250m downstream of the bridge. This location is now covered in a deep layer of stone from the broken weir.

In the survey carried out on 29/05/2020, no live freshwater pearl mussels were found in the section of the River Blackwater within 100m upstream and downstream of Fermoy Bridge. A few empty shells, washed down from upstream were found in gravel/cobble deposits.

It is concluded therefore that there will be no direct impact on this species within or immediately downstream of the proposed development. While the present of occasional adults further downstream cannot be entirely discounted given that juveniles are absent, the short duration of the works and the dilution provided in the Blackwater River no significant effect on water quality is predicted to occur. Therefore, no significant effect on individual adults further downstream is predicted to occur. It is also noted that in the absence of works there is the potential for the high levels of silt to be deposited in the river due to ongoing erosion issues.

10.8 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)

This is a generic term for a number of different woodland types. The principal communities within the SAC are gallery woodland dominated by tree willows, principally Salix triandra, S. alba, S. fragilis, S. viminalis and S. cinerea., ash-ivy woodland, locally with alder (Alnus glutinosa) and pedunculate oak, with wood avens (Geum urbanum) and wood speedwell (Veronica montana) and Wet willow-alder-ash woodland (WN6). Most of the alluvial woodlands are relatively small stands, although on the lower reaches more extensive stands occur, albeit rather patchy and broken up by tall herb communities in marshes. The total area surveyed within the SAC is 19.2ha but the actual extent is considerably larger. Periodic flooding is essential for the maintenance of alluvial woodland. By and large the Blackwater has not been drained and flooding occurs periodically. Locally, embankments have been built to contain the water, but many have not been maintained. The habitat Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) does not occur in proximity to the proposed works area. A small area of this habitat which is currently being re-surveyed to confirm the habitat classification is located approximately 800m upstream of the proposed works area as indicated in **Figure 4.** The use of temporary dams may slightly increase water levels upstream of the weir which could have a slight effect on this habitat.

10.9 Qualifying SAC habitats and species potentially affected-specific targets

The NPWS conservation objectives for the Blackwater River SAC (NPWS 2012) details the following targets for species and habitats which were screened into this NIS for further assessment (**Tables 5 and 6).**

Table 5. QI species for which a potential impact has been identified – specific targets

Species	Attribute	Measure	Target

White Clawed Crayfish	Distribution	Occurrence	No reduction from baseline.
	Population structure: recruitment	Percentage occurrence of juveniles and females with eggs	Juveniles and/or females with eggs in at least 50% of positive samples
	Negative indicator species	Occurrence	No alien crayfish species
	Disease	Occurrence	No instances of disease
	Water quality	EPA Q value	At least Q3-4 at all sites sampled by EPA
	Habitat quality: heterogeneity	Occurrence of positive habitat features	No decline in heterogeneity or habitat quality
Sea Lamprey	Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary.
	Population structure of juveniles	Number of age/size groups	At least three age/size groups present
	Juvenile density in fine sediment	Juveniles/m²	Juvenile density at least 1/m²
	Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds
	Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive.
Brook Lamprey	Distribution	% of river accessible	Access to all water courses down to first order streams
	Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present
	Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m²
	Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds
	Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive.
River Lamprey	Distribution	% of river accessible	Access to all water courses down to first order streams

	Population structure of juveniles	Number of age/size groups	At least three age/size groups of river/brook lamprey present
	Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m²
	Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds
	Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive.
Atlantic Salmon	Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary
	Adult spawning fish Number	Number	Conservation Limit (CL) for each system consistently exceeded
	Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling
	Out-migrating smolt abundance	Number	No significant decline
	Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes
	Water quality	EPA Q value	At least Q4 at all sites sampled by EPA
Otter	Distribution	Percentage positive survey sites	No significant decline
	Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 103ha above high water mark (HWM); 1165.7ha along river banks/ around ponds
	Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 647.2ha
	Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 599.54km
	Extent of freshwater (lake) habitat	Hectares	No significant decline. Area mapped and calculated as 25.06ha
	Couching sites and holts	Number	No significant decline
	Fish biomass available	Kilograms	No significant decline
	Barriers to connectivity	Number	No significant increase

Freshwater Pearl Mussel	Distribution	Kilometres	Maintain at 161km.
	Population size	Number of adult mussels	Restore to 35,000 adult Mussels Information on the size of the population in the Blackwater and its tributaries is poor but estimated at less than 10,000 for the Blackwater main channel, for which the target is set at 10,000.
	Population structure: recruitment	Percentage per size class	Restore to at least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length Mussels of no more than 65mm are considered 'young mussels' and may be found buried in the substratum and/or beneath adult mussels. Mussels of no more than 30mm are 'juvenile mussels' and are always buried in the substratum.
	Population structure: adult mortality	Percentage	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution. The Blackwater failed both targets in 2009.
	Habitat extent	Kilometres	Restore suitable habitat in more than 35km and any additional stretches necessary for salmonid spawning. The species' habitat is a combination of 1) the area of habitat adult and juvenile mussels can occupy and 2) the area of spawning and nursery habitats the host fish can occupy. Fish nursery habitat typically overlaps with mussel habitat. Fish spawning habitat is generally adjacent to mussel habitat but may lie upstream of the generalised mussel distribution. Only those salmonid spawning areas that could regularly contribute juvenile fish to the areas occupied by adult mussels should be considered. The availability of mussel habitat and fish spawning and nursery habitats are determined by flow and substratum conditions. The habitat for the species is currently unsuitable for the survival of adult mussels or the recruitment of juveniles. The target is

			based on the stretches of river identified, from a combination of dedicated survey and incidental records, as having suitable habitat for the species. As there has been no full baseline survey, the quality of the data from the Blackwater and its tributaries is poor.
	Water quality: macroinvertebrate and phytobenthos (diatoms)	Ecological Quality Ratio(EQR)	Restore water quality- macroinvertebrates: EQR greater than 0.90; phytobenthos: EQR greater than 0.93. These EQRs correspond to high ecological status for these two Water Framework Directive biological quality elements. They represent high water quality with very low nutrient concentrations (oligotrophic conditions). The habitat in the Blackwater failed both standards during 2009 sampling for the Sub-basin Management Plans.
	Substratum quality: filamentous algae (macroalgae), macrophytes (rooted higher plants)	Percentage	Restore substratum quality- filamentous algae: absent or trace (<5%); macrophytes: absent or trace (<5%). Significant growth of macrophytes was found at some sites in all three populations sampled during 2009 for the Sub-basin Management Plans. Recruitment of juvenile mussels is being prevented by the poor quality of the river substrate.
	Substratum quality: sediment	Occurrence	Restore substratum quality- stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment. The habitat for the species is currently unsuitable for the recruitment of juveniles owing to sedimentation of the substratum. In some locations, it is also unsuitable for the survival of adult mussels.
	Substratum quality: oxygen availability	Redox potential	Restore to no more than 20% decline from water column to 5cm depth in substrate. Juvenile mussels require full oxygenation while buried in gravel. In suitable habitat, there should be very little loss of redox potential between the water column and underlying gravels. Data is not

			available for the main Blackwater River.
	Hydrological regime: flow variability	Metres per second	Restore appropriate hydrological regimes.The availability of suitable Freshwater Pearl Mussel habitat is largely determined by flow (catchment geology being the other important factor). In order to restore the habitat for the species, flow variability over the annual cycle must be such that: 1) high flows can wash fine sediments from the substratum, 2) low flows do not exacerbate the deposition of fines and 3) low flows do not cause stress to mussels in terms of exposure, water temperatures,food availability or aspects of the reproductive cycle.
	Host fish	Number	Maintain sufficient juvenile salmonids to host glochidial larvae. Salmonid fish are host to the larval form of the Freshwater pearl mussel and, thus, they are essential to the completion of the life cycle. 0+ and 1+ fish are typically used, both because of the habitat overlaps and the development of immunity with age in the fish. Fish presence is considered sufficient, as higher densities and biomass of fish are indicative of enriched conditions in mussel rivers. Geist et al. (2006) found that higher densities of host fish coincided with eutrophication, poor substrate quality for pearl mussels and a lack of pearl mussel recruitment, while significantly lower densities and biomass of host fish were associated with high numbers of juvenile mussels. Fish movement patterns must be such that 0+ fish in the vicinity of the mussel habitat remain in the mussel habitat until their 1+ summer. No fish stocking should occur within the mussel habitat, nor any works that may change the salmonid balance or residency time. No data on fish preferences are available for the Blackwater.

Table 6. QI habitats for which a potential impact has been identified – specific targets

Habitats	Attribute	Measure	Target
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	Habitat distribution	Occurrence	No decline, subject to natural processes
	Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes
	Hydrological regime: tidal influence	Daily water level fluctuations- metres	Maintain natural tidal regime
	Substratum composition: particle size range	Millimetres	The substratum should be dominated by the particle size ranges, appropriate to the habitat sub-type (typically sands, gravels and cobbles)
	Water quality: nutrients	Milligrammes per litre	The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition
	Vegetation composition: typical species	Occurrence	Typical species of the relevant habitat sub-type should be present and in good condition
	Floodplain connectivity: area	Hectares	The area of active floodplain at and upstream of the habitat should be maintained
Habitats	**Attribute**	**Measure**	**Target**
Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least 19.2ha for sites surveyed. S
	Habitat distribution	Occurrence	No decline.
	Woodland size	Hectares	Area stable or increasing. Where

			topographically possible, "large" woods at least 25ha in size and “small” woods at least 3ha in size
	Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi- mature trees and shrubs; and well-developed herb layer
	Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types
	Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy
	Hydrological regime: flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation
	Woodland structure: dead wood	m^3 per hectare; number per hectare	At least 30m^3/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder)

11. Water quality

11.1 EPA Biological Monitoring

Water quality is a key supporting feature for aquatic qualifying interests for the Blackwater River SAC and therefore any impacts on water quality have the potential to negatively impact on these species and habitats.

The Environmental Protection Agency carries out a biological assessment of most river channels in the country on a regular basis. The assessments are used to derive Q values, indicators of the biological quality of the water. The biological health of a watercourse provides an indication of long-term water quality. The EPA Q value scheme is summarised in **Table 7**. The relationship between the Q-rating system and the Water Framework Directive

classification as defined by the Surface Waters Regulations 2009 (S.I. 272 of 2009) is shown in **Table 8.**

The Q Value system which is used by the Environmental Protection Agency describes the relationship between water quality and the macro-invertebrate community in numerical terms. The presence of pollution causes changes in flora and fauna of rivers. Well documented changes occur in the macro-invertebrate community in the presence of organic pollution: sensitive species are progressively replaced by more tolerant forms as pollution increases. Q5 waters have a high diversity of macro-invertebrates and good water quality, while Q1 have little or no macro-invertebrate diversity and unsatisfactory water quality.

The intermediate ratings Q1-2, Q2-3, Q3-4 and Q4-5 are used to denote transitional conditions, while ratings within parenthesis indicate borderline values. Great importance is attached to the EPA biotic indices, and consequently it is these data that are generally used to form the basis of water quality management plans for river catchments. EPA biological monitoring data for the closest sites, for which up to date data is available, on the River Blackwater is shown in **Table 9** and **Figure 5.**

Table 7. EPA biotic index scheme.

Q value	Water quality	Pollution	Condition
5	Good	Unpolluted	Satisfactory
4	Fair	Unpolluted	Satisfactory
3	Doubtful	Moderately polluted	Unsatisfactory
2	Poor	Seriously polluted	Unsatisfactory
1	Bad	Seriously polluted	Unsatisfactory

Source: EPA

Table 8. Correlation between the WFD classification and Q values

Ecological status WFD	Q Values
High	Q5, Q4-5
Good	Q4
Moderate	Q3-4
Poor	Q3, Q2-3
Bad	Q2, Q1

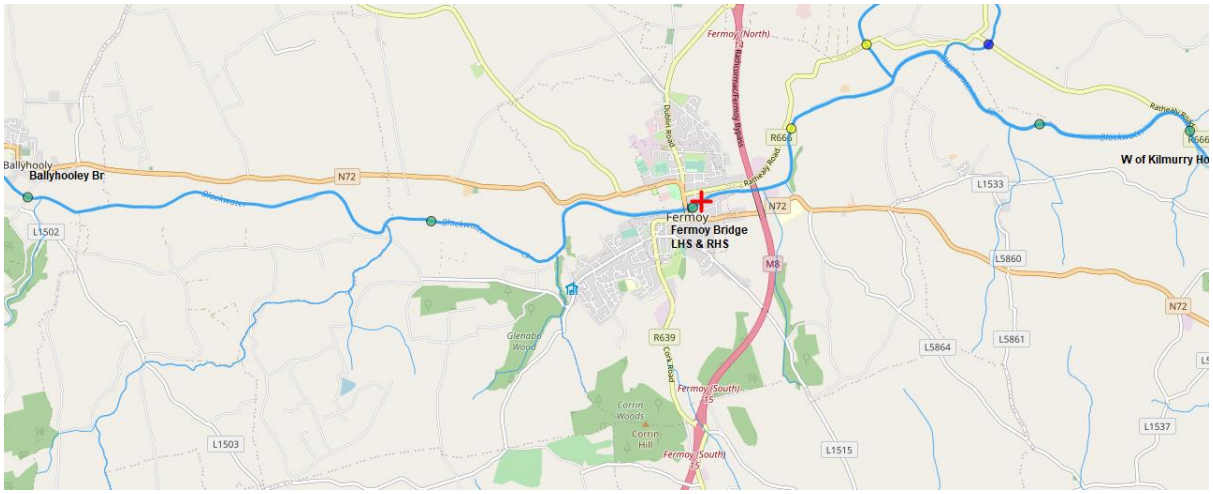


Figure 4 Location of EPA Q values.

Table 9. Q-values and survey locations.

Q-Value location	Distance from development (as the crow flies)	Q-Value (Most recent)
MUNSTER BLACKWATER		
Ballyhooley Br	9.2 km upstream	Q4(Fair Status – 2018)
Fermoy Bridge LHS	Adjacent	Q4(Fair Status – 2015)
Fermoy Bridge RHS	Adjacent	Q4(Fair Status – 2018)
W of Kilmurry Ho	7.8km downstream	Q4 (Fair Status – 2018)

Source: EPA Envision map system

11.2 River Basin Management Plan for Ireland 2018 – 2021 (2nd Cycle)

The Water Framework Directive (WFD) sets out the environmental objectives which are required to be met through the process of river basin planning and implementation of those plans. Specific objectives are set out for surface water, groundwater and protected areas. The challenges that must be overcome in order to achieve those objectives are significant. Therefore, a key purpose of the River Basin Management Plan (RBMP) is to set out priorities and ensure that implementation is guided by these priorities.

The second cycle RBMP aims to build on the progress made during the first cycle. Key measures during the first cycle included the licensing of urban waste-water discharges (with an associated investment in urban waste-water treatment) and the implementation of the Nitrates Action Programme (Good Agricultural Practice Regulations). The former measure has resulted in significant progress in terms both of compliance levels and of the impact of urban wastewater on water quality. The latter provides a considerable environmental baseline which all Irish farmers must achieve and has resulted in improving trends in the level of nitrates and phosphates in rivers and groundwater. It is acknowledged, however, that sufficient progress has not been made in developing and implementing supporting measures during the first cycle.

Overall, RBMP assesses the quality of water in Ireland and presents detailed scientific characterisation of our water bodies. The characterisation process also takes into account wider water quality considerations, such as the special water-quality requirements of protected areas. The characterisation process identifies those water bodies that are At Risk of not meeting the objectives of the WFD, and the process also identifies the significant pressures causing this risk. Based on an assessment of risk and pressures, a programme of measures has been developed to address the identified pressures and work towards achieving the required objectives for water quality and protected areas. Data relating to the watercourses within the study area is provided in **Table 10** and shown in **Figure 6**.

Table 10. Water Framework Directive Data – Relevant data

Catchment: Blackwater (Munster) (Code 18) – 2nd Cycle

This catchment includes the area drained by the River Blackwater and all streams entering tidal water between East Point and Knockaverry, Youghal, Co. Cork, draining a total area of 3,310km². The largest urban centre in the catchment is Mallow. The other main urban centres in this catchment are Fermoy, Mitchelstown, Youghal, Kanturk and Millstreet. The total population of the catchment is approximately 109,030 with a population density of 33 people per km².

The Blackwater rises on the southern side of Knockanefune in the Mullaghareirk Mountains and flows south to Rathmore where it is joined by the Cullavaw River and the Owentaraglin River. The Blackwater continues eastwards to Banteer where it is joined by the Allow River from the north and the Glen River from the south. On its route east, the Blackwater is joined by the Awbeg, and the Cyldagh River before flowing through Mallow and eastwards to Fermoy. Downstream of Fermoy, the river is joined by its tributaries, the Rivers Funsion, Ariglin and Owennashad. The Blackwater becomes tidal, before turning abruptly south at Cappoquin where the Glennafilla River joins from the northeast. The tidal Blackwater is joined by the Finisk River and the Bride River from the west downstream of Villerstown. The Goish, Licky, Glendine and Tourig Rivers drain the lands adjacent to the estuarine part of the catchment, and the Blackwater then flows past Youghal and out to sea through Youghal Harbour.

The Munster Blackwater catchment comprises 28 subcatchments with 158 river water bodies, no lakes, three transitional and one coastal water body, and 18 groundwater bodies. There are no heavily modified or artificial water bodies in the Munster Blackwater Catchment.
There are three designated Nutrient Sensitive Areas (NSAs) (Blackwater (River), Blackwater Estuary Upper and Blackwater Estuary Lower) associated with three waste water treatment plants (Mallow, Fermoy and Youghal).

Two of the three urban wastewater treatment plants (Mallow and Fermoy) have tertiary treatment and, therefore, were compliant with the environmental objectives for NSAs.

Youghal urban wastewater treatment was not compliant with the environmental objective for NSAs in 2015. Works are currently underway to provide secondary treatment at the plant.

<u>Waterbodies At Risk</u>

Fifty-two river water bodies in the catchment are At Risk of not meeting their water quality objectives. There are 15 river water bodies in Review (this means that either more information is required, or Good ecological status was recorded in 2010-2015, but nutrient concentrations are elevated).

Alteration of hydro-morphological (or physical) conditions is one of the most significant issues in rivers in the Munster Blackwater Catchment. This includes inputs of excess fine sediment and alteration of the morphology of the river channel, which in turn alter habitat conditions. This can occur because of, for example, implementing river and field drainage schemes, forestry activities, animal access, and discharge from quarries.

Excess phosphate leading to eutrophication is also a significant issue of concern in several water Bodies.

Urban Wastewater Treatment Plants (WWTPs) and agglomeration networks have been identified as a significant pressure in 13 At Risk water bodies within the catchment. None of these is relevant to the proposed development being assessed.

Subcatchment data

The proposed development falls close to the eastern boundary of Subcatchment Blackwater [Munster]_SC_110. The issues on the main channel occur in the westerly part of the subcatchment and range from elevated nutrients due to a combination of point (Section 4 and licenced facility) and urban diffuse sources on Blackwater (Munster)_130 to unknown pressures driving moderate fish status on Blackwater (Munster)_160. On a tributary to the Blackwater, Ross Killavulleen_010, ecological status declined to Moderate and the significant pressures are a combination of hydromorphology, forestry and nutrients from an urban wastewater treatment plant.

Waterbodies prioritised for Action

Following the publication of the draft river basin management plan in early 2017, the EPA and the Local Authority Waters and Communities Office (LAWCO) jointly led a collaborative regional workshop process to determine where, from a technical and scientific perspective, actions should be prioritised in the second cycle. The prioritisation process was based on the priorities in the draft river basin management plan, the evidence from the characterisation process, and the expertise, data and knowledge of public body staff with responsibilities for water and the different pressure types. The recommended areas for action selected during the workshops were then agreed by the Water and Environmental Regional Committees. The recommended areas for action are an initial list of areas where action will be carried out in the second cycle. All water bodies that are At Risk still however, need to be addressed. The initial list of areas for action is not therefore considered as a closed or finite list; it simply represents the initial areas where work will be carried out during the second WFD planning cycle from 2018 to 2021.

