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Appropriate Assessment Screening and Natura Impact Statement

Boherbue WWTP Upgrade, Co. Cork

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Contents

1. Introduction

This report provides an ecological assessment to inform Appropriate Assessment for a proposed upgrade to Boherbue Waste water Treatment Plant (WwTP) including its construction and operation.

All EU Member States are obliged to establish a network of sites of conservation importance known as the Natura 2000 network. The network is made up of Special Areas of Conservation (SACs) established under the EU Habitats Directive (92/43/EEC) and Special Protection Areas (SPAs) established under the EU Birds Directive (2009/147/EC). Under Article 6(3) of the Habitats Directive, Member States are required to consider the potential for likely significant effects of any project or plan on the conservation objectives of a SAC or SPA (European site) before a decision can be made to allow that project or plan to proceed.

Appropriate Assessment (AA) is the process whereby the potential impacts of a project or plan are assessed in view of a European site's conservation objectives. The first step in the process is to conduct AA screening to determine, on the basis of a preliminary assessment and objective criteria, whether the project or plan, alone or in combination with other projects or plans could have significant effects on the conservation objectives of a European site. Where significant effects are likely, uncertain or unknown at the screening stage, Appropriate Assessment is required to enable a consent authority to carry out an appropriate assessment.

Screening for AA was carried out for the proposed project and is presented in section 7 of this report. The Screening assessment concluded that "*it cannot be excluded, on the basis of objective information, that the proposed project, individually or in combination with other plans or projects, will have a significant effect on the Conservation Objectives of a European site. Accordingly, it is concluded that an Appropriate Assessment of the proposed project is required*". A Natura Impact Statement (NIS) was subsequently prepared and is presented in section 8 of this report.

The screening assessment and NIS was prepared by Dr. Louise Scally MCIEEM of MERC Consultants Ltd.

2. Statement of authority

Louise Scally is a professional ecologist with a wide range of experience in the field of conservation biology, habitat mapping, aquatic ecology and taxonomy. She completed a M.Sc. in ecology and taxonomy at Trinity College Dublin in 1989 and a Ph.D. in taxonomy also at Trinity College Dublin in 2001.

She has conducted field surveys and assessments for a range of habitats over the last 15 years for private and public sector clients including the National Parks and Wildlife Service, The Marine Institute, Inland Fisheries Ireland, Coillte Teo. Environmental Protection Agency, and ESB Networks Ltd.

She was the senior ecologist and field survey team member of the 2015-2018 NPWS national monitoring of marine Annex I habitats for compliance under Article 17 of the EU Habitats Directive. In this context she was responsible for the assessment and reporting of marine Annex I habitats and was lead author of all Article 17 reports and the overarching site monitoring reports.

She was a scientific team member of MERC consultant's habitat mapping surveys carried out in a number of marine Special Area of Conservation from 2005-2010 for the National Parks and Wildlife Service and was the Project Manager and scientific team leader for the 2009 to 2011 programme of marine surveys conducted by MERC Consultants on behalf of the Marine Institute for their current programme of Appropriate Assessment of designated sites.

She was a member of the National Parks and Wildlife Service peatland ecology field team in 1990. In this capacity she was part of a field team that mapped, recorded and reported on the botanical composition and features of extensive tracts of blanket bog habitat in Co. Donegal. She was also part of the National Parks and Wildlife Service Native woodland field team (under the management of BEC Consultants Ltd) in 2004. In this capacity she was part of a field team that mapped and recorded the botanical and structural composition of a range of native woodlands in Counties Sligo and Leitrim.

In addition to her scientific expertise, she has an in-depth knowledge of Irish and European Environmental legislation and policy. In 2011 she prepared the text describing Activities Requiring Consent (ARCs) for inclusion in a handbook detailing the regulatory framework for all developments within designated sites in Ireland on behalf of the National Parks and Wildlife Service. She has also produced numerous Conservation Management Plans for the same department. To-date she has conducted in excess of 80 ecological reports in support of Appropriate Assessment under Article 6(3) of the EU Habitats Directive.