In the Munster Blackwater Catchment, thirteen river water bodies within have been prioritised for action as the water conservation objectives for their species and/or habitats are not being supported by ecological status. This includes seven water bodies with designated Freshwater pearl mussel populations and the reasons for selection included failing to meet protected area objectives for Freshwater Pearl Mussel. None of these have relevance to the proposed development being assessed. The Funshion _080 (A tributary >4km east of Fermoy) has been identified as At Risk but it is not a High ecological status objective water body.

(A remaining fifty-eight At Risk and Review surface water bodies were not included in the recommended areas for action for the second cycle.

Blackwater [Munster] – River Waterbodies relevant to the proposed project

Waterbody	Status 2007-09	Status 10-12	Status 10-15	Protected area (SAC)	Significant Pressures identified	WFD Risk	Date to meet environmental objective
Blackwater (Munster)_190	Poor	Good	Good	Within protected area	None	Not at risk	N/A

Blackwater (Munster)_200	Good	Good	Good	Within protected area	None	Not at risk	N/A

Figure 6. Blackwater [Munster] – River Waterbodies relevant to the proposed works (red square) | Source: EPA Envision mapping (https://gis.epa.ie/EPAMaps/) | Not to scale

11.3 Fermoy Wastewater Treatment Plant

The WWTP was designed to cater for a population equivalent of 11,000 and the existing P.E. served by the wastewater works is 9,855, with a remaining capacity of 1,145. (EPA, 2019). The 2018 Annual Environmental Report (AER) states that the WWTP discharge is compliant with the ELV's set in the Wastewater Discharge Licence. In relation to ongoing monitoring of water quality by Irish Water the 2018 AER summarised the following:

- The WWTP discharge was compliant with the Emission Limit Values (ELV's) set out in the wastewater discharge licence.
- The discharge from the wastewater treatment plant does not have an observable impact on the water quality.
- The discharge from the wastewater treatment plant does not have an observable negative impact on the Water Framework Directive status.

12. Assessment of Potential Effects from the proposed works

All potential impacts relate to discharges into the River Blackwater and impacts to relevant habitats and fauna. Based on the EC Article 6 Guidance Document (2001) and IEEM guidelines '*Guidelines for Ecological Impact Assessment*' (IEEM, 2016) 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. As the Natura 2000 sites are of International importance, any significant adverse impacts would be significant at an 'International' level.

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

As part of the assessment direct, indirect and cumulative 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:

- Effects on water quality
- Spread of Invasive Species and Biosecurity Risks
- Impacts on fish migration and spawning
- Loss of habitat
- Direct effects on qualifying species
- Prevention of ongoing erosion, damage to flood relief walls and siltation effects
- In combination effects

13. Effects on Water Quality

13.1 Hydrocarbons

Instream works and surface water emissions associated with the proposed works could impact on aquatic habitats via increased silt levels in surface water run-off and resuspension of riverbed sediments and inadvertent spillages of hydrocarbons from fuel and hydraulic fluid.

Inadvertent spillages of hydrocarbon and/or other chemical substances during construction could introduce toxic chemicals into the aquatic environment via direct means, surface water run-off or groundwater contamination. Some hydrocarbons exhibit an affinity for sediments and thus become entrapped in deposits from which they are only released by vigorous erosion or turbulence. Oil products may contain various highly toxic substances, such as benzene, toluene, naphthenic acids and xylene which are to some extent soluble in water; these penetrate into the fish and can have a direct toxic effect. The lighter oil fractions (including kerosene, petrol, benzene, toluene and xylene) are much more toxic to fish than the heavy fractions (heavy paraffins and tars). In the case of turbulent waters, the oil becomes dispersed as droplets into the water. In such cases, the gills of fish can become mechanically contaminated and their respiratory capacity reduced. However, any such spills, in the unlikely event of their occurrence, would be minor in the context of the available dilution in the Blackwater River and impact the will be localised.

Hydrocarbon contamination could potentially impact on water quality and thus could impact on aquatic qualifying species for the Blackwater River (Cork/Waterford) namely Freshwater Pearl Mussel, Sea Lamprey, Brook lamprey, River Lamprey, White Clawed Crayfish, and Atlantic Salmon. There could also be impacts on Brown Trout which are an important component of the Freshwater Pearl Mussel lifecycle and on European Eel which is now considered endangered.

Significant impacts on White Clawed Crayfish and on fish stocks, if they were to occur, could impact on otter due to a reduction in prey availability.

No effect on Twaite Shad will occur given the minor nature of any spills, the distance for Twaite Shad populations from the works area and the dilution provided in the lower reaches of the Blackwater River.

A range of mitigation measures have been specified in Section 14 to minimise the risk of such spills occurring and measures have been specified to effectively deal with such spills were they to occur. It is also noted that any spills would be minor in the context of the dilution provided within the Blackwater River. It is concluded therefore that no impact on water quality from hydrocarbons or other chemical spills during construction will occur and thus no adverse effects on the aquatic qualifying interests and conservation objectives for qualifying interests will occur or on the integrity of European sites will occur.

13.2 Silt

The proposed works have the potential to generate silt. It is noted however that the current situation where there is severe erosion has already resulted in bank collapse and the deposition of high levels of silt including relatively fine particles from boulder clay into the Blackwater River SAC. In the absence of works and given the high velocity of river water moving through the breach in the weir, this process will continue. As shown in **Appendix 2** the estimated extent of ground that could be lost due to erosion if temporary/permanent remedial works are not carried out = 247m3 to 413m^3 most of which would be deposited on the riverbed as fine/coarse sediment. This has the potential to have a significant deleterious effect on aquatic QI species for the Blackwater River SAC.

High levels of silt can impact on fish species, in particular spawning salmonids. Suspended sediment can settle on spawning areas, infill the intragravel voids and smother the eggs and alevins (newly hatched fish) in the gravel. If of sufficient severity, adult fish could be affected by increased silt levels as gills may become damaged by exposure to elevated suspended solids levels. Similarly, aquatic invertebrates may be smothered by excessive deposits of silt from suspended solids. In areas of stony substrate, silt deposits may result in a change in the macro-invertebrate species composition, favouring less diverse assemblages and impacting on sensitive species. Suspended sediment can reduce water clarity and visibility in the stream, impairing the ability of fish to find food items

Aquatic plant communities may also be affected by increased siltation. Submerged plants may be stunted and photosynthesis may be reduced. Qualifying habitats which are estuarine or terrestrial in nature wont be affected; however, there could be an impact on the river habitat water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation downstream of the proposed works area.

Silt can be extremely harmful to Freshwater Pearl Mussel. Silt deposition on the riverbed results in formerly clean gravels become clogged with fine sediment. This prevents oxygen movement into the waters in the riverbed (interstitial) that feed the juvenile mussels, and they quickly die. Each time siltation of gravels occurs, all juvenile mussels below five years of age are killed, and in rivers with chronic siltation problems, juvenile recruitment is rare and unsustainable, and existing adult populations face extinction. Fine sediment, once introduced to a pearl mussel river, can continue to cause very serious effects on a long term basis (Ellis 1936, Marking & Bills 1979, Naden et al. 2003, Araujo & Ramos 2001, Killeen et al. 1998. All referenced in DEHLG, 2010).

Direct ingestion of silt by adult mussels can lead to rapid death. Turbidity, particularly from fine peat entering the water, causes adult mussels to clam up (they close their shells tightly and do not filter water through their siphons), a response that provides a protection against ingesting damaging fine particles. If the river water remains strongly turbid for a number of days, mussels can die from oxygen starvation, either from remaining clammed, or from

ingesting contaminated water while stressed. The fine sediment subsequently provides a medium for macrophyte growth, which makes the riverbed habitat unsuitable for pearl mussels

It is noted that the Fourth Schedule of the Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (S.I. No. 296 of 2009) cites five ecological quality objectives for Freshwater pearl mussel habitat- See **Table 4**. The Blackwater catchment fails to meet all five Environmental Quality Objectives (EQOs) listed.

Juvenile Freshwater Pearl Mussels require an extremely low concentration of Phosphate in the interstitial water in which they live. According to the Freshwater Pearl Mussel Sub Basin Management Plans Literature Review (May 2010, Subsection 3.1.13), ''*…….the normal background ortho-phosphate level of 0.005 mg/l is considered to be essential to the maintenance of oligotrophic waters for reproducing pearl mussel rivers* (Moorkens, 2006).'' In the ecological quality objectives **Table 4** sustainable pearl mussel habitat attributes, an EQR ≥0.90 for biological water quality (macroinvertebrates) equates to WFD high status or an EPA Q value rating of 4-5 or 5. Results between 1971 and 2018 are consistent, with a Q value of 4 recorded.

Based on the above and as confirmed by surveys in the lower catchment to date, the conditions do not exist at present within the lower catchment to support functioning populations of Freshwater Mussel and only adults are likely to be present, nor are such conditions likely to occur in the short-term. In the context the generation of silt as a result of works, particularly when compared to the amount of silt that will be generated by ongoing erosion, given the absence of juvenile populations which are most susceptible to elevated silt levels and given that silt is likely to be rapidly moved downstream by winter storms rather than consolidate on the riverbed, no significant adverse effect on this species is likely to occur.

No effect on Twaite Shad will occur given the distance for Twaite Shad populations from the works area and the dilution provided in the lower reaches of the Blackwater River. It is also noted that Twaite Shad inhabit estuarine areas of the Blackwater River which naturally undergo significant fluctuations in silt levels.

Based on the above, increased silt levels, if severe, could potentially impact on water quality and thus could impact on aquatic qualifying species for the Blackwater River (Cork/Waterford) namely Sea lamprey, Brook lamprey, Freshwater Pearl Mussel, White Clawed Crayfish, River Lamprey and Atlantic Salmon. Significant impacts on fish stocks could impact on otter due to a reduction in prey availability. A range of standard mitigation procedures will be employed during construction to minimise the potential for impacts on water quality. These mitigation methods will effectively minimise impacts from silt. As noted above the emergency works will prevent bank collapse and the associated high level of silt deposition within the watercourse. It is also noted any silt generated during emergency works in Autumn 2020 is likely to be rapidly dissipated by winter storms, however in the absence of emergency maintenance works there may be ongoing erosion in spring/summer of 2021 and this silt may consolidate on the riverbed and therefore have a more detrimental ecological effect.

Following the implementation of mitigation measures identified in Section 14, it has been concluded that the works will not have a significant effect on water quality and thus on the aquatic qualifying interests and conservation objectives or integrity of European sites.

13.3 Spread of Invasive Species and Biosecurity Risks

There is potential during the construction phase of the proposed works for invasive species to be spread within the Blackwater River (Cork/Waterford) SAC thus impacting negatively on terrestrial habitats.

Himalayan Balsam was recorded growing within and in close proximity to the development area. Theoretically, the spread of this species could impact on European sites although it is

noted that the ecological impact from the spread of this species is low and as at a local level this species is extremely common. Any effects can be effectively prevented by the implementation of standard mitigation measures.

Crayfish occur within the Blackwater system and establishment of the disease crayfish plague can have highly detrimental impacts on this species. Throughout its European range, this species has been decimated by the impact of Crayfish plague disease which spread to Europe with the introduction of the plague carrier North American species of crayfishBiosecurity protocols will be strictly enforced. A Biosecurity Management Plan which will be prepared by the contractor and approved by the supervising ecologist prior to the commencement of site works. The Biosecurity Management Plan will take into account up do date information with respect to biosecurity risks. Biosecurity protocols will be strictly enforced as the risks associated with non-compliance are high. Protocols will follow Irish Waters Standard Operation Procedures and guidance.

Overall, the implementation of mitigation measures identified in Section 14 will ensure there is no effect on the qualifying interests and conservation objectives and integrity of European sites from biosecurity or invasive plant issue.

13.4 Impacts on fish migration and spawning

13.4.1 Migration

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 & 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 can make these species more susceptible to predation or poaching.

Although works will be carried out as early as practically possible, they will extend into November which is outside the migration period for lamprey species however salmon may be migrate through this area during the works. It is noted works will take place at one side of the river and whilst the use of a temporary dam, which will only be used for very limited time periods, will change flow patterns Atlantic Salmon may be able to migrate upstream using either the breach in the weir, the existing fish pass or the shallow trough type feature on the weir surface. In a worst-case scenario, there will be a short-term delay in fish migration upstream.

In addition, construction activities will be undertaken primarily during daylight hours only and will ensure that there is generally the potential for undisturbed passage at night, when main surges of migratory fish are more likely to occur. Given the limited nature of the works no increased risk of predation or poaching has been identified.

Movement of sea lamprey and river lamprey will not be affected as works will take place outside the migration period for these species.

Given the distance to Twaite Shad populations which only occur downstream and given the estuarine conditions in which these species commonly occur, no impact on Shad migration patterns will occur.

13.4.2 Spawning

The main channel of the River Blackwater is a designated Salmonid Water designated under the European Communities (Quality of Salmonid Waters) Regulations of 1988 (S.I. No. 293 of 1988). Suspended sediment can settle on spawning areas, infill the intragravel voids and smother the eggs and alevins (newly hatched fish) in the gravel. Taking a worst case scenario, there is suitable salmon spawning and nursery habitat and lamprey spawning habitat within the proposed works area. The egg and juvenile stages of the salmon and lamprey life cycles are very vulnerable to deteriorations in water quality.

River lamprey spawn from April to May and sea lamprey from June to mid-July. Sea lamprey are known to spawn in this area (Habitats Directive Assessment Report Removal of Gravel Islands from Blackwater River at Fermoy, Sweeney Consultancy 2010 - Alan Cullagh, Inland Fisheries Ireland, *pers comm.*).

Salmon spawn from November to January and works are expected to extend into November. As noted earlier. due to the breach in the weir the works area has been highly modified by the increased flow velocities in this area. The habitats in this area are not stable and are of recent origin. This area was not surveyed in detail due to the high water velocities however taking a worst case scenario there could be small areas of spawning/nursery habitat for salmon within the works area. However the works will have commenced before the spawning period and these areas of habitat will not be available by the time spawning commences. Taking a worst case scenario there may be a very minor loss of recently formed, potential spawning habitat for salmon and this habitat will be removed prior to the spawning period.

Shad spawn between early April and the end of June and given the distance to Twaite Shad populations which only occur downstream and given the estuarine conditions in which these species commonly occur, no impact on Shad spawning will occur.

13.5 Loss of habitat

13.5.1Terrestrial and aquatic habitat

Potential impacts on aquatic habitats will be generally restricted to physical alteration to the riverbed habitat/morphology and smothering of habitats due to resuspension of sediments. Flows will be diverted away from the works area and detailed mitigation, including silt curtains, will be utilised to minimise any deposition of resuspending sediments on aquatic habitats. Riverbed material removed by the works within the River Blackwater will be used for backfill in order to maintain natural riverbed material in the reinstated bed area. Fish shall be removed from the area of river within the barriers and dams and within any silt curtain envelope. White Clawed Crayfish will be trapped and relocated from the works area. Cavities within the rock armour will provide suitable habitat for White Clawed Crawfish.

The terrestrial habitats to be affected are of low value and consist of BL3 Buildings & artificial surfaces and GA2 Amenity grassland and an area of gravel and tall herb swamp. Gravel removed from areas of gravel adjoining the works area will be taken from above the waterline. There will be impacts on the river substrate, however the restored structures and substrate will be comparable to what was present prior to the breach of the weir and the subsequent increased erosion with the works area.

Marginal habitats with overhanging vegetation and reduced flows are important for migration as they provide areas of cover for fish and invertebrates and for otter. These marginal areas also provide protection from predators and direct sunlight and consequently fish may remain

in these areas for extensive periods of time. There will be no significant loss of riparian trees associated with this project.

13.5.2 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae

There is a small pocket of woodland upstream of the works area which may be categorised as Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae). It is noted however the breach of the weir is relatively recent and this has altered upstream flow dynamics which may be having adverse effect on alluvial woodland upstream due to lower water levels. The temporary dam may result is a slight rise in water levels upstream of the weir for the short periods that it is in situ, which will move conditions back towards the baseline conditions that existed when the alluvial woodland was developing. Therefore, the works are likely to have a neutral to slightly positive impact on alluvial woodland upstream of the works area. Downstream of the works there are no areas of alluvial woodland in proximity to the works area and given the temporary nature of the works no significant impact on water levels or flow patterns is predicted to occur. Therefore, no effect on alluvial woodland downstream of the works area will occur.

13.5.3 Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation

The NPWS conservation objectives for the Blackwater River SAC (NPWS 2012) notes that no high conservation value subtypes of the qualifying habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation are known to occur in the SAC and further survey is required to determine whether any such are present. This document also notes that one rare/threatened vascular plant species is known to occur in the SAC, the protected opposite-leaved pondweed (*Groenlandia densa*), which is abundant in the tidal stretches around Cappoquin.

No significant examples of the qualifying habitat Watercourses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation were recorded within the works area during site surveys for the Fermoy Weir Remediation Project.

Overall based on the short-term nature of the works, the seasonal restrictions pertaining to the project, the implementation of detailed and site specific mitigation measures and the reinstatement of instream habitat post construction no significant loss of habitat is predicted to occur and the proposed development will not result in any significant deterioration in habitat quality or loss of habitat within the Blackwater River (Cork/Waterford) SAC.

13.6 Direct effects on qualifying species

13.6.1 Atlantic Salmon, River Lamprey, Brook Lamprey, Sea Lamprey, Twaite Shad

Construction activities will be limited to daylight hours where possible and will minimise night working when main surges of migratory fish are more likely to occur.

There is the potential for direct impacts on fish species including QI species such as Atlantic Salmon and Brook Lamprey to become trapped within silt curtain envelopes. Other species such as European Eel, Brown Trout and Dace may also be affected. The area to be affected is small and an electrofishing salvage operation will be carried out (by IFI or by licenced ecologist) to remove any fish that become enclosed within the works area. This will ensure that there will be no significant direct effects on species listed as QIs for the Blackwater River SAC such as Atlantic Salmon and Brook Lamprey and no significant effect on other species such as Brown Trout and Eel which are prey for otter.

13.6.2 White Clawed Crayfish

NPWS conservation objectives for the Blackwater River SAC (NPWS 2012) lists specific targets with respect to this species. Relevant targets relate to distribution, population structure: recruitment, negative indicator species, disease, water quality, habitat quality: heterogeneity.

The works will impact on the existing river substrate of mixed stone and gravel and will result in the removal of undercut banks which, assuming a worst case scenario, may provide suitable refuges for White Clawed Crayfish. The use of scour protection and rock amour will alter the habitat within the works area and may result in the loss of refuges for White Clawed Crayfish. It is noted that White Clawed Crayfish are gradually colonising the Blackwater River and there is likely to be large areas of habitat which is available to this species.

A trapping programme will be implemented to ensure that any Crayfish within this area are removed prior to the commencement of works. Up to twenty 'Trappy Funnel Crayfish Traps' ballasted with extra rock will be positioned in the footprint of instream works areas during each trapping episode.

If flows are too high to remove crayfish prior to commencement of site works then it may be necessary to remove crayfish once the temporary dam is in place. The ECOW will check for crayfish on an ongoing basis during site works and translocated as necessary. An outline methodology is included as **Appendix 4.** In addition to the translocation area outlined in **Appendix 4,** a second translocation area will be located adjacent to Fermoy Slipway as agreed with NPWS. The Section 23 and 24 license to capture and translocate White Clawed Crayfish is attached as **Appendix 5.**

It is noted that the rock armour is expected to provide refuges for this species. No significant adverse effect on this species will occur.

13.6.3 Freshwater Pearl Mussel

The habitats within the works area were disturbed by the previous works for the construction of the Fermoy Flood Relief Walls at this location. In absence of any active juvenile recruitment in the interim period the presence of Freshwater Pearl Mussel within this area is highly improbable and no FPM were recorded in this area during FPM surveys for the Fermoy Weir Remediation Project in 2020. There are no known areas of active recruitment downstream of the works and the works will prevent significant deposition of fine material into the Blackwater River SAC. No significant adverse effect on this species will occur.

13.6.4 Otter

Potentially increased noise and disturbance associated with the site works could cause disturbance/displacement of fauna. If of sufficient severity, there could be impacts on reproductive success.

Otter activity in this general area is high and works will impact directly on a otter couch which is extensively used as a feeding area. An otter holt is located approximately 180m from the proposed works. There is no evidence that this is a breeding holt and this will be determined by trail camera monitoring prior to the commencement of site works. There will be some disruption of otter activity during the works period although there will nothing to preclude from using the works area when works are complete.

Therefore, the primary concern is disturbance from noise, light and disturbance during site works. It is noted otter would have undergone disturbance and possible displacement during the Fermoy Flood Relief Scheme works in this area but they readily used this area once works were complete. Otters and in particular otters in urban areas, as evidenced by their presence

in Irish cities, can habituate to increased noise and disturbance and are largely nocturnal. Most of the work will be carried out during daylight hours and there will be no significant barriers to otter movement during site works.

13.7 Prevention of ongoing erosion, damage to flood relief walls and siltation effects

The proposed works have the potential to generate silt although mitigation measures will be put in place to minimise such impacts. It is noted however that the current situation where there is severe erosion has already resulted in bank collapse and the deposition of high levels of silt including relatively fine particles from boulder clay into the Blackwater River SAC. In the absence of works and given the high velocity of river water moving through the breach in the weir, this process will continue**.** As shown in Appendix **2** the estimated extent of ground that could be lost due to erosion if temporary/permanent remedial works are not carried out = 247m^3 to 413m^3 most of which would be deposited on the riverbed as fine/coarse sediment. This has the potential to have a significant deleterious effect on aquatic QI species for the Blackwater River SAC.

As noted above the emergency works will prevent bank collapse and the associated high level of silt deposition within the watercourse. It is also noted any silt generated during emergency works in Autumn 2020 is likely to be rapidly dissipated by winter storms, however in the absence of emergency maintenance works there may be ongoing erosion in spring/summer of 2021 and this silt may consolidate on the riverbed and therefore have a more detrimental ecological effect. Therefore, the proposed works are likely to have a beneficial effect by reducing bank erosion and the subsequent deposition of fine sediment on the river substrate.

13.8 In-combination effects

In-combination effects refer to a series of individual impacts that may, in combination, produce a significant impact. The underlying intention of this in combination provision is to take account of cumulative impacts from existing or proposed plans and projects and these will often only occur over time. The proposed works could theoretically create a cumulative impact. Other developments relevant to the proposed development and potential cumulative effects are listed in **Table 12**.

Table 12. Other developments near site and potential cumulative impacts

Plans and Projects	**Key Policies/Issues/Objectives Directly Related to the Conservation of the European Network**	
River Basin Management Plan 2018-2021	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	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.

	issues which will build knowledge for the third cycle.	
Inland Fisheries Ireland Corporate Plan 2016 -2020 **The Inland Fisheries Act 2010.**	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 that pristine 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.	The implementation and compliance with key environmental issues and objectives of this corporate plan will result in positive in-combination effects to European sites. The implementation of this 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 2014-2016	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. 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 River Blackwater SAC i.e. Dairygold,	Discharges from these facilities are governed by strict limits to to

	Micam, Road Binders, ALPS Electric Ireland, Newmarket Creameries Co-op, Micro-Bio Limited.	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
Industrial Applications Under consideration	Dairygold Co-operative Society (Ref 184616) Construct a significant Expansion of their Milk Processing Facility at Annabella, Mallow, Co. Cork. Dairygold Co-operative Society (Ref 184946): Includes large scale expansion of site. The application relates to an establishment which has an Industrial Emissions Licence (P0403-03). The EIAR and the NIS will be submitted to the Planning Authority with the Application. Quarry Park Ltd (Ref 167121). General industrial development with storm water drainage, water supply infrastructure, pump houses. It is noted that any 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.	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.
Residential Applications Under consideration	The South West Regional Planning guidelines (2010) have identified a population target for Mallow of 22,000 by 2022. Mallow has also been identified as a 'hub' town in the National Spatial Strategy (NSS). Cork County Development Plan has set out a slightly lower growth plan for Mallow to 20,000 by 2022, representing a growth of 72% from 2011 levels. Therefore, there is likely to be significant housing development in the area is the short to medium term. It is noted that any future developments will only be granted permission where discharges from same meet with relevant water quality standards. The	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.

	long-term cumulative impact is predicted to be negligible.	
Fermoy Weir Remediation Project	The Fermoy Weir is a protected structure and such is expected to be repaired in the future. Any such works will have to take into consideration the requirement of the Habitats Directive in relation to QI habitats and species for the Blackwater River SAC. In particular the remediation of the weir will need to take into account the requirement of the passage of migratory fish listed as QIs for this European site.	The emergency works will not have a significant effect on the integrity of the Blackwater SAC. The remediation of the weir will take into account the requirements of the Habitats Directive and will be planned and carried out in a manner that prevents significant adverse effects on European sites. No significant adverse effects on the integrity of Natura 2000 sites will occur.

The proposed works could theoretically have in-combination impacts on water quality during construction. Impacts from noise and disturbance during construction and operation could also arise. A range of mitigation measures will be implemented during construction to effectively prevent impacts on water quality during construction. These include detailed methodologies for all works and no impediments to their effective implementation has been identified. The measures to be implemented will effectively prevent any significant discharges of hydrocarbons or excess levels of silt from the individual elements of the project thus ensuring that no cumulative impacts will occur.

The works will be located in proximity to the town of Fermoy and thus background levels of noise and disturbance will be relatively high. Whilst works could potentially disrupt feeding patterns, given the short-term nature of the disturbance, the often-nocturnal habits of otter and the ability of otter to move away from disturbance, no significant impact on otter is predicted to occur and thus no cumulative impact on this species from disturbance has been identified.

In the absence of any significant potential impacts on the on the qualifying interests and conservation interests for the River Blackwater SAC and in the absence of significant impacts on its overall integrity, no potential cumulative impact from the proposed works has been identified.

14. Mitigation

- A suitably qualified Ecological Clerk of Works (ECOW) with experience in supervision of instream works will be appointed prior to commencement of the works.
- The mitigation measures to be implemented are based on proven technology and techniques which have been agreed with the relevant experts (IFI). Works will be overseen by the ECOW who will liaise with the contractor prior to the commencement of site works and will evaluate the effectiveness of mitigation measures. In the unlikely event that the mitigation measures do not function as planned during construction, it will be role of the ECOW to supplement the mitigation measures to ensure that they function as planned. Ultimately, the ECOW may decide to halt works until mitigation functions effectively.

However, the benefit of halting the works, will need to be balanced against the risk of not getting the works completed in advance of wet winter weather and further floods. It is conceivable that the risk of not getting the works completed, is considered a more significant negative than not a mitigation measures or measures not functioning as intended.

14.1 Mitigation measures and guidelines.

A detailed Construction and Environmental Management Plan (CEMP) will be developed by the appointed Contractors. The principal mitigation measures included in the CEMP are detailed below:

Construction best practice measures (of relevance in respect of any potential ecological impacts) will be implemented throughout the project, including the preparation and implementation of detailed method statements. The mitigation measures detailed herein have been devised following the guidelines:

- NRA (2010) *Guidelines for the Management of Noxious Weeds and Non- Native Invasive Plant Species on National Roads*. National Roads Authority, Dublin.
- IW-AMP-SOP-009 Information and Guidance Document on Japanese knotweed
- Asset Strategy and Sustainability and Invasive Species Ireland Best Practice Management Guidelines for Himalayan Balsam
- IFI (2016) *Guidelines on protection of fisheries during construction Works in and adjacent to waters* (IFI, 2016)
- H. Masters-Williams et al (2001) *Control of water pollution from construction sites. Guidance for consultants and contractors (C532).* CIRIA.
- E. Murnane, A. Heap and A. Swain. (2006) *Control of water pollution from linear construction projects. Technical guidance (C648). CIRIA.*
- E. Murnane et al., (2006) *Control of water pollution from linear construction projects. Site guide (C649). CIRIA.*

- All personnel involved with the project will receive an on-site induction relating to operations and the environmentally sensitive nature of European sites and to re-emphasize the precautions that are required as well as the precautionary measures to be implemented. Site managers, foremen and workforce, including all subcontractors, will be suitably trained in pollution risks and preventative measures.
- All staff and subcontractors have the responsibility to:
    - Work to agreed plans, methods and procedures to eliminate and minimise environmental impacts,
    - Understand the importance of avoiding pollution on-site, including water pollution, noise and dust, and how to respond in the event of an incident to avoid or limit environmental impact;
    - Respond in the event of an incident to avoid or limit environmental impact;
    - Report all incidents immediately to their line manager;
    - Monitor the work place for potential environmental risks and alert the immediate line manager if any are observed; and
    - Co-operate as required, with site inspections.

14.2 Construction Works – Hydrocarbons and Waste Management

- Oil, petrol and other fuel containers will be double-skinned and bunded to be able to contain 110% volume to guard against potential accidental spills or leakages entering local watercourses linked to the European sites. Bund specification will conform to the current best practice for oil storage such as Enterprise Irelands Best Practice Guidelines. Construction materials will be stored in a secure compound to prevent the potential for vandalism and theft of material.

- Vehicle re-fueling will be undertaken in accordance with recommended best practice at the site compound on Mill Island and with spill kits available in the immediate vicinity.

- All vehicles and plant will be regularly inspected for fuel, oil and hydraulic fluid leaks. Suitable equipment to deal with spills will be maintained on site.

- It will be ensured that all staff are trained and follow vehicle cleaning procedures. Details of the procedures in the work area will be posted for easy reference. Use of cleaning chemicals will be minimised.

- Machinery including hand-tools will never be washed in watercourses or drainage ditches. The location for any washing of machinery will be agreed with the ECOW prior to the commencement of works.

- A detailed spillage procedure will be put in place and all will be trained with respect to the relevant procedures to be undertaken in the event of the release of any sediment, hydrocarbons into a watercourse. Spill kits will be maintained on site and relevant staff will be trained in their effective usage. All site personnel will be trained and aware of the appropriate action in the event of an emergency, such as the spillage of potentially polluting substances. In the event of spillage of any polluting substance and/or pollution of a watercourse, Cork County Council, Inland Fisheries Ireland and the NPWS shall be notified.

14.3 Silt Control

- Silt movement within the working area will be managed through the use of silt curtains and which will be disposed of off-site as part of a site clean-up operation as detailed in **Appendix 2**.

- To reach gravel deposits on small islands within the channel it may be necessary for machinery to track across a section of the river. This will only occur along defined routes which are clearly mapped and this will be emphasised to all machinery drivers. The routes will be identified by the ECOW.

- Each individual silt fence or curtain panel shall be joined together by the use of high strength nylon rope. An overlap of 500mm shall be provided between each adjacent panel and threaded continuously together along the whole length with nylon rope to prevent piping of pollutant. The silt curtain shall be attached to a HDPE float for buoyancy and a steel chain weight fixed along the bottom of the silt curtain, with the size and weight of these determined by the silt curtain supplier. Appropriately sized and spaced concrete blocks shall also be used to anchor the HDPE float in position.

- The silt curtain shall initially be installed as close as possible to the proposed works and then moved from here into its required position to prevent fish being trapped behind it.

The Contractor shall carefully choose the type and depth of silt curtain to ensure it is not damaged / swept away during flood conditions. Maintenance will be carried out daily.

- The requirement for additional silt curtains will be determined by the ECOW based on the contractor's detailed methodology and flow conditions in the river prior to commencement of works.

- In the event of a significant flood warning, the contractor may be obliged to breach the temporary dams in order to reduce the risk of the embankment contributing to increased flood risk.

- Any bagging which may be put in place to provide temporary flow controls should use gravel aggregate fill rather than sand so that any potential loss of same will not negatively impact upon receiving waters or existing gravel beds. In this respect it is noted that any temporary dam emplacement will be primarily to regulate flow control rather than to create a strictly dry working area as there are no in-situ concrete works proposed.

- Works will be suspended during severe flood events or when such events are forecast. This makes all activities and measures easier to implement and manage and limits the potential for generation of sediment and mobilisation of both sediment and pollutants downstream.

- Detailed contingency plans will be specified to deal with flood events and to manage or remove elements of the development such as temporary dams which could impact on water quality within the Blackwater River SAC in the event of a severe flood event.

14.4 Mitigation species and habitats

- The use of temporary dams will take into account the preservation of river flows for movement of fish by ensuring a minimum depth of water will be maintained either through the existing breach in the weir or through the existing fish pass or shallow trough type feature on the weir surface.

- Fish will be removed from the area of river within the silt curtain or temporary dams. This activity will be undertaken by Inland Fisheries Ireland or by qualified personnel under IFI section 14 licence.

- Island habitats will be used as a source of gravel. However, there will be no removal of gravel below the waterline and the periphery of islands will be left intact.

- Any material that is brought on site to use as fill will have a similar geological profile and i to existing sediments, i.e. sandstone.

- Artificial lighting at night has the potential to disrupt and disorientate fish and increase exposures to predation. Lighting during the construction phase will avoid direct illumination of the river where possible and lights will be cowled where necessary to minimise light spill onto aquatic habitats outside the works area.

14.5 White Clawed Crayfish.

- Prior to construction delimiting areas where construction activity is not necessary and which is to remain off-limits and undisturbed will be outlined by the supervising ECOW and securely marked up on contractor maps and where possible marked out or fenced on site.

This species was recently recorded in crevices in proximity to Fermoy Weir and may occur within the works area in eroded crevices.

- A trapping programme will be implemented to ensure that any Crayfish within this area are removed prior to the commencement of works. Up to twenty 'Trappy Funnel Crayfish Traps' ballasted with extra rock will be positioned in the footprint of instream works areas during each trapping episode.

- If flows are too high to remove crayfish prior to commencement of site works then it may be necessary to remove crayfish once the temporary dam is in place. The ECOW will check for crayfish on an ongoing basis during site works and translocated as necessary. An outline methodology is included as **Appendix 4**. In addition to the translocation area outlined in **Appendix 4**, a second translocation area will be located adjacent to Fermoy Slipway as agreed with NPWS. The Section 23 and 24 license to capture and translocate White Clawed Crayfish is attached as **Appendix 5.**

- It is noted that rock armour is likely to provide suitable refuges for White Clawed Crayfish and this species is likely to recolonise this area after works are complete.

14.6 Invasive Species

- To prevent Japanese Knotweed or other invasive species from outside the site being inadvertently being brought in to the site, the contractor will be required to inspect, clean and wash down vehicles within a specific area within the site compound before using them on site.

- Any Himalayan Balsam within the works will be hand-pulled and bagged prior to the commencement or site works. It will be then placed in a designated area of the site to decay. The seeds are not particularly robust but may survive for 18 months so a two-year programme of control, which will extend beyond the construction period, will be required.

- If and where contaminated soil or heaps of high-risk invasive species (i.e. Himalayan Balsam) are to be stockpiled, the area will be clearly marked out on site.

- Post development any Amber Listed invasive species remaining on the site will be treated via a standard herbicide programme. Herbicides must be used according the manufacturers recommendations and must be suitable for use near watercourses.

14.7 Biosecurity

- Crayfish Plague is caused by a fungus-like organism *Aphanomyces astaci* which is of North American origin but now occurs throughout Europe. The Crayfish Plague organism (technically an Oomycete and often called water moulds) normally grows on the outer shell of crayfish and North American crayfish are generally immune to it, as they can prevent any infection reaching their body tissues. However, when the water mould infects White-clawed and other European crayfish, it rapidly, and fatally, spreads into the body tissues. Infected animals become distressed and behave abnormally and may survive several weeks before dying.

- Crayfish occur within the Blackwater system and establishment of the disease crayfish plague can have highly detrimental impacts on this species. Throughout its European range, this species has been decimated by the impact of Crayfish plague disease which

spread to Europe with the introduction of the plague carrier North American species of crayfish. Therefore, as recommended by the Inland Fisheries Ireland a Check, Clean and Dry protocol should be utilised. All wet gear or machinery which has previously come into contact with watercourses should be checked for any silt or mud, plant material or animals. It then should be cleaned and finally dried. Disinfectant or hot water (over 65ºC) should be used to clean all equipment followed by a 24hr drying period. This should be adopted as standard practice in all freshwaters. This will be incorporated into a detailed Biosecurity Management Plan which will be prepared by the contractor and approved by the ECOW prior to the commencement of site works.

- Stringent biosecurity measures will be implemented throughout the works following the OPW's Invasive Species Procedures. The best practice principles of Check-Clean-Dry guidance of the Non-Native Species Secretariat (NNSS, 2017), IFI biosecurity protocols (IFI,2010) and Waterways Ireland Marine Notice No. 39/2017 shall be followed during these works, to ensure that crayfish plague and invasive non-native species are not introduced into the proposed working area.

14.8 Mitigation Habitats

- Grassland area that are damaged and disturbed will be left to regenerate naturally or will be rehabilitated and landscaped with standard seed mixtures. The ECOW will specify suitable new grassland mixes, including native species mixes which are available from specialist suppliers, depending on the ground conditions post construction.

14.9 Mitigation - Otter

- An otter holt and couch were recorded within 180m of the works area during a survey in relation to the proposed remedial works for the Fermoy Weir. This holt is not suitable as a breeding holt at the present time. A pre-construction otter survey, including the use of camera traps, will be carried out prior to the commencement of works to ascertain if this holt is being used and to monitor usage during the works period. Where significant effects on otter are identified by the camera survey then the ECOW may specify additional mitigation such as acoustic or visual screens. A derogation licence in relation to otter is attached as **Appendix 3.**

- The ECOW will ensure that there are no impediments to prevent free movement of otters, for example, between different feeding areas or between holts and a feeding area. The provisions required, which may include leaving gaps in fencing will be specified by the ECOW based on a preconstruction survey.

14.10 Mitigation Noise

- Best practice noise and vibration control measures will be employed by the contractor. The best practice measures set out in BS 5228 (2009) Parts 1 and 2 will be complied with. This includes guidance on several aspects of construction site environmental measures, including the following:

    - The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected.

    - If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control “at source”. This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through

stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

- Mobile plant will be switched off when not in use and will not be left idling.
- All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.
- Working at night will be only used if absolutely necessary.

15. Predicted effects on qualifying interests

Following the implementation of mitigation measures as outlined above the impact on qualifying interests and conservation objectives for relevant species and habitats with the Blackwater River SAC was assessed. As detailed below in **Tables 13 to 19,** no impacts on the species and habitats listed as qualifying interests in respect of the individual targets for these species and habitats was identified.