3. Methods

3.1 Relevant guidelines and legislation

This report has been prepared with reference to the following European Directives, national legislation and guidance on the appropriate assessment of projects and plans with regard to the implementation of the provisions of Article 6(3) and (4) of the EU Habitats Directive 92/43/EEC.

- *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild flora and fauna*. Official Journal of the European Communities.
- *Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds* (codified version).
- *European Communities (Birds and Natural Habitats) Regulations 2011*. SI No. 477 of 2011.
- *Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC*. European Commission 2018. 7621 final. Office for Official Publications of the European Communities, Luxembourg.
- *Assessment of plans and projects significantly affecting Natura 2000 sites; Methodological Guidance on the provisions of Articles 6(3) and (4) of the Habits Directive 92/43/EEC*. European Commission, 2002;
- *Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities*. DoEHLG, 2009.
- Urban Waste Water Treatment Regulations, 2001, S.I. No. 254/2001.
- Office of the Planning Regulator (2021). OPR Practice note PN01. Appropriate Assessment Screening for Development Management.

3.2 Description of the proposed project and its associated scope of works

A description of the proposed project was compiled and is set out in Section 4. The description details all works required to carry out the proposed project.

3.3 Description of the receiving environment

To fully understand the receiving environment, relative to project related effects, the literature consulted included the available National Parks and Wildlife Service data sources for all Natura 2000 sites within the zone of influence of the proposed project. This included the individual site synopsis for European sites, standard Natura 2000 data forms, conservation objectives and GIS layers (habitats and species). The focus of the literature survey was concentrated on the information available for Blackwater River (Cork/Waterford) SAC (Site code 002170), the closest European site to the proposed project and the primary receiving waterbody of the WwTP discharge.

Site walkovers were conducted in January and March 2021 to obtain an overview of the proposed project site and its environs.

3.4 Impact assessment approach

The zone of influence (ZOI) of a project is the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities. In the context of AA screening, the ZOI is the area over which a plan or project could affect the receiving environment such that it could potentially have significant effects on the conservation status of European Sites. This has the

potential to extend far beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries. Within the ZOI those receptors that are sensitive to change must be identified and considered.

To define the ZOI of a project the potential for project related effects on sensitive receptors must first be established. For this purpose, a **Source-Path-Receptor-Consequence (SPRC)** model was applied. The SPRC model is a well-established model frequently applied to the analysis of project related effects on ecosystems and is the one which we have applied to the assessment of the proposed site investigations.

The application of the SPRC is summarised below:
Source - The origin of a hazard e.g., noise generation from site investigation equipment.
Pathway - Route that a hazard takes to reach Receptors e.g., through water. A pathway must exist for a Hazard to be realised.
Receptor - The entity that may be affected (e.g., a marine mammal, a habitat etc.).
Consequence - An effect e.g., hearing damage as a consequence of noise generation.

Using this approach all elements of the proposed project were reviewed to assess potential pathways and receptors which might be affected so that a ZOI could be established for the proposed project. This process involved the following steps:

- The identification of sources of potential impacts and their pathways from the proposed project site to European Sites.
- Consideration of sensitive receptors and their dependent ecosystems within the aforementioned European sites.
- Identifying and characterising project related impacts and their likely effects, direct, indirect and cumulative on the identified sensitive receptors.

Once the ZOI was established, the following steps were taken to assess the potential for likely significant effects on sensitive receptors:

1. The scale, scope of the project was examined.
2. A desk review of the available literature describing the habitats and species known to occur at the proposed project site and surrounding area was undertaken.
3. Any project related activities likely to affect migratory or highly mobile species was considered.
4. Any use of the proposed project site by mobile species that make regular movements to, from, or across the site was assessed.
5. An assessment was carried out of the key ecological processes and species activity periods including seasonal variations in distribution, abundance and activity.

3.5 Review of relevant European Sites

Once the ZOI of the proposed project was determined all European sites within this ZOI were documented and an analysis of the sensitivity of ecological receptors therein was conducted. In determining the sensitivity of ecological receptors consideration was given to the scale, scope and location of the proposed project relative to the aforementioned receptors.