Table 13. QI species White Clawed Crayfish – predicted impact

Attribute	Measure	Target	Predicted Impact
Distribution	Occurrence	No reduction from baseline.	Trapping programme to remove this species from works area. Potential loss of refugia, but new niches created within rock armour. Biosecurity measure will prevent spread of crayfish plague. In the absence of a negative impact on water quality or loss of habitat, no direct, indirect or cumulative significant effect on this species has been identified in respect of the specific targets for this species.
Population structure: recruitment	Percentage 0ccurrence of juveniles and females with eggs	Juveniles and/or females with eggs in at least 50% of positive samples	
Negative indicator species	Occurrence	No alien crayfish species	
Disease	Occurrence	No instances of disease	
Water quality	EPA Q value	At least Q3-4 at all sites sampled by EPA	
Habitat quality: heterogeneity	Occurrence of positive habitat features	No decline in heterogeneity or habitat quality	

Table 14. QI species Sea Lamprey – predicted impact

Attribute	Measure	Target	Predicted Impact
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary.	No barriers to migration will be created as instream works will be undertaken outside the migration/spawning period. Potential loss of a very minor area of recently formed and unstable spawning habitat outside the spawning season Post completion of works habitats will be comparable to those present before the weir breached. In the absence of a negative impact on water quality or loss of habitat, no direct, indirect or cumulative impacts on this species has been identified in respect of the specific targets for this species.
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	
Juvenile density in fine sediment	Juveniles/m²	Juvenile density at least 1/m²	
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive.	

Table 15. QI species Brook Lamprey – predicted impact

Attribute	Measure	Target	Predicted impact
Distribution	% of river accessible	Access to all water courses down to first order streams	Potential loss of a very minor area of recently formed and unstable spawning habitat outside the spawning season. Post completion of works habitats will be comparable to those present before the weir breached. In the absence of a negative impact on water quality or loss of habitat, no direct, indirect or cumulative impacts on this species has been identified in respect of the specific targets for this species.
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m²	
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive.	

Table 16. QI species River Lamprey – predicted impact

Attribute	Measure	Target	Predicted Impact
Distribution	% of river accessible	Access to all water courses down to first order streams	No barriers to migration will be created as instream works will be undertaken outside the migration/spawning period. Potential loss of a very minor area of recently formed and unstable spawning habitat outside the spawning season Post completion of works habitats will be comparable to those present before the weir breached. Post completion of works habitats will be comparable to those present before the weir breached. In the absence of a negative impact on water quality or loss of habitat, no direct, indirect or cumulative impacts on this species has been identified in respect of the specific targets for this species.
Population structure of juveniles	Number of age/size groups	At least three age/size groups of river/brook lamprey Present	
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m²	
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive.	

Table 17. QI species Atlantic Salmon – predicted impact

Attribute	Measure	Target	
Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary	Any impacts on migration will be temporary and insignificant. Potential loss of a very minor area of recently formed and unstable spawning habitat prior to the commencement of the spawning period. Following completion of works, habitats will be comparable to those present before the weir breached. In the absence of a negative impact on water quality or loss of habitat, no direct, indirect or cumulative impacts on this species has been identified in respect of the specific targets for this species.
Adult spawning fish Number	Number	Conservation Limit (CL) for each system consistently exceeded	
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling	
Out-migrating smolt abundance	Number	No significant decline	
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	

Table 18. QI species Otter – predicted impact

Attribute	Measure	Target	Predicted Impact
Distribution	Percentage positive survey sites	No significant decline	Appropriate mitigation measures will be implemented and works are temporary. In the absence of a negative impact on water quality or loss of habitat, no impact on prey availability for this species will occur. No direct, indirect or cumulative impact on this species in respect of the specific targets for this species will occur.
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 103ha above high water mark (HWM); 1165.7ha along river banks/ around ponds	
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 647.2ha	
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 599.54km	
Extent of freshwater (lake) habitat	Hectares	No significant decline. Area mapped and calculated as 25.06ha	
Couching sites and holts	Number	No significant decline	
Fish biomass available	Kilograms	No significant decline	
Barriers to connectivity	Number	No significant increase	

Table 19. QI habitat - Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation – predicted impact

Attribute	Measure	Target	Predicted Impact
Habitat distribution	Occurrence	No decline, subject to natural processes	No significant examples of this habitat type were recorded within the proposed works area. In the absence of a negative impact on water quality or loss of habitat, no direct, indirect or cumulative impacts on habitat has been identified in respect of the specific targets for this species.
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	
Hydrological regime: tidal influence	Daily water level fluctuations-metres	Maintain natural tidal regime	
Substratum composition: particle size range	Millimetres	The substratum should be dominated by the particle size ranges, appropriate to the habitat sub-type (typically sands, gravels and cobbles)	
Water quality: nutrients	Milligrammes per litre	The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition	
Vegetation composition: typical species	Occurrence	Typical species of the relevant habitat sub-type should be present and in good condition	
Floodplain connectivity: area	Hectares	The area of active floodplain at and upstream of the habitat should be maintained	

16. Conclusions

The only European site for which potential significant impacts have been identified is the Blackwater River (Cork/Waterford) SAC, within which a large proportion of the proposed development site is located.

Impacts which were considered to have the potential to impact on the Blackwater River (Cork/Waterford) SAC relate primarily to impacts on water quality, increased noise and disturbance, invasive species and loss of habitat. Potential cumulative impacts were also considered.

A range of mitigation measures have been incorporated into the project design, and other mitigation measures have been developed and proposed, with the purpose of avoiding any adverse impacts on the qualifying interests and conservation objectives of the Blackwater River (Cork/Waterford) SAC.

The provisions of Article 6 of the 'Habitats' Directive 92/43/EC (2000) defines 'integrity' as the 'coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and / or population of species for which the site is or will be classified'. *The draft documents Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (Draft)* (EC, 2015) states that the integrity of the site can be usefully defined as the coherent sum of the site's ecological structure, function and ecological

processes, across its whole area, which enables it to sustain the habitats, complex of habitats and/or populations of species for which the site is designated"

Following a comprehensive evaluation of the potential direct, indirect and cumulative impacts on the qualifying interests and conservation objectives for the Blackwater River (Cork/Waterford) SAC, it has been concluded that the proposed development will not have an adverse effect on the integrity of the Blackwater River (Cork/Waterford) SAC or any other European sites.

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Appendices

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.

Appendix 2 - Proposed works

SURVEY SHOWN THUS WAS CARRIED OUT BY MURPHY SURVEYS GLOBAL CONSULTING SURVEYORS IN AUGUST 2020, DRAWING REFERENCE MSL37760_01. THE SURVEY WAS CARRIED OUT TO ITM AND HAS BEEN CONVERTED TO IRISH NATIONAL GRID.

OS MAP SHOWN IN BLACK

REINSTATE RIVER BED LEVEL TO A MINIMUM OF 18.000 MOD USING SELECTED GRANULAR MATERIAL.

APPROXIMATE ANCHOR LOCATIONS SHOWN THUS

INSTALL SCOUR PROTECTION USING SELECTED STONE MATERIAL AND ROCK ARMOUR TO PROTECT THE RIVER BANK / MILL ISLAND.

EXISTING MILL RACE SHEET PILE WALL INSTALLED BY LAGAN

CO-ORDINATES OF PILES TAKEN FROM LAGAN AS-BUILT PILE RECORDS

APPROXIMATE ANCHOR LOCATIONS SHOWN THUS

INSTALL SCOUR PROTECTION USING SELECTED STONE MATERIAL AND ROCK ARMOUR TO PROTECT RIVER BED LEVEL IN FRONT OF WALL 19.

WALL 19

WALL 20

WALL 21

MILL ISLAND PUMP STATION

22.0 mod

20.0 mod

18.0 mod

LEGEND

- FERMOY FLOOD DEFENCE WALLS
- GROUND ANCHORS
- RIVER BED LEVEL REINSTATED TO A MINIMUM OF 18.000 MOD.
- SCOUR PROTECTION TO BASE OF WALL 19.
- SCOUR PROTECTION TO RIVER BED AT WALL 19 / WALL 20.
- SCOUR PROTECTION TO RIVERBANK IN FRONT OF WALLS 20 & 21.
- SCOUR PROTECTION TO RIVER BED AT WALL 20 / WALL 21.
- APPROXIMATE OUTLINE OF GRAVEL BEDS IN RIVER

1/710 OVERVIEW OF PROPOSED EMERGENCY PROTECTION WORKS REQUIRED TO FLOOD DEFENCE WALLS 19, 20 AND 21

SCALE: 1:250

REV	STAT	DESCRIPTION	DATE
P03	S2	ISSUED FOR INFORMATION	18.09.2020
P02	S2	ISSUED FOR INFORMATION	16.09.2020
P01	S2	ISSUED FOR INFORMATION	28.08.2020

DRAWING STATUS: ISSUED FOR INFORMATION

CHECKED BY:	REVIEWED BY:	APPROVED BY:
RON	JM	JM

TJ O'CONNOR & ASSOCIATES
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CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
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PROJECT: MUNSTER BLACKWATER RIVER - FERMOY SOUTH EAST AND SOUTH WEST DRAINAGE SCHEMES

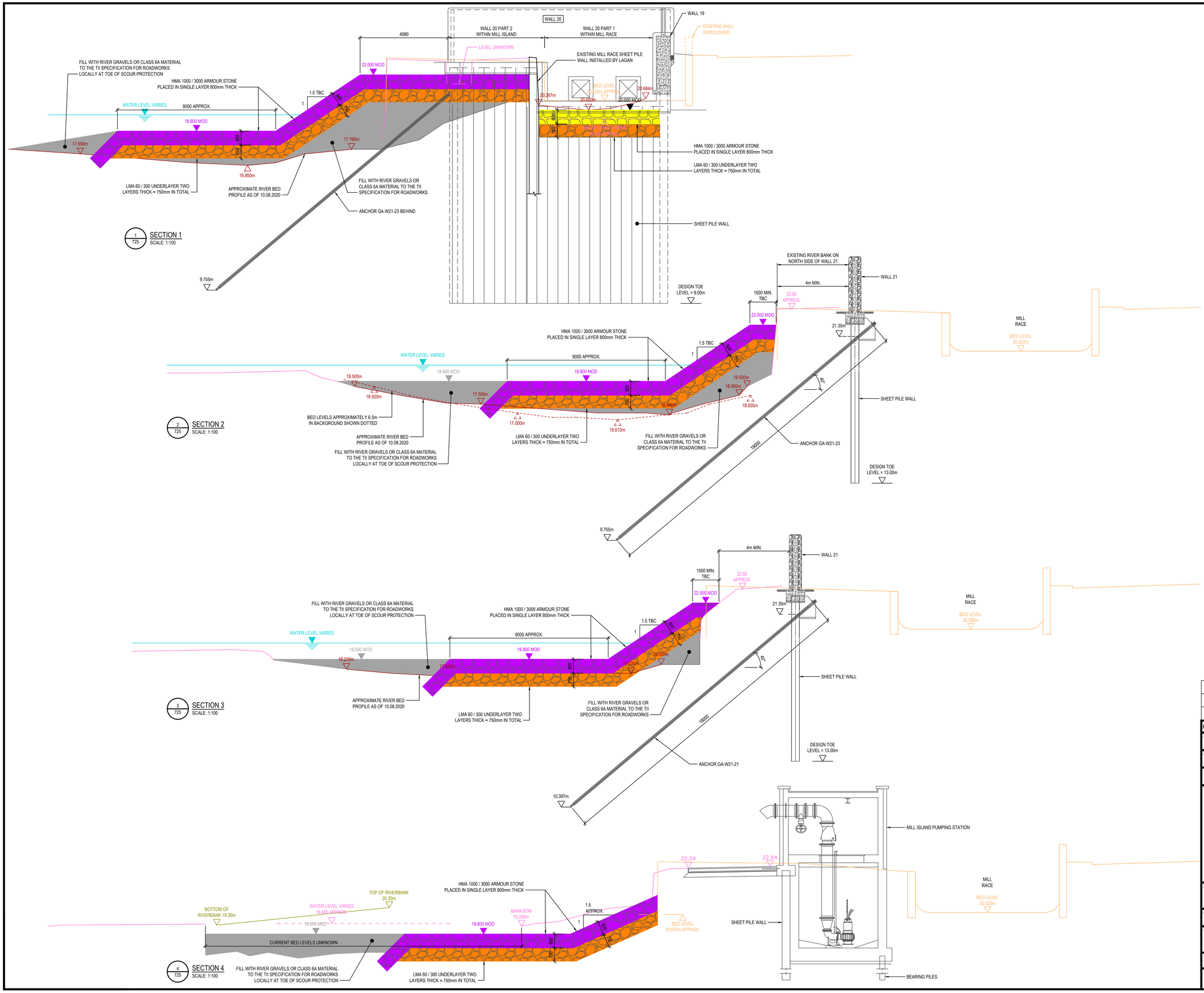
CLIENT: OFFICE OF PUBLIC WORKS

DRAWING TITLE: OVERVIEW OF PROPOSED EMERGENCY PROTECTION WORKS REQUIRED TO FLOOD DEFENCE WALLS 19, 20 AND 21

SCALE: 1:250 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER: 2961 - 711

REV: P03



GROUND PROFILE AND LEVELS SHOWN THUS ARE TAKEN FROM SURVEY CARRIED OUT BY LAND SURVEYS IN 2002, DRAWING REFERENCE D9273-3D AND EXCEL FILE REFERENCE D9273-F. THE SURVEY WAS CARRIED OUT TO IRISH NATIONAL GRID.

GROUND PROFILE AND LEVELS SHOWN THUS ARE TAKEN FROM SURVEY CARRIED OUT BY PRECISE CONTROL LAND & ENGINEERING SURVEYORS IN FEBRUARY 2010, DRAWING REFERENCE 10002d-6. THE SURVEY WAS CARRIED OUT TO IRISH NATIONAL GRID.

GROUND PROFILE AND LEVELS SHOWN THUS ARE TAKEN FROM SURVEY CARRIED OUT BY GEODATA CHARTERED LAND SURVEYORS IN JUNE 2020, DRAWING REFERENCE 20423-101, REVISION 2. THE SURVEY WAS CARRIED OUT TO ITM AND CONVERTED TO IRISH NATIONAL GRID.

GROUND PROFILE AND LEVELS SHOWN THUS ARE TAKEN FROM SURVEY CARRIED OUT BY MURPHY SURVEYS GLOBAL CONSULTING SURVEYORS IN AUGUST 2020, DRAWING REFERENCE MSL37760_01. THE SURVEY WAS CARRIED OUT TO ITM AND HAS BEEN CONVERTED TO IRISH NATIONAL GRID.

NOTE:
REFER TO DRAWING 2961 -720 FOR OVERLAY OF PREVIOUS SURVEY INFORMATION ON CROSS SECTIONS.

LEGEND

- RIVER GRAVELS OR CLASS 6A MATERIAL TO THE TII SPECIFICATION FOR ROADWORKS.
- SCOUR PROTECTION TO BASE OF WALL 19 FORMED USING HMA 1000 / 3000 ARMOUR STONE PLACED IN SINGLE LAYER 800mm THICK.
- SCOUR PROTECTION TO RIVERBANK IN FRONT OF WALLS 20 & 21 FORMED USING HMA 1000 / 3000 ARMOUR STONE PLACED IN SINGLE LAYER 800mm THICK.
- UNDERLAYER / CORE MATERIAL FORMED USING LMA 60 / 300 UNDERLAYER TWO LAYERS THICK = 750mm IN TOTAL.

REV	STAT	DESCRIPTION	DATE
P03	S2	ISSUED FOR INFORMATION	18.09.2020
P02	S2	ISSUED FOR INFORMATION	16.09.2020
P01	S2	ISSUED FOR INFORMATION	28.08.2020

DRAWING STATUS: ISSUED FOR INFORMATION

CHECKED BY:	REVIEWED BY:	APPROVED BY:
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PROJECT:
MUNSTER BLACKWATER RIVER - FERMOY SOUTH
EAST AND SOUTH WEST DRAINAGE SCHEMES

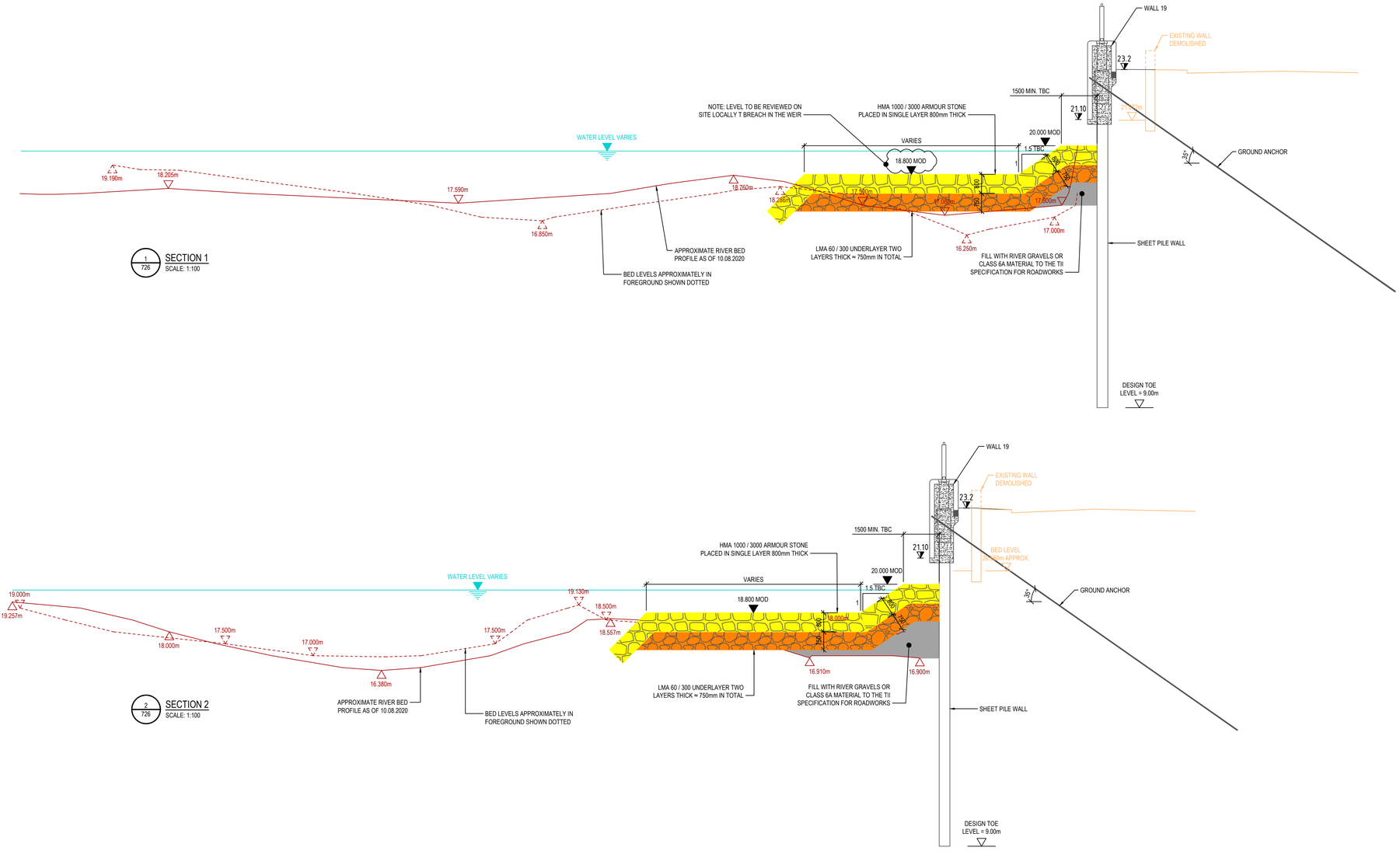
CLIENT:
OFFICE OF PUBLIC WORKS

DRAWING TITLE:
SECTIONS THROUGH FLOOD DEFENCE WALLS SHOWING
PROPOSED EMERGENCY PROTECTION WORKS - SHEET 1

SCALE: 1:100 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
2961 - 725

REV: P03



GROUND PROFILE AND LEVELS SHOWN THUS ARE TAKEN FROM SURVEY CARRIED OUT BY LAND SURVEYS IN 2002, DRAWING REFERENCE D9273-3D AND EXCEL FILE REFERENCE D9273-F. THE SURVEY WAS CARRIED OUT TO IRISH NATIONAL GRID.

GROUND PROFILE AND LEVELS SHOWN THUS ARE TAKEN FROM SURVEY CARRIED OUT BY PRECISE CONTROL LAND & ENGINEERING SURVEYORS IN FEBRUARY 2010, DRAWING REFERENCE 10002d-6. THE SURVEY WAS CARRIED OUT TO IRISH NATIONAL GRID.

GROUND PROFILE AND LEVELS SHOWN THUS ARE TAKEN FROM SURVEY CARRIED OUT BY HYDROGRAPHIC SURVEY LTD. IN OCTOBER 2010, DRAWING REFERENCE P10032 / HS86/10, REVISION D02. THE SURVEY WAS CARRIED OUT TO IRISH NATIONAL GRID.

GROUND PROFILE AND LEVELS SHOWN THUS ARE TAKEN FROM SURVEY CARRIED OUT BY MURPHY SURVEYS GLOBAL CONSULTING SURVEYORS IN AUGUST 2018, DRAWING REFERENCE 27232 18024_Femoy_Weir. THE SURVEY WAS CARRIED OUT TO ITM AND HAS BEEN CONVERTED TO IRISH NATIONAL GRID.

GROUND PROFILE AND LEVELS SHOWN THUS ARE TAKEN FROM SURVEY CARRIED OUT BY MURPHY SURVEYS GLOBAL CONSULTING SURVEYORS IN AUGUST 2020, DRAWING REFERENCE MSL37760_01. THE SURVEY WAS CARRIED OUT TO ITM AND HAS BEEN CONVERTED TO IRISH NATIONAL GRID.

NOTE:
REFER TO DRAWING 2961 -721 FOR OVERLAY OF PREVIOUS SURVEY INFORMATION ON CROSS SECTIONS.

LEGEND

- RIVER GRAVELS OR CLASS 6A MATERIAL TO THE TII SPECIFICATION FOR ROADWORKS.
- SCOUR PROTECTION TO BASE OF WALL 19 FORMED USING HMA 1000 / 3000 ARMOUR STONE PLACED IN SINGLE LAYER 800mm THICK.
- SCOUR PROTECTION TO RIVERBANK IN FRONT OF WALLS 20 & 21 FORMED USING HMA 1000 / 3000 ARMOUR STONE PLACED IN SINGLE LAYER 800mm THICK.
- UNDERLAYER / CORE MATERIAL FORMED USING LMA 60 / 300 UNDERLAYER TWO LAYERS THICK ≈ 750mm IN TOTAL.

REV	STAT	DESCRIPTION	DATE
P03	S2	ISSUED FOR INFORMATION	18.09.2020
P02	S2	ISSUED FOR INFORMATION	16.09.2020
P01	S2	ISSUED FOR INFORMATION	28.08.2020

DRAWING STATUS: ISSUED FOR INFORMATION

CHECKED BY: RON | REVIEWED BY: JM | APPROVED BY: JM

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PROJECT: MUNSTER BLACKWATER RIVER - FERMOY SOUTH EAST AND SOUTH WEST DRAINAGE SCHEMES

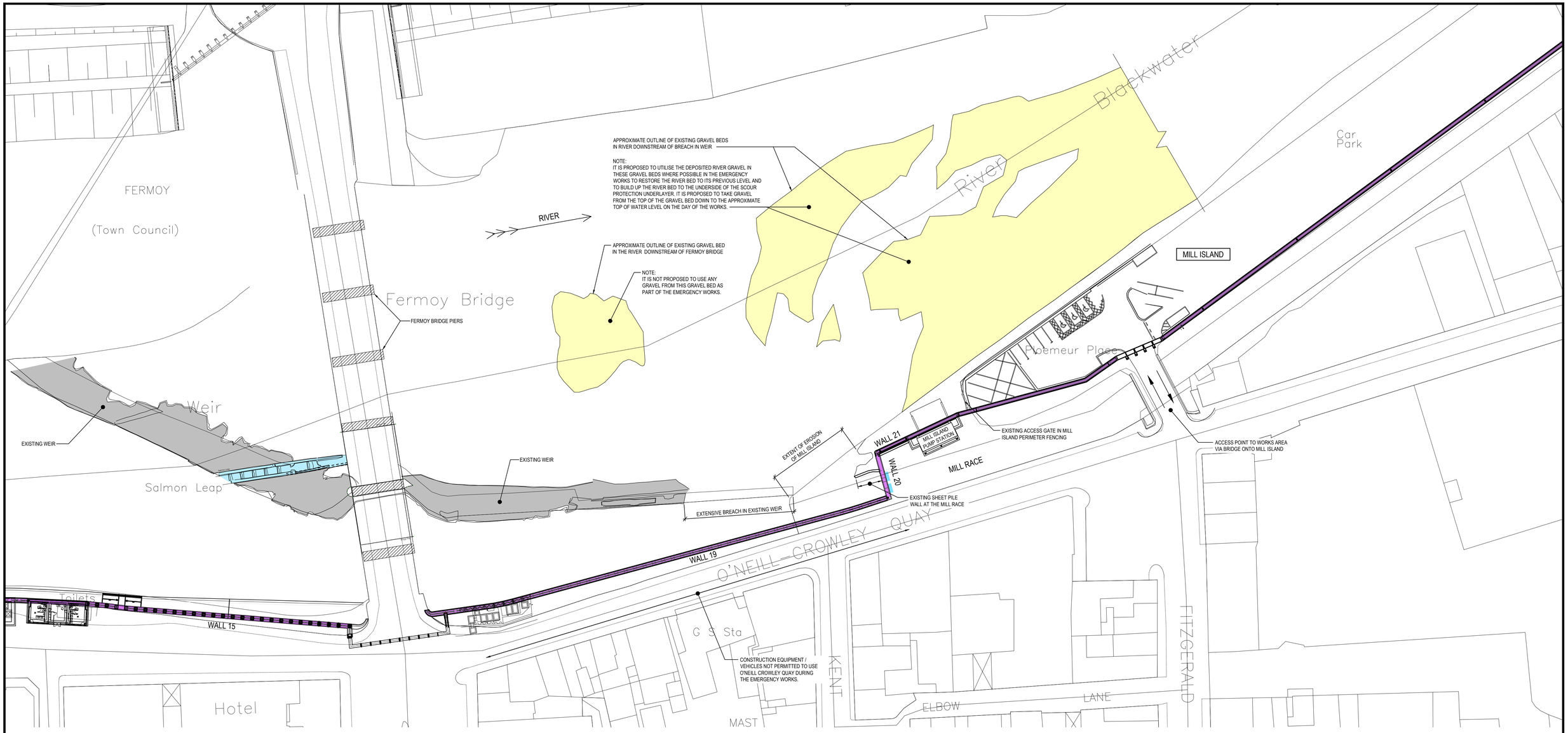
CLIENT: OFFICE OF PUBLIC WORKS

DRAWING TITLE: SECTIONS THROUGH FLOOD DEFENCE WALLS SHOWING PROPOSED EMERGENCY PROTECTION WORKS - SHEET 2

SCALE: 1:100 (A1)

PROJECT - ORGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER: 2961 - 726

REV: P03



1/740 OVERVIEW OF MILL ISLAND AND O'NEILL CROWLEY QUAY
SCALE: 1:500

N

LEGEND:

- APPROXIMATE OUTLINE OF EXISTING WEIR TAKEN FROM MURPHY SURVEY LTD. DRAWING
- EXISTING FISH PASS
- FERMOY FLOOD DEFENCE WALLS
- APPROXIMATE OUTLINE OF GRAVEL BEDS IN RIVER

REV	STAT	DESCRIPTION	DATE
P02	S2	ISSUED FOR INFORMATION	18.09.2020
P01	S2	ISSUED FOR INFORMATION	16.09.2020

DRAWING STATUS: ISSUED FOR INFORMATION

CHECKED BY:	REVIEWED BY:	APPROVED BY:
RON	JM	JM

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: MUNSTER BLACKWATER RIVER - FERMOY SOUTH EAST AND SOUTH WEST DRAINAGE SCHEMES

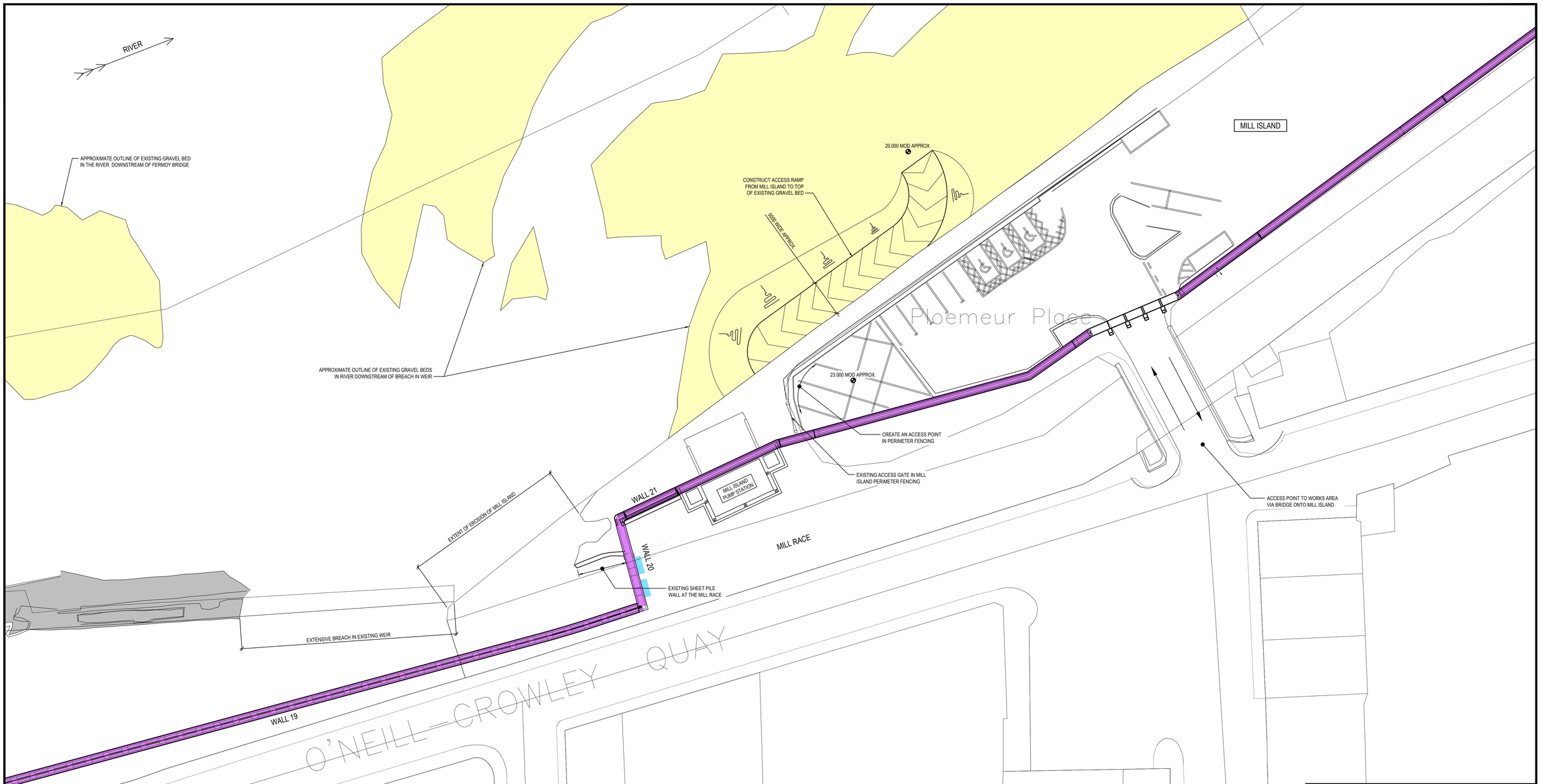
CLIENT: OFFICE OF PUBLIC WORKS

DRAWING TITLE: OVERVIEW OF MILL ISLAND AND O'NEILL CROWLEY QUAY

SCALE: 1:500 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER: 2961 - 740

REV: P02



1/741 INDICATIVE CONSTRUCTION WORKS METHODOLOGY
SCALE: 1:250

NOTE: THE INDICATIVE CONSTRUCTION WORKS METHODOLOGY / SEQUENCE OF WORKS IS SET OUT ON THE FOLLOWING DRAWINGS: DRG. 742 TO 748.

N

LEGEND:

- APPROXIMATE OUTLINE OF EXISTING WEIR TAKEN FROM MURPHY SURVEY LTD. DRAWING
- FERMOY FLOOD DEFENCE WALLS
- APPROXIMATE OUTLINE OF GRAVEL BEDS IN RIVER

REV	STAT	DESCRIPTION	DATE
P02	S2	ISSUED FOR INFORMATION	18.09.2020
P01	S2	ISSUED FOR INFORMATION	16.09.2020

DRAWING STATUS: ISSUED FOR INFORMATION

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

PROJECT: MUNSTER BLACKWATER RIVER - FERMOY SOUTH EAST AND SOUTH WEST DRAINAGE SCHEMES

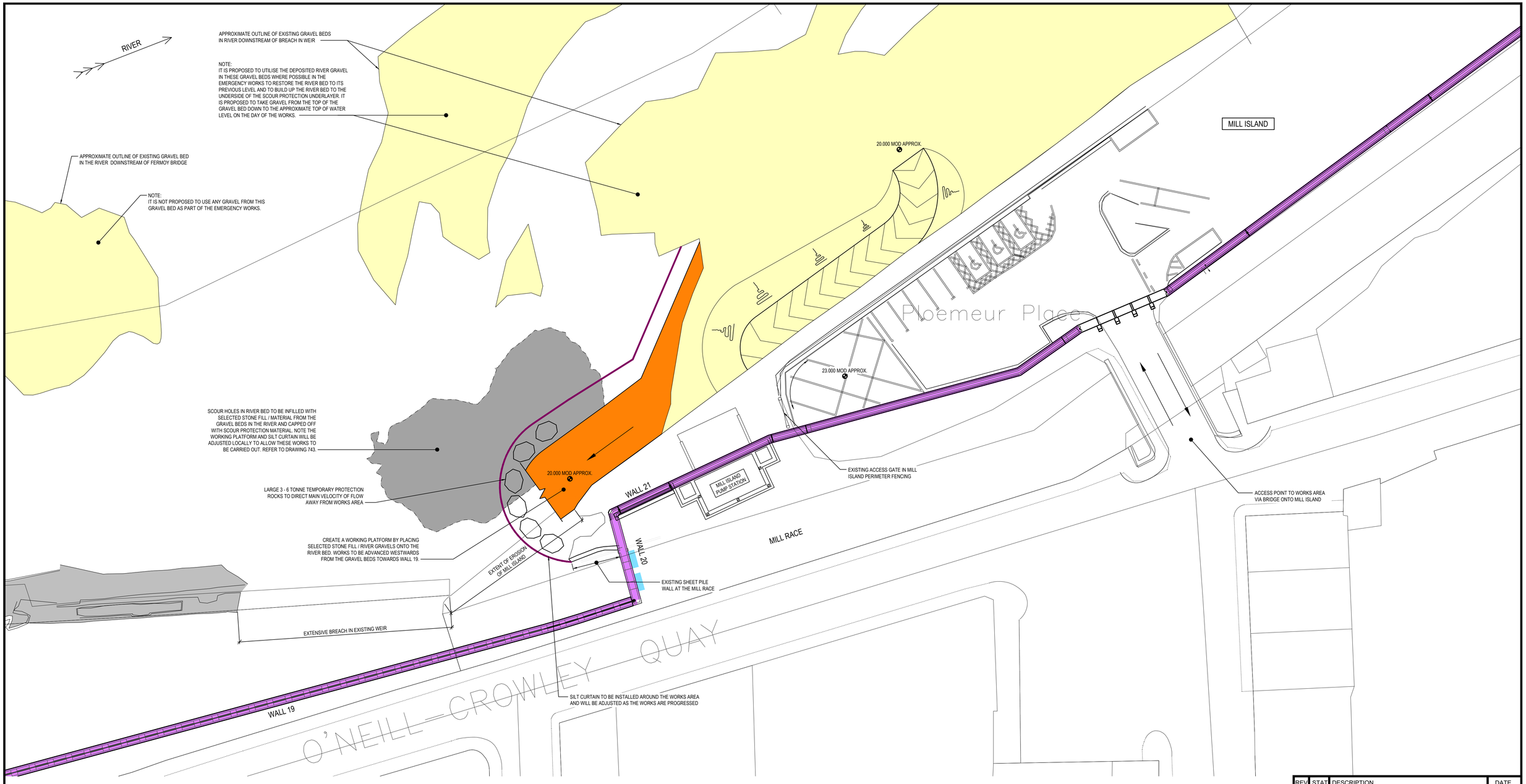
CLIENT: OFFICE OF PUBLIC WORKS

DRAWING TITLE: INDICATIVE CONSTRUCTION WORKS METHODOLOGY - SHEET 1

SCALE: 1:250 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER: 2961 - 741

REV: P02



1/742 INDICATIVE CONSTRUCTION WORKS METHODOLOGY
SCALE: 1:250

LEGEND:

- APPROXIMATE OUTLINE OF EXISTING WEIR TAKEN FROM MURPHY SURVEY LTD. DRAWING
- FERMOY FLOOD DEFENCE WALLS
- APPROXIMATE OUTLINE OF GRAVEL BEDS IN RIVER
- WORKING PLATFORM CREATED BY PLACING SELECTED STONE FILL ON THE RIVER BED
- RIVER BED LEVEL REINSTATED TO A MINIMUM OF 18.000 MOD.
- APPROXIMATE OUTLINE OF SILT CURTAIN EXTENDING AROUND WORKS AREA.