4. Details of proposed project

4.1 Background to the proposed project

The EPA identified a need to carry out upgrade works to the existing Boherbue WwTP, Boherbue, Co. Cork prior to the formation of Irish Water. Due to the agglomeration growth, the WwTP is failing to meet the treatment standards specified in its current Wastewater Discharge Licence (WwDL). Irish Water are now proposing to carry out upgrade works to address this issue. The upgrade will provide for greater sludge storage capacity to bring the plant in line with Irish waters requirements due to operational issues with the current volume of sludge storage and to meet waste water discharge licence requirements. The existing WwTP is located in north County Cork, 0.4km north of the village of Boherbue. It discharges into the Brogeen River, approximately 0.2km north of the WWTP.

The existing WwTP is designed for up to 800 Population Equivalent (PE). It is comprised of three forwarding pumping stations which convey sewage to the WwTp and from there through a constructed wetland system before discharging to the Brogeen River.

The location of the existing WwTP, which is also the site of the proposed works, is shown in figure 4.1

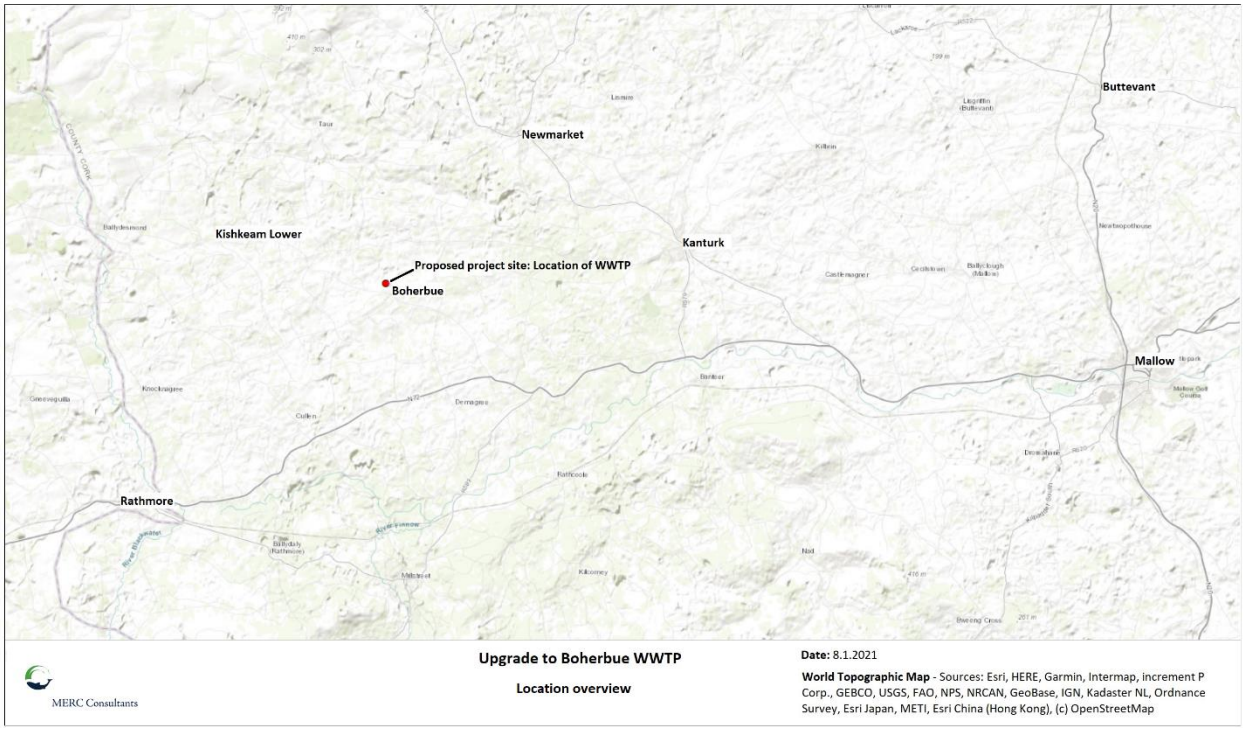

Figure 4.1. Location of Proposed project site.