N

REV	STAT	DESCRIPTION	DATE
P02	S2	ISSUED FOR INFORMATION	18.09.2020
P01	S2	ISSUED FOR INFORMATION	16.09.2020

DRAWING STATUS: ISSUED FOR INFORMATION

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RON	JM	JM

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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: MUNSTER BLACKWATER RIVER - FERMOY SOUTH EAST AND SOUTH WEST DRAINAGE SCHEMES

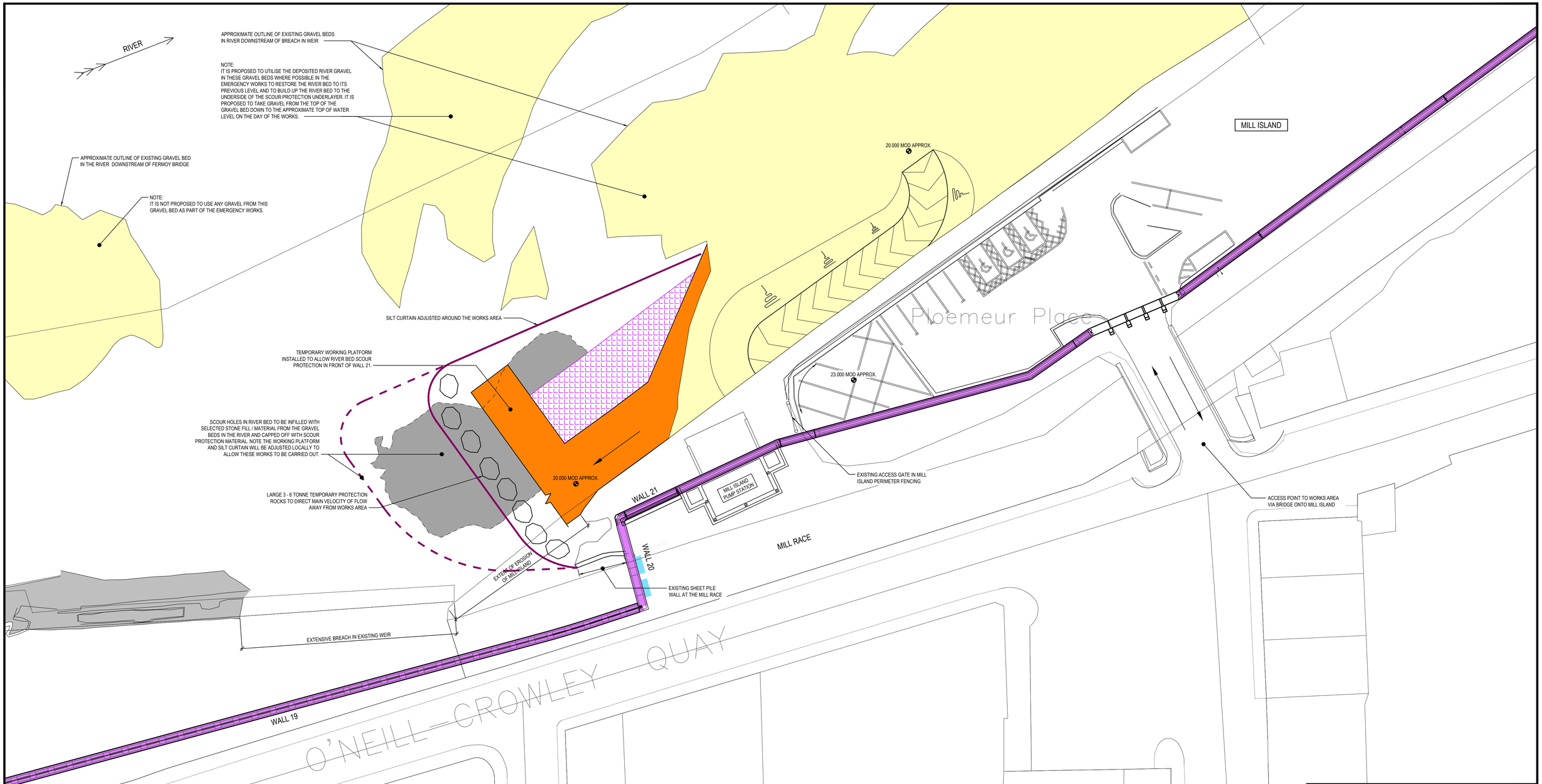
CLIENT: OFFICE OF PUBLIC WORKS

DRAWING TITLE: INDICATIVE CONSTRUCTION WORKS METHODOLOGY - SHEET 2

SCALE: 1:250 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER: 2961 - 742

REV: P02



1/743 INDICATIVE CONSTRUCTION WORKS METHODOLOGY
SCALE: 1:250

LEGEND:

- APPROXIMATE OUTLINE OF EXISTING WEIR TAKEN FROM MURPHY SURVEY LTD. DRAWING
- FERMOY FLOOD DEFENCE WALLS
- APPROXIMATE OUTLINE OF GRAVEL BEDS IN RIVER
- WORKING PLATFORM CREATED BY PLACING SELECTED STONE FILL ON THE RIVER BED
- RIVER BED LEVEL REINSTATED TO A MINIMUM OF 18.000 MOD.
- APPROXIMATE OUTLINE OF SILT CURTAIN EXTENDING AROUND WORKS AREA.

N

REV	STAT	DESCRIPTION	DATE
P02	S2	ISSUED FOR INFORMATION	18.09.2020
P01	S2	ISSUED FOR INFORMATION	16.09.2020

DRAWING STATUS: ISSUED FOR INFORMATION

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

PROJECT: MUNSTER BLACKWATER RIVER - FERMOY SOUTH EAST AND SOUTH WEST DRAINAGE SCHEMES

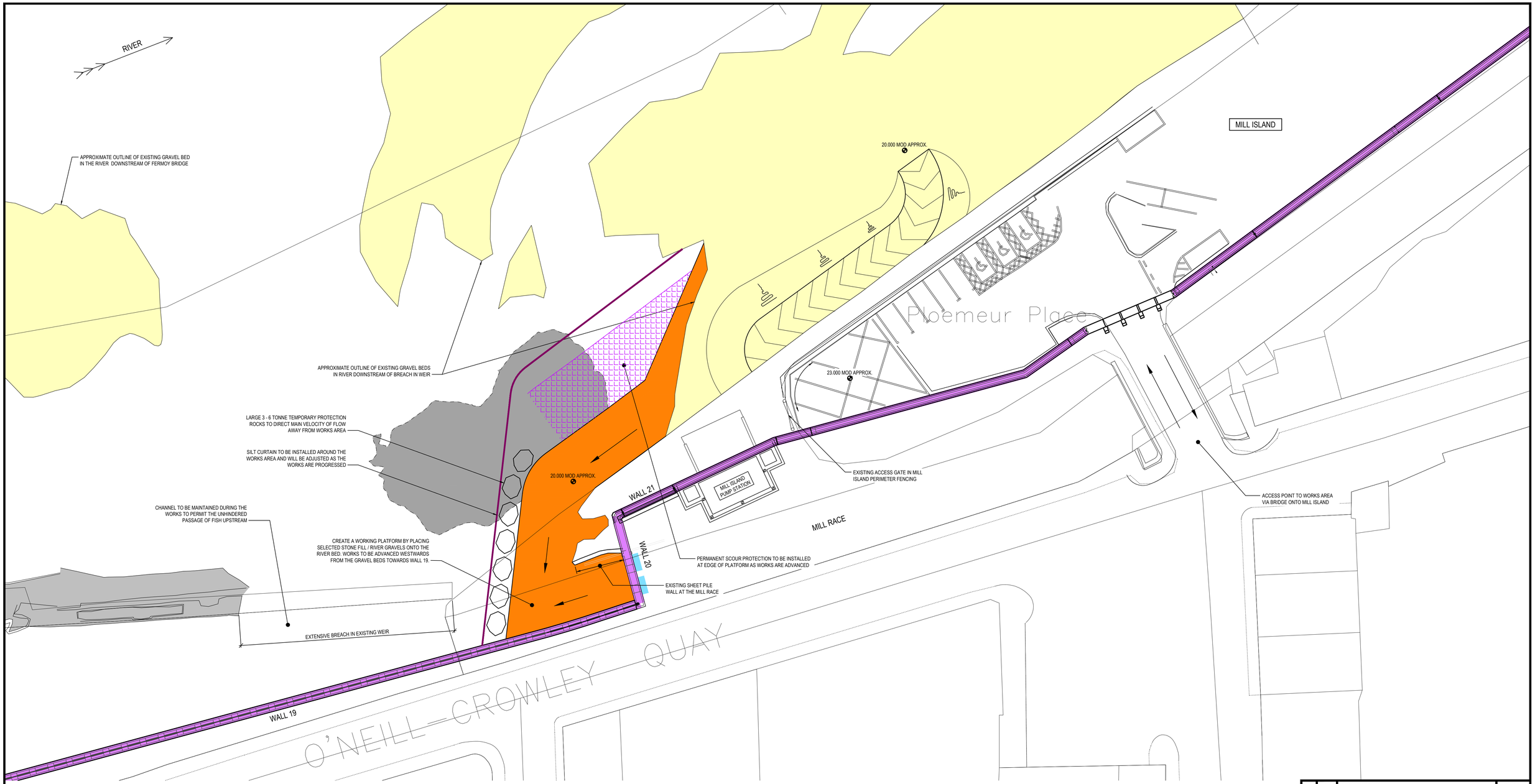
CLIENT: OFFICE OF PUBLIC WORKS

DRAWING TITLE: INDICATIVE CONSTRUCTION WORKS METHODOLOGY - SHEET 3

SCALE: 1:250 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER: 2961 - 743

REV: P02



1/744 INDICATIVE CONSTRUCTION WORKS METHODOLOGY
SCALE: 1:250

LEGEND:

- APPROXIMATE OUTLINE OF EXISTING WEIR TAKEN FROM MURPHY SURVEY LTD. DRAWING
- FERMOY FLOOD DEFENCE WALLS
- APPROXIMATE OUTLINE OF GRAVEL BEDS IN RIVER
- WORKING PLATFORM CREATED BY PLACING SELECTED STONE FILL ON THE RIVER BED
- RIVER BED LEVEL REINSTATED TO A MINIMUM OF 18.000 MOD.
- APPROXIMATE OUTLINE OF SILT CURTAIN EXTENDING AROUND WORKS AREA.

N

REV	STAT	DESCRIPTION	DATE
P02	S2	ISSUED FOR INFORMATION	18.09.2020
P01	S2	ISSUED FOR INFORMATION	16.09.2020

DRAWING STATUS: ISSUED FOR INFORMATION

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

PROJECT: MUNSTER BLACKWATER RIVER - FERMOY SOUTH EAST AND SOUTH WEST DRAINAGE SCHEMES

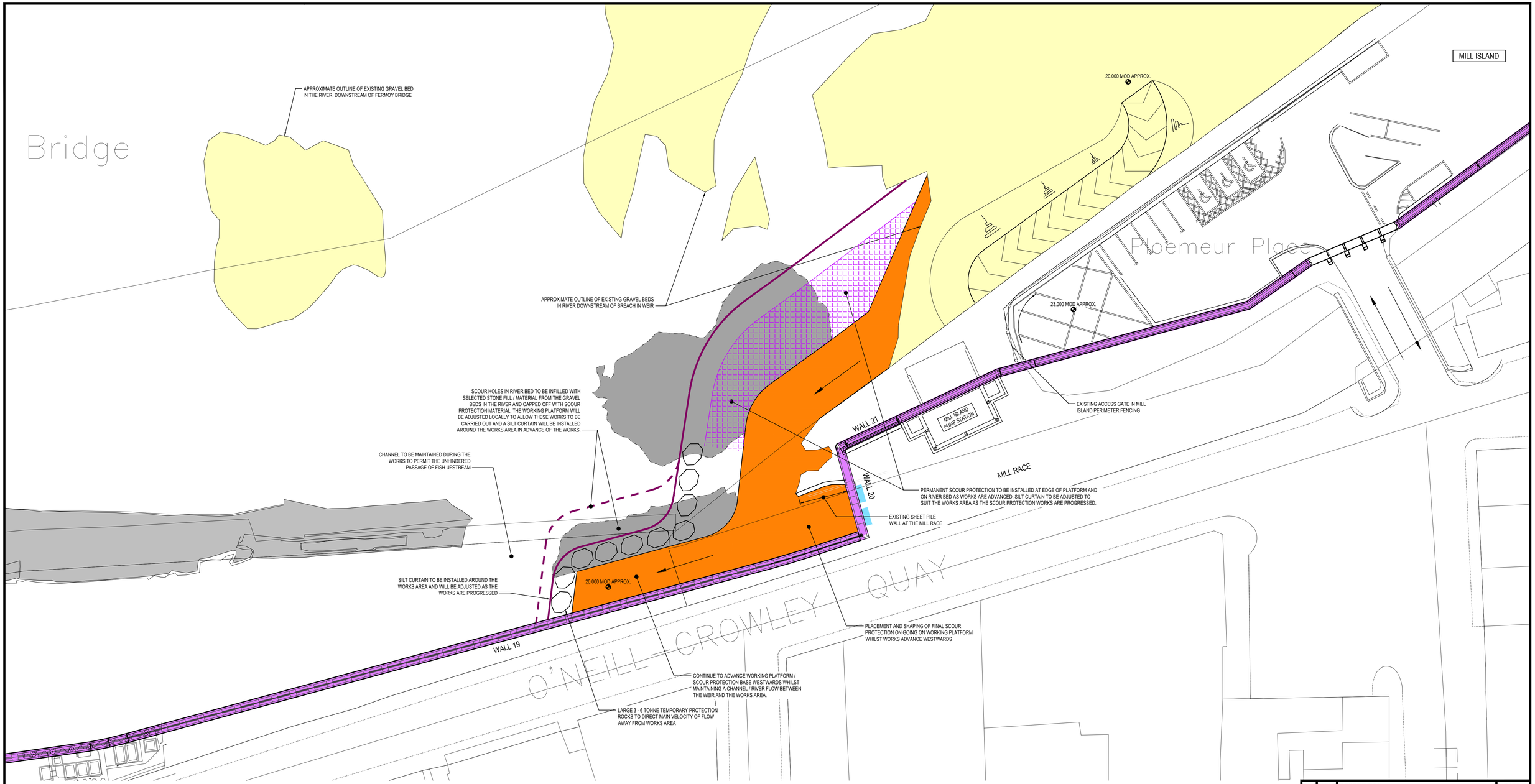
CLIENT: OFFICE OF PUBLIC WORKS

DRAWING TITLE: INDICATIVE CONSTRUCTION WORKS METHODOLOGY - SHEET 4

SCALE: 1:250 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER: 2961 - 744

REV: P02



1/745 INDICATIVE CONSTRUCTION WORKS METHODOLOGY
SCALE: 1:250

LEGEND:

- APPROXIMATE OUTLINE OF EXISTING WEIR TAKEN FROM MURPHY SURVEY LTD. DRAWING
- FERMOY FLOOD DEFENCE WALLS
- APPROXIMATE OUTLINE OF GRAVEL BEDS IN RIVER
- WORKING PLATFORM CREATED BY PLACING SELECTED STONE FILL ON THE RIVER BED
- RIVER BED LEVEL REINSTATED TO A MINIMUM OF 18.000 MOD.
- APPROXIMATE OUTLINE OF SILT CURTAIN EXTENDING AROUND WORKS AREA.

N

REV	STAT	DESCRIPTION	DATE
P02	S2	ISSUED FOR INFORMATION	18.09.2020
P01	S2	ISSUED FOR INFORMATION	16.09.2020

DRAWING STATUS: ISSUED FOR INFORMATION

CHECKED BY:	REVIEWED BY:	APPROVED BY:
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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: MUNSTER BLACKWATER RIVER - FERMOY SOUTH EAST AND SOUTH WEST DRAINAGE SCHEMES

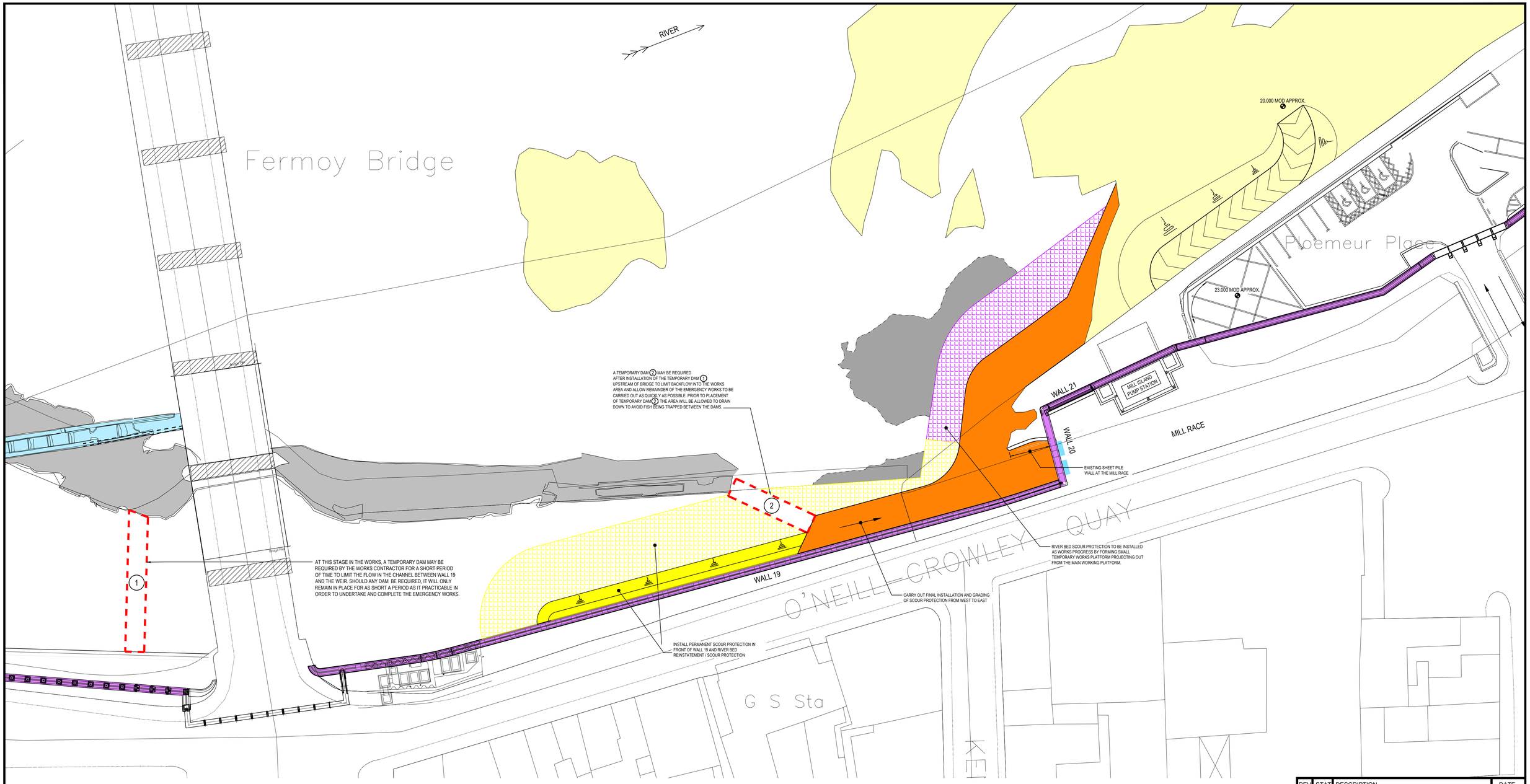
CLIENT: OFFICE OF PUBLIC WORKS

DRAWING TITLE: INDICATIVE CONSTRUCTION WORKS METHODOLOGY - SHEET 5

SCALE: 1:250 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER: 2961 - 745

REV: P02



1/746 INDICATIVE CONSTRUCTION WORKS METHODOLOGY
SCALE: 1:300

LEGEND:

- APPROXIMATE OUTLINE OF EXISTING WEIR TAKEN FROM MURPHY SURVEY LTD. DRAWING
- FERMOY FLOOD DEFENCE WALLS
- APPROXIMATE OUTLINE OF GRAVEL BEDS IN RIVER
- WORKING PLATFORM CREATED BY PLACING SELECTED STONE FILL ON THE RIVER BED
- RIVER BED LEVEL REINSTATED TO A MINIMUM OF 18.000 MOD.
- SCOUR PROTECTION TO BASE OF WALL 19

N

REV	STAT	DESCRIPTION	DATE
P02	S2	ISSUED FOR INFORMATION	18.09.2020
P01	S2	ISSUED FOR INFORMATION	16.09.2020

DRAWING STATUS: ISSUED FOR INFORMATION

CHECKED BY:	REVIEWED BY:	APPROVED BY:
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Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: MUNSTER BLACKWATER RIVER - FERMOY SOUTH EAST AND SOUTH WEST DRAINAGE SCHEMES

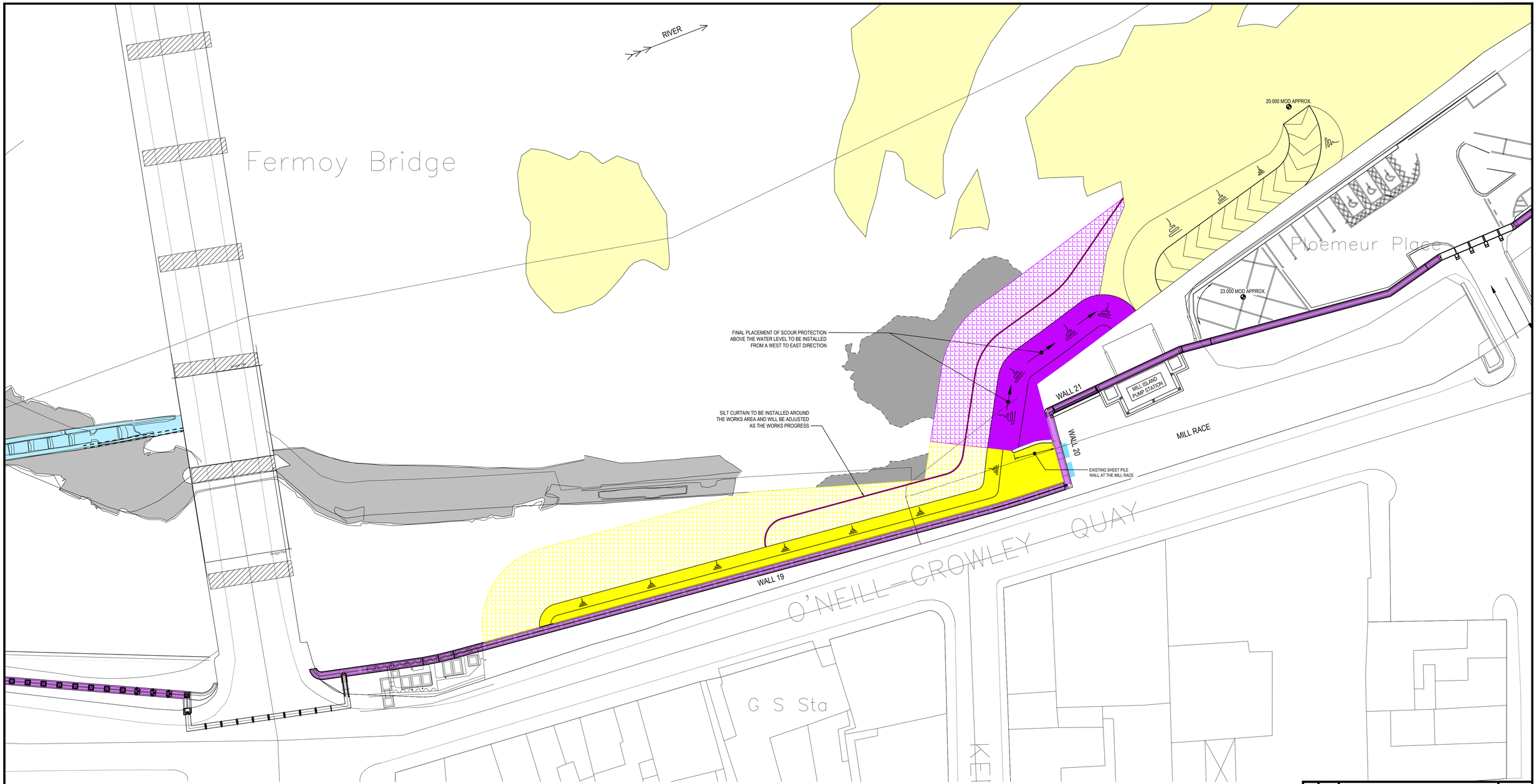
CLIENT: OFFICE OF PUBLIC WORKS

DRAWING TITLE: INDICATIVE CONSTRUCTION WORKS METHODOLOGY - SHEET 6

SCALE: 1:300 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER: 2961 - 746

REV: P02



1/747 INDICATIVE CONSTRUCTION WORKS METHODOLOGY
SCALE: 1:300

LEGEND:

- APPROXIMATE OUTLINE OF EXISTING WEIR TAKEN FROM MURPHY SURVEY LTD. DRAWING
- FERMOY FLOOD DEFENCE WALLS
- APPROXIMATE OUTLINE OF GRAVEL BEDS IN RIVER
- WORKING PLATFORM CREATED BY PLACING SELECTED STONE FILL ON THE RIVER BED
- RIVER BED LEVEL REINSTATED TO A MINIMUM OF 18.000 MOD.
- SCOUR PROTECTION TO BASE OF WALL 19
- SCOUR PROTECTION TO RIVERBANK IN FRONT OF WALLS 20 & 21.

N

REV	STAT	DESCRIPTION	DATE
P02	S2	ISSUED FOR INFORMATION	18.09.2020
P01	S2	ISSUED FOR INFORMATION	16.09.2020

DRAWING STATUS: ISSUED FOR INFORMATION

CHECKED BY:	REVIEWED BY:	APPROVED BY:
RON	JM	JM

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: MUNSTER BLACKWATER RIVER - FERMOY SOUTH EAST AND SOUTH WEST DRAINAGE SCHEMES

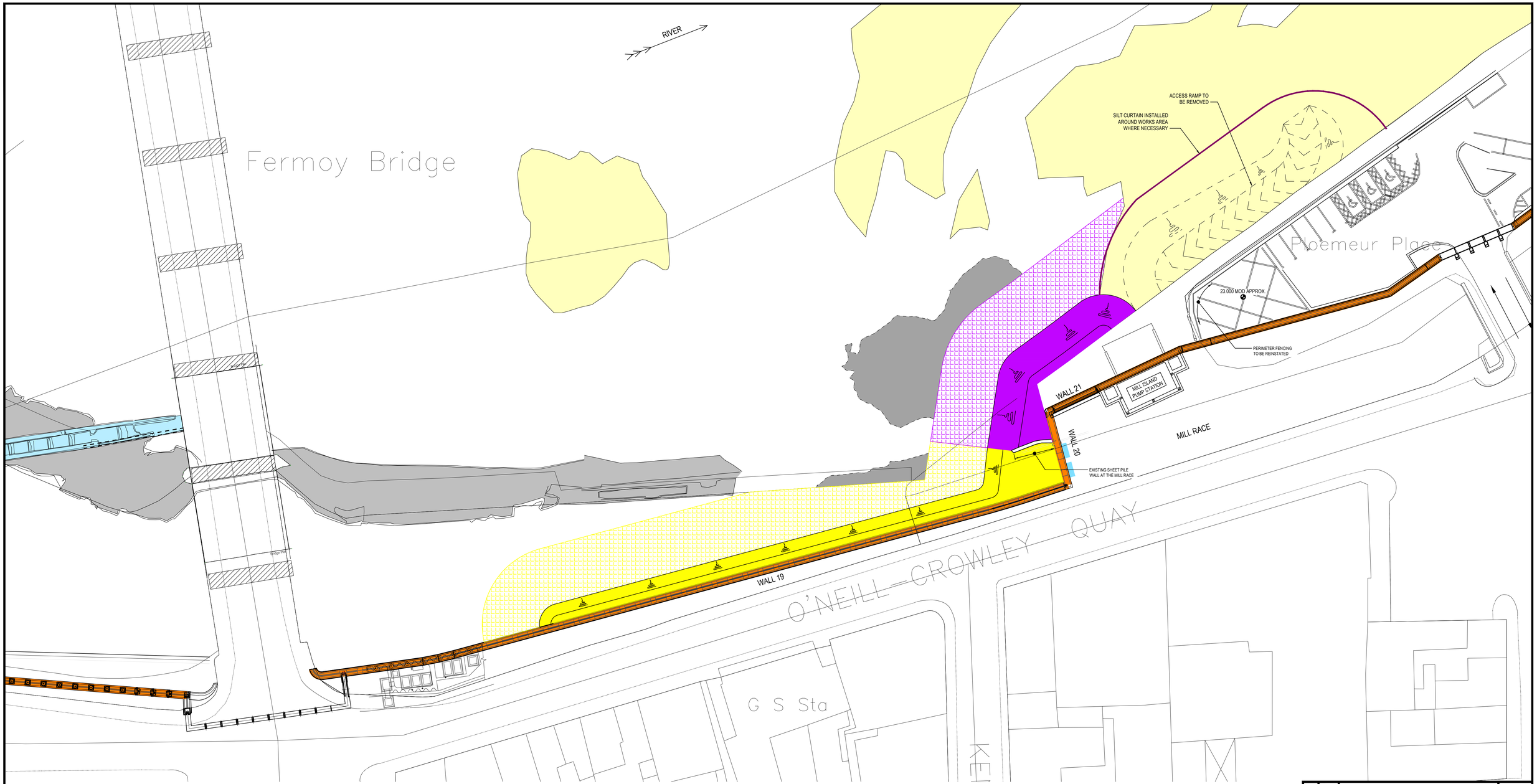
CLIENT: OFFICE OF PUBLIC WORKS

DRAWING TITLE: INDICATIVE CONSTRUCTION WORKS METHODOLOGY - SHEET 7

SCALE: 1:300 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
2961 - 747

REV: P02



1/748 INDICATIVE CONSTRUCTION WORKS METHODOLOGY
SCALE: 1:300

LEGEND:

- APPROXIMATE OUTLINE OF EXISTING WEIR TAKEN FROM MURPHY SURVEY LTD. DRAWING
- FERMOY FLOOD DEFENCE WALLS
- APPROXIMATE OUTLINE OF GRAVEL BEDS IN RIVER
- RIVER BED LEVEL REINSTATED TO A MINIMUM OF 18.000 MOD.
- SCOUR PROTECTION TO BASE OF WALL 19
- SCOUR PROTECTION TO RIVERBANK IN FRONT OF WALLS 20 & 21.

N

REV	STAT	DESCRIPTION	DATE
P01	S2	ISSUED FOR INFORMATION	18.09.2020

DRAWING STATUS: ISSUED FOR INFORMATION

CHECKED BY:	REVIEWED BY:	APPROVED BY:
RON	JM	JM

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: MUNSTER BLACKWATER RIVER - FERMOY SOUTH EAST AND SOUTH WEST DRAINAGE SCHEMES

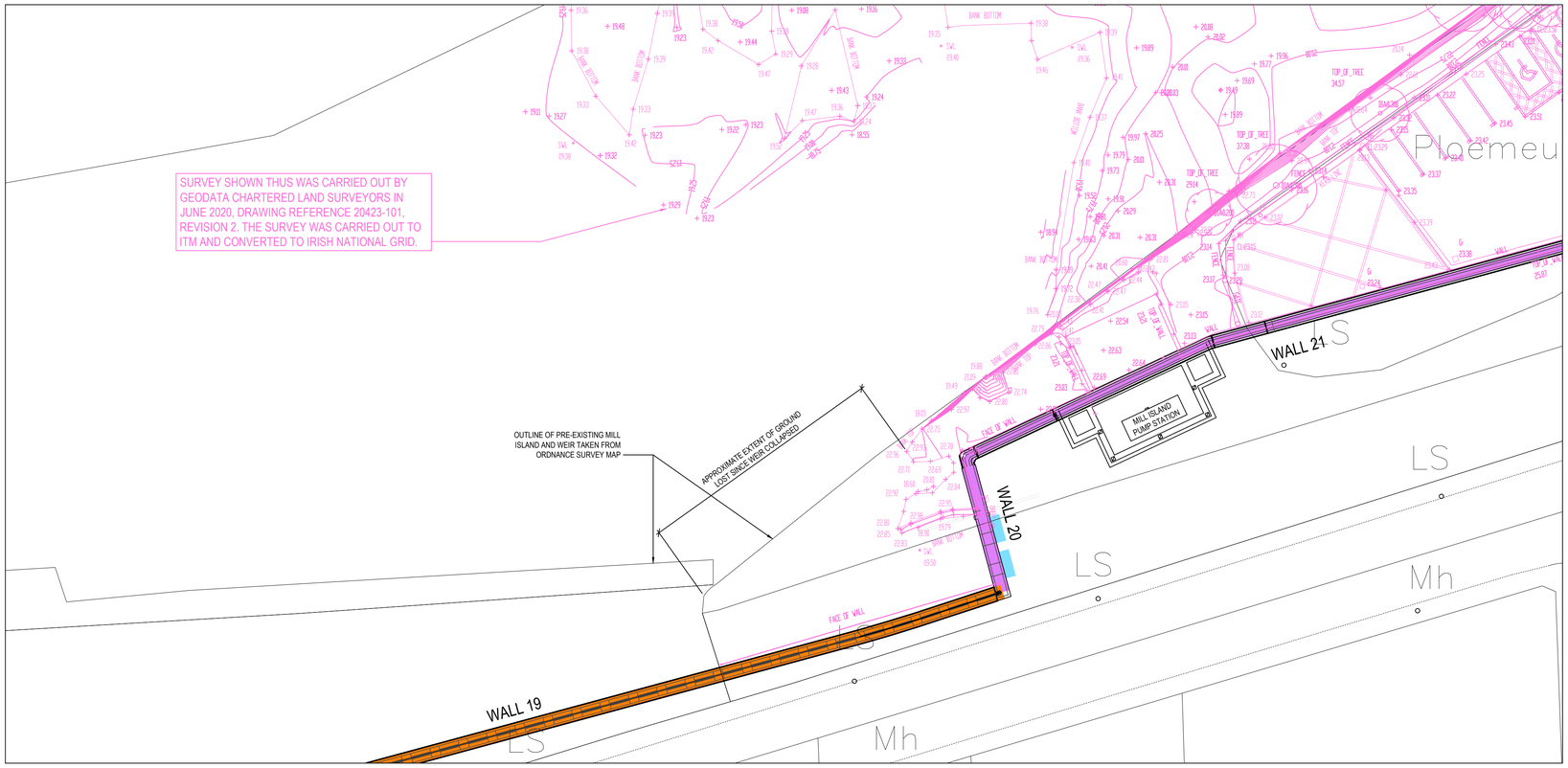
CLIENT: OFFICE OF PUBLIC WORKS

DRAWING TITLE: INDICATIVE CONSTRUCTION WORKS METHODOLOGY - SHEET 8

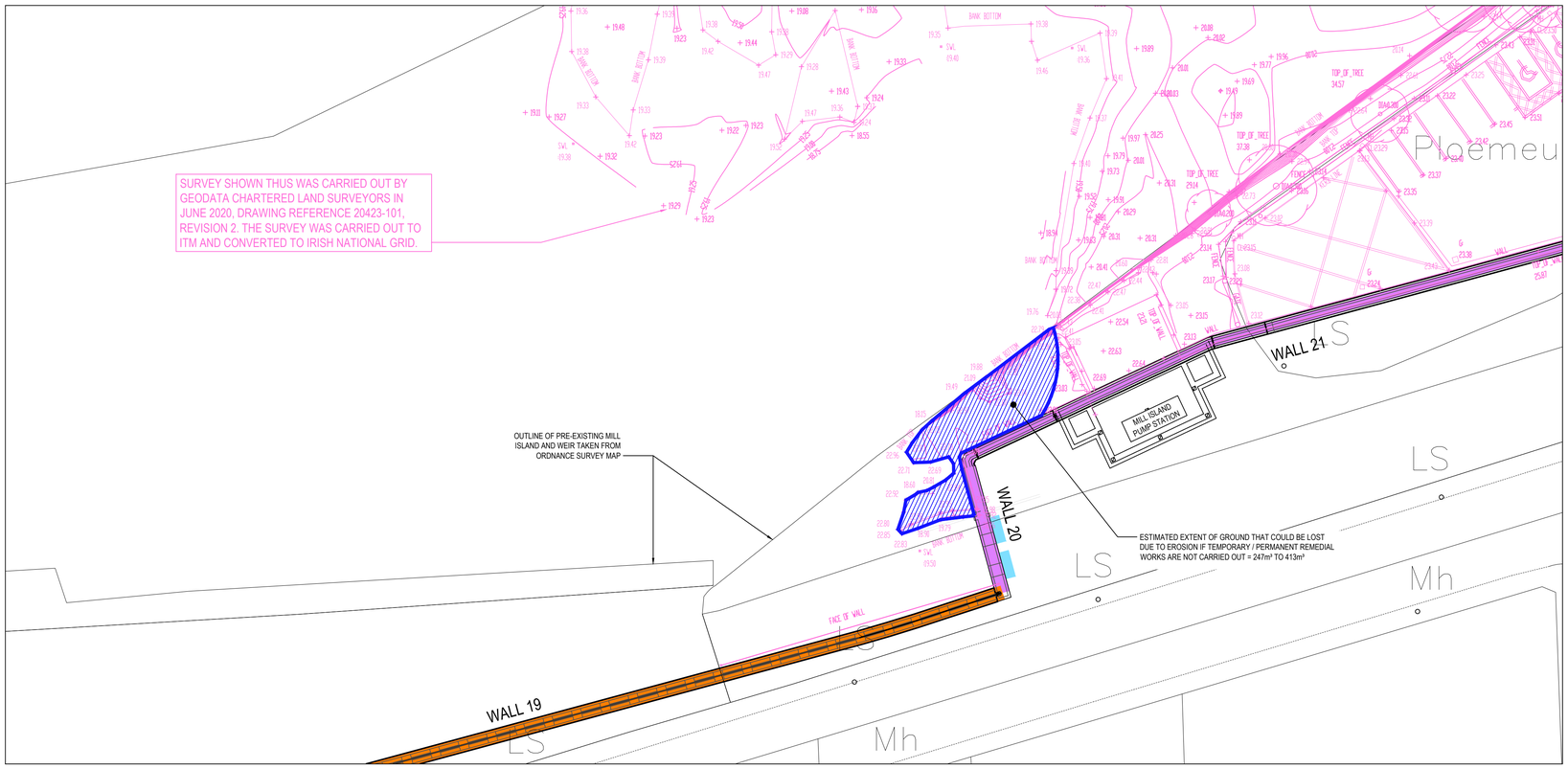
SCALE: 1:300 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER: 2961 - 748

REV: P01



1/706 OVERLAY OF FLOOD DEFENCE WALLS ON OS MAP AND 2020 SURVEY
SCALE: 1:250



2/706 APPROXIMATE ESTIMATE OF GROUND LOSS WITHOUT TEMPORARY / PERMANENT REMEDIAL WORKS
SCALE: 1:250

N

REV	STAT	DESCRIPTION	DATE
P01	S2	ISSUED FOR INFORMATION	27.07.2020

DRAWING STATUS: ISSUED FOR INFORMATION

CHECKED BY:	REVIEWED BY:	APPROVED BY:
RON	JM	JM

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: MUNSTER BLACKWATER RIVER - FORMOY SOUTH EAST AND SOUTH WEST DRAINAGE SCHEMES

CLIENT: OFFICE OF PUBLIC WORKS

DRAWING TITLE: ESTIMATED LOSS OF GROUND DUE TO ONGOING EROSION

SCALE: 1:250 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER: 2961 - 706

REV: P01

Appendix 3 – Otter derogation licence

An Roinn Cultúir,
Oidhreachta agus Gaeltachta
Department of Culture,
Heritage and the Gaeltacht

Licence No.: DER – OTTER – 2020-85

EUROPEAN COMMUNITIES (BIRDS AND NATURAL HABITATS) REGULATIONS 2011 (S.I. No 477 of 2011)

DEROGATION LICENCE

Granted under Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011, hereinafter referred to as "the Habitats Regulations".

The Minister for Culture, Heritage, and the Gaeltacht, (hereinafter referred to as "the Minister"), after obtaining professional advice, is satisfied that: -

(A) this licence is to be granted for the purpose of protecting wild fauna and conserving natural habitats and for imperative reasons of overriding public interest, including those of a social or economic nature, and

(B) there is no satisfactory alternative, and the action authorised by this licence will not be detrimental to the maintenance of the population of **OTTERS** referred to below at a favourable conservation status in their natural range.

The Minister, in exercise of the powers conferred on her by Regulation 54 of the Habitats Regulations hereby grants to **Ross Macklin** on behalf of **The Office of Public Works** ("the licensee") a licence in respect of **Otter Species**. This licence authorises the following:

(a) disturbance;
(b) damage or destruction of breeding sites or resting places;
("the authorised actions").

This licence is subject to the terms and conditions set out overleaf.

Terms and Conditions

1. This licence is granted solely in respect of the activities specified in connection with **emergency structural repairs on flood defence walls at Fermoy Weir, Co. Cork.**

2. The authorised actions shall be carried out on the licensee's behalf by, or under the authorisation of **Ross Macklin of Triturus Environnemental Ltd.**

3. All activities authorised by this licence, and all equipment used in connection herewith, shall be carried out, constructed and maintained (as the case may be) so as to avoid unnecessary injury or distress to any species of **OTTER**.