4.2 Scope of works

The construction works will include the installation of an Aeration tank (19.1m x 11.2mx 4m deep), Sludge Reed Beds (32m x 32m x 3m deep), 2 no. Settlement Tank (6m diameter x 4.5m deep), Storm Tank (9m diameter x 4.5m deep), Tertiary tank (12m x 8m x2m deep). All associated pipework will be open trenched. All of the proposed works together with the construction compound will be located within the confines of the existing WwTp site boundary.

The scope of works includes the components listed in table 4.1 and shown in figure 4.2 and a detailed description is provided below. The scheme described below will have the capacity for 1,200PE.

Table 4.1 Main project components

No.	Component	Main elements
1	New preliminary treatment	New inlet works New stormwater storage tank New stormwater overflow pipework to existing constructed wetlands
2	New treatment	New secondary treatment process New tertiary treatment process
3	Sludge treatment process	New sludge drying reed beds
4	Stormwater management	New stormwater holding tank
5	Decommissioning works	Decommission existing primary Imhoff tanks Decommission existing trickling filters and humus tanks Decommission of old (existing) stormwater overflow pipework to existing constructed wetlands
6	Installation of solar panels	Installation of a 150KW ground mounted system for the generation of solar energy which will generate 144,391 KWh/year.

Component 1: Preliminary Treatment

Inlet works

Prior to storm separation, flows will pass through the inlet works in order to be screened. Fine screening to 6mm in 2D and a manual bypass screen to 19mm with a stone trap upstream of the screens will be provided. The screens will ensure that all flow will be screened to 6 mm before passing through to the main plant or to the storm water tank. As per IW-TEC-700-99-02, screens will be designed to cope with a minimum of 150% of the design capacity for works under 2,500 PE

Stormwater separation

Stormwater storage is required on site to handle excess flows. Sewage currently flows by gravity to an overflow chamber at the entrance of the Boherbue WwTP and through the existing constructed wetlands. Stormwater from the new holding tank will continue to be diverted through the existing constructed wetlands.

Component 2: New treatment

Secondary treatment - Biological treatment stage

Following storm separation, flows to full treatment will pass to a biological treatment stage, where carbonaceous oxidation, nitrification and suspended solids separation will be carried out in order to achieve the required treated effluent quality. Coagulant dosing will be carried out at the outlet of the biological

treatment stage (but upstream of the secondary settlement stage) to promote chemical phosphorus removal.

Secondary treatment – Settlement tanks
Following biological treatment, mixed liquor will be forwarded to a secondary settlement stage consisting of 2no. secondary settlement tanks. Both biological and chemical sludge generated by the chemical phosphorus removal process will separate from secondary treated effluent by gravity, and will be collected in a central hopper for sludge return and wasting, whilst treated effluent will flow over a weir before undergoing tertiary treatment.

In order to avoid overdosing and because iron does not form part of the ELV's for the site, a correlation dosing curve will be developed based on flows and incoming proposed COD probe, estimating the dilution factor. That information in conjunction with the pH will prevent the possibility of iron discharge associated to the lack of alkalinity.

Tertiary treatment
Following settlement Following settlement, secondary treated effluent will be passed onto a tertiary treatment stage for final effluent polishing prior to discharge to the Brogeen River. Tertiary treatment will consist of the installation of cloth filters for final treatment. Cloth filters are efficient in the removal of TSS, associated BOD, phosphorus and other pollutants. See figure 4.2 for location of new overflow pipe which will be located and discharge to the same location as the existing outfall pipe.

Component 3: Sludge management
Sludge settled within the final settlement tanks will flow continuously by gravity to the centre of the sloped tank and from there to the RAS/WAS Pumping Station (PS) by hydrostatic pressure. The amount of sludge removed from the sedimentation tanks is controlled by the pumping station. All produced sludge will be conveyed to a new sludge reed bed where the sludge will dry and liquor will be pumped back to the treatment by the Mixed Liquor Return PS to the Control Stormwater Overflow chamber. The drying sludge bed has been designed for sludge production of 85kg/day.

As described above, the correlation dosing curve will prevent any overdosing into the system. It is recommended that sludge sampling for heavy metals, in particular iron in the WAS is employed