4. This licence may be modified or revoked, for stated reasons, at any time.

5. The actions to which this licence authorises shall be completed between **22nd September 2020** and **31st December 2020.**

6. The works are to comply with **TII's 'Guidelines for the treatment of Otters prior to the construction of National Road Scheme.'**

7. No agent or servant of the licensee, nor any other person, shall carry out any of the activities to which this licence applies unless authorised in writing by the scientific agent. Any such agent, servant or other person shall make a copy of the written authorisation available for and shall produce it on demand to any member of An Garda Síochána or an authorised officer.

8. This licence is granted subject to the licensee, including his or her servants and the scientific agent, adhering to the recommendations as set out in the accompanying survey report (**Derogation license for otter (breeding & resting area disturbance) under section 54 of S.I. No. 477 of 2011 (Birds and Natural Habitats Regulations) at Fermoy, Co. Cork)**, prepared by **Ross Macklin,** for **The Office of Public Works**, dated **22nd September 2020** and, if specified, any additional mitigation measures requested by the National Parks and Wildlife Service.

9. The local NPWS official shall be contacted prior to the commencement of work under the terms of this licence. The local NPWS District Conservation Officer is **David Rees** who can be contacted at **David.Rees@chg.gov.ie.**

10. Within 5 working days of being requested to do so by an authorised officer, the licensee shall provide a report on the progress of the work covered by this licence and of the mitigation measures implemented.

11. The licensee shall, within 14 days of completion of the actions which this licence authorises, submit a written report to the address below, describing the activities carried out and the mitigation measures implemented in pursuance of this licence.

12. The licensee shall provide for and implement a scientific programme (hereinafter referred to as "the scientific programme") of monitoring of any translocated populations and of the operation of the mitigation measures, to investigate and provide data on the effectiveness of the mitigation measures. The scientific

programme will provide for supplementary mitigation measures informed by data obtained from this monitoring programme.

13. The licensee shall, within **3 calendar months** of the submission of the report under 13 above, submit to the signatory at the address below an interim report on the continued monitoring under the scientific programme. The licensee shall submit a further report by the **13th (final report)** calendar month after the submission of the report under 10 above, setting out the results of the monitoring carried out over these periods and particulars of any supplementary mitigation measures taken.

14. The reporting requirements under this licence will continue in force after the completion of the actions which it authorises, until their completion and the licensee shall be responsible for ensuring that these requirements are met in full.

Gerry Leckey
(a person authorised by the Minister to sign on her behalf)

22/09/2020

Wildlife Licensing Unit
Department of Culture, Heritage and the Gaeltacht
Wildlife Licensing Unit
R. 2.03
90 North King Street
Smithfield
Dublin 7
D07 N7CV
wildlifelicence@chg.gov.ie

NOTES (1 to 2).

1. This licence is granted for the period specified and subject to compliance with the conditions specified. Anything done other than in accordance with the terms of this licence may constitute an offence.

2. This licence applies to **otters** and to no other species.

Appendix 4 – Crayfish trapping outline methodology

Ross Macklin,
Triturus Environnemental Ltd.,
42 Norwood Court,
Rochestown,
Cork City.
E-mail - rossmacklin@gmail.com
Phone - 087-9208742

Our Ref: **LT_SEP15_20**
Date: **21st September 2020**

Wildlife Licensing Unit,
National Parks and Wildlife Service,
Department of Arts, Heritage, Regional, Rural & Gaeltacht Affairs,
90 North King Street,
Dublin 7,
D07 N7CV.

Re: White clawed-crayfish trapping & translocation license (Fermoy emergency flood wall repairs 2020), Co. Cork

Dear Sir /Madam,

The OPW are proposing to conduct emergency structural repairs on flood defence walls that have suffered significant structural damage following the partial collapse of the Fermoy Weir (refer to drawing in Appendix A). The engineering surveys have established that up to 4m depth of scour has occurred at the east end of the original weir that has collapsed. The site surveys have also identified that a section of the western end of Mill Island has also collapsed into the river. In order to maintain stability of the flood walls and to prevent closure of the adjoining road at O' Neill-Crowley Quay, emergency works are required before the end of September 2020.

During a preliminary ecological appraisal of the site, crayfish have been recorded at Fermoy Weir in July and August 2020, with crayfish remains also being numerous in widespread otter spraint from the very active local otter population. In order to facilitate emergency repair works, crayfish trapping will be required in late September through November 2020 to trap and translocate crayfish from the footprint of the works areas. An indicative map of the works areas is shown in Figure 1 below.

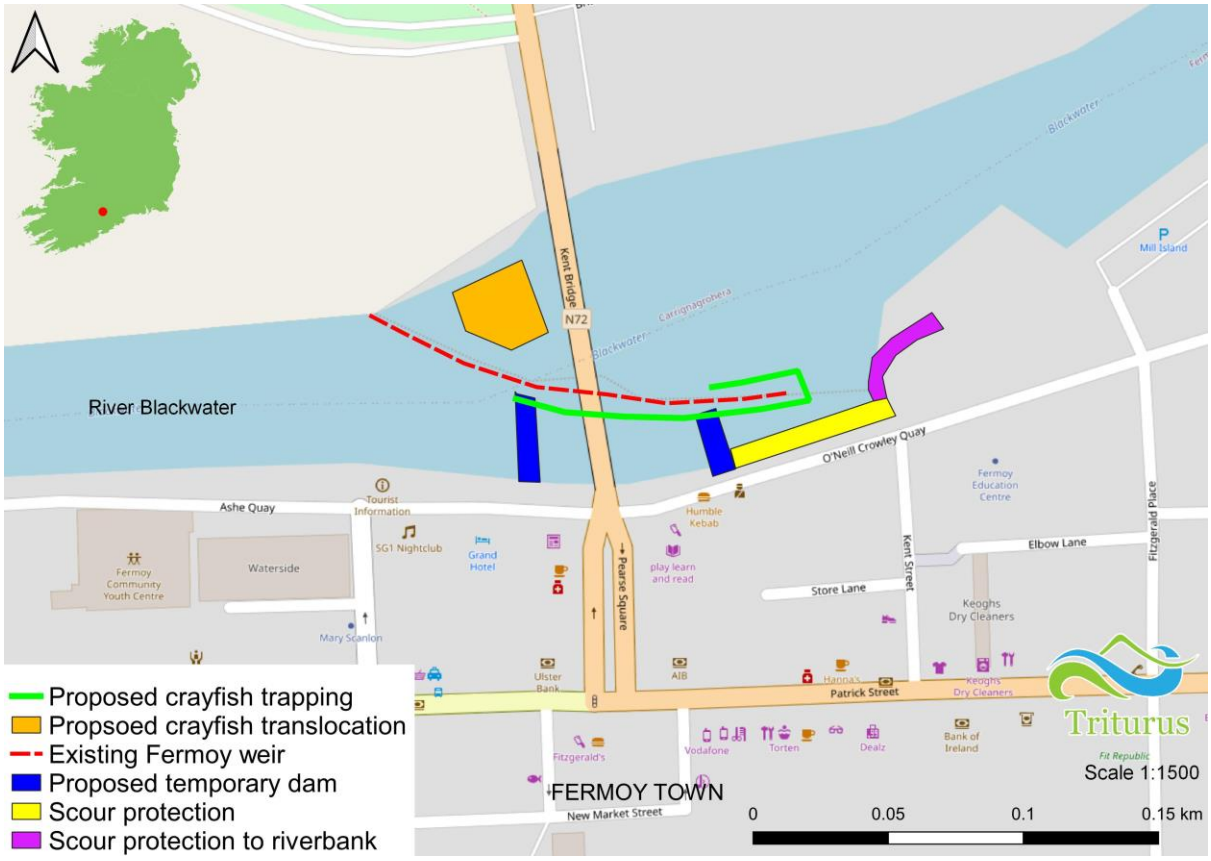


Figure 1. Crayfish trapping and translocation area at Fermoy, Co. Cork relative to proposed emergency repair works.

Trapping, Sweep Netting & Searching

In advance of crayfish removal the local ranger of the NPWS will be contacted to inform the NPWS of the works programme being undertaken. Up to twenty 'Trappy Funnel Crayfish Traps' ballasted with extra rock will be positioned in the footprint if instream works areas during each trapping episode. It is envisaged that trapping will occur over three to four periods. The traps will be positioned the night before and retrieved the following morning. The traps will be baited with 100grams of cat food in cable tied mesh bags that will be disposed of after surveying. Oily food such as tuna based meat offers greater attractant properties because of the oil scent dispersion.

Sweep netting will also be utilised (using biosecurity pond net from NHBS) to detect juvenile Crayfish that may be localised in mats of aquatic vegetation or not enter traps because of adults. Sweep netting involves sampling of both in-stream macrophytes in addition to checking boulder and cobble refugia. This process involves the lifting of boulders (single boulder considered a single refuge) while the net is swept underneath to trap crayfish living underneath.

Identification of Receptor Sites & Tranlocation

In accordance with best practice, Crayfish must be kept in their watercourse of origin, to ensure survival following relocation (Peay, 2000). The distance from the donor habitat to the recipient habitat should be kept within 500m if possible to ensure that the habitat quality remains suitable, given that changes in food resources, instream habitat quality, predation pressure etc. may change. This is often

reflected in rivers with lower population densities where crayfish distribution is often clumped in small sections of river while other reaches remain devoid of crayfish. A suitable area within 150m of the works area has been identified (Figure 1). The receptor (translocation area) is situated in a large weir pool with abundant cobble and boulder refugia on the north side of the river upstream of Fermoy Bridge. This area is separated from the works area by river islands and the old weir wall at Fermoy. The donor area and receptor site are shown on Figure 1. Following trapping and other methods, captured crayfish will be transferred in clean oxygenated buckets to the receptor (translocation) site from the donor area (as identified in the previous section). Crayfish will not be kept for more than 30 minutes in a holding tank prior to translocation.

As per typical license conditions, it is required to make a submission of return on the number of animals caught (i.e. as supplied in the prepared report) to the NPWS. The carapace length and sex of crayfish will also be determined for crayfish captured.

Biosecurity

The check, clean, dry approach is applied routinely before and after site surveys. In this respect equipment will be cleaned and soaked in a hot bat of Virkon before drying for up to 72 hours. Therefore, before trapping commences all equipment is thoroughly disinfected and dried. We use two sets of equipment (as an added precaution) to further reduce cross contamination between sites, albeit in this case all surveys will be undertaken in the vicinity of Fermoy Weir and Quay Walls only (Figure 1 below). Staff will at all times during the project, remain aware of crayfish plague updates and report any incidences of plague immediately.

We trust you have the information required to consider our license application and please do not hesitate to contact us should you require any further clarifications. We would request the license period covers the period 25th September through 30th November 2020. We would appreciate if you could expedite your response to this application at your earliest convenience given there is urgency to complete the works as the client is under pressure to commence works before winter floods may undermine the quay walls further.

Yours Sincerely,

Principal Ecologist & Fisheries Scientist

Triturus Environmental Ltd.

Appendix 5 - Crayfish section 23 and 24 licence.

WILDLIFE ACTS 1976 TO 2018 – SECTIONS 23 AND 34

APPLICATION FOR LICENCE FOR WHITE-CLAWED CRAYFISH *Austropotamobius pallipes*

TO PERMIT SURVEY, CAPTURE, TEMPORARY CONFINEMENT OR TRANSLOCATION FOR EDUCATIONAL, SCIENTIFIC OF OTHER PURPOSES

1. Name of applicant: Company/Organisation (if applicable) Address Email Address Telephone No	Ross Macklin (Principal Ecologist) Triturus Environmental Ltd. Eircode: T12ECF3 rossmacklin@gmail.com 097-9208742
Type of licence sought	Full License (crayfish capture & translocation)
2. Location licence is to cover	River Blackwater at Fermoy Weir, Co. Cork (see attached application letter)
3. Period for which licence is required	September 2020 to November 2020 (November added as this is an emergency works situation)

4. Indicate all that apply Yes/No See Note 4	**Survey, capture and release**	**Trapping**	**Confinement**	**Translocation**
		x	**X (temporarily i.e. <30 minutes in tanks)**	**x**

5. Provide a brief description of the work to be done and methods to be used	Crayfish will be trapped from footprint of quay wall emergency repair works and translocated upstream of works area (see attached application later). This will be undertaken between September 2020 and November 2020. Trapping area, River Blackwater, Fermoy: - 581254, 598582 Translocation area, River Blackwater, Fermoy: - 581090, 598610	
6. **Biosecurity. Outline biosecurity protocol.**	Biosecurity protocol outlined in attached application letter. All surveyors have University of Leeds aquatic biosecurity training.	
7. Provide details of most recent previous licence held.	See Note 7 (delete when completing form)	**Date licence return sent** **Open crayfish license 2020 still active – all previous licenses returned**

8. Declaration.
See note 8
I declare that the above particulars are true and correct, that I:

a) have fully read and understand the conditions attached to this licence application
b) agree to comply with these and any other conditions which may be attached to the licence should it be issued.

Signature:

Date: 21st September 2020

I have provided additional information in separate document(s)	Yes

Please return completed application form by email to: wildlifelicence@chg.gov.ie
Or by post to Wildlife Licensing Unit at the address below
Tel.: (064) 662 7300

An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Department of Culture, Heritage and the Gaeltacht
Wildlife Licensing Unit
National Parks and Wildlife Service
90 King Street North
Smithfield
Dublin 7
D07 N7CV

GUIDANCE NOTES FOR APPLICATION FOR WILDLIFE ACTS 1976 TO 2018 – SECTIONS 23 AND 34 LICENCE FOR WHITE-CLAWED CRAYFISH *Austropotamobius pallipes*

These guidance notes are to help you provide the necessary information so that your application can be processed as quickly as possible. Please provide the information requested and answer all the questions. If the space is insufficient, then please provide more detail on a new page or by in a separate document(s) attached to the same email as your application. Make sure it is clear that the documents are related to the application by including your name and contact details. **ALL QUESTIONS MUST BE ANSWERED, THE FORM SIGNED AND DATED**.

Note 1: Licences are individual and a signed application form is required from **each** applicant. You can apply for two grades of licence for White-clawed Crayfish

A **Full Licence**. Under a Full Licence means you are responsible for all activity under the licence AND reporting. This licence is required by anyone working alone and also by at least one member of a team in any licensed work. All crayfish work should involve a minimum of one Full Licence holder to ensure that reporting is delivered.

B **Limited Licence**. Under a Limited Licence means you are responsible for all activity under the licence with the exception of reporting. This type of licence would be suitable for those working as part of a team for a company or organisation under the coordination of a Full Licence Holder when there is a requirement for just one report.

Note 2: Please specify the location the licence is to cover. A licence can be applied to the whole state, catchment or a specific location. If it is a specific location e.g. bridge then the name of the river/watercourse/waterbody and appropriate grid references should be provided. For example:

- whole State. This will **ONLY** be provided for survey.
- Lough Owel SAC,
- or a specific location e.g. Between New Bridge and Old Bridge, on River Shannon (give grid references)

Note 3: Please indicate the period for which the licence is required e.g. whole year, March to April. Licences can be granted for a whole year or part of a year ending the 31st December after which a new licence is required. Annual licences will **ONLY** be given for Survey (see Note 4 below). Such a licence may be useful if you are engaged in regular surveys for crayfish e.g. to detect presence absence of crayfish prior to detailed survey or emergency works. All other activities will require a separate application. Please apply for a licence as soon as possible and **ideally 3 weeks** before they are required.

Note 4: indicate here by answering Yes or No the activity that the licence will cover following these definitions of the terms. If your proposal does not fall into these categories, please contact Dr Brian Nelson to discuss:

- **Survey** – covers visual search for crayfish at a site using e.g. nocturnal surveys, bathyscope and the use of hand nets, stone turning etc. Any animals caught must be released as soon as possible after necessary information has been gathered to the same waterbody from which they were taken and at the closest possible safe location to the site of capture.
- **Trapping** – covers the use of crayfish traps of any type and for any time period. Any animals caught must be released as soon as possible after necessary biological information has been gathered to the same waterbody or watercourse from which they were taken and at the closest possible safe location to the site of capture.
- **Confinement** – covers the keeping of caught crayfish normally for a maximum of 4 hours and release back to the same waterbody or watercourse from which they were taken and at the closest possible safe location to the site of capture. If the crayfish are to be kept longer than 4 hours, justification and explanation MUST be provided with a full description of the conditions under which they will be held.
- **Translocation** – covers the movement of caught crayfish to a new pre-identified donor site. This should be on the same watercourse or waterbody. Crayfish must NEVER be translocated from the point of capture to a donor site in a different catchment or subcatchment. It is illegal to release any non-native crayfish.

The licence will only cover what is stated on the licence. The default licence is for Survey. This licence will not cover trapping, confinement or translocation. However a licence cannot be provided for these without details

provided on the methodology. So if it becomes clear that confinement or translocation are required following survey, you must apply for a new licence to cover these activities and provide the information needed to assess the application.

Note 5: Please give a brief description of the work to be done under this licence application including description of the protocols on:

- how animals will be held in confinement to ensure their welfare
- how traps will be used, checked and emptied
- translocation protocol including detail of receptor site and its preparation

If there is insufficient space, provide answer on a separate page or by attaching additional documents.

Note 6: Applicants are required to specify the biosecurity protocol that will be in place during the licence period. The information should demonstrate an understanding of biosecurity as it affects White-clawed Crayfish and other aquatic species in Ireland. There is an online course for Biosecurity run by the University of Leeds which you may find useful and which provides a certificate on completion.

https://openeducation.blackboard.com/mooc-catalog/courseDetails/view?course_id=_1189_1.

Note 7: Provide the number, type and expiry date of your most recent crayfish licence (if any) and, in the case of Full Licences indicate whether a return has been provided. It is a condition of all Full Licences that a licence return is provided within a specified timeframe and failure to do this may result in refusal to grant a further licence. Negative returns are required as well as positive ones.

Note 8: This declaration should be signed and dated**.** By doing this you agree to the following conditions

- Licences permit action solely for the purposes specified on that licence.
- Licences do not permit actions prohibited under any other legislation, nor do they confer any right of entry upon land.
- Follow established biosecurity protocols
- It is the responsibility of the person named on this licence to use appropriate equipment (eg traps and nets) and to ensure that they are competent to use such equipment so as to avoid causing unnecessary suffering.
- Carry a copy of this licence whilst undertaking any activities under this licence.
- The common name of the species given in a licence is included by way of guidance only. In the event of any dispute or proceedings, it is the scientific name of a species only that will be taken into account
- To release any crayfish caught under this licence as soon as possible to the place of capture or in the case of translocation to a receptor site
- It is the responsibility of licence holders to identify crayfish to species.
- To inform NPWS immediately of any non-native crayfish that are found
- It is the responsibility of the licence holders to be aware of the signs of crayfish plague and to inform NPWS immediately of any suspected outbreak of crayfish plague

Reporting

It is a condition of all **FULL** Licence holders to comply with the following reporting conditions

- Each Licensed Person must maintain full records of all activity under this licence. This may include the activity of Limited Licence holders under your supervision.
- Provide photographs of a sample of crayfish to prove identification
- Provide records in a spreadsheet with the **minimum** fields; Species; Date of survey, River or lake name; survey location placename; survey location grid reference (minimum of 6 figure); recorder, determiner (if different); habitat; and number caught/seen.
- The placename should be a standard name e.g. that on an Ordnance survey map.

Commercial confidentiality

If you encounter difficulties releasing data due to client confidentiality restrictions then you are advised to remind your client that it is a condition of using this licence that survey information is reported. Furthermore, the licence may only be used if this condition is met and withholding information may lead to a licence breach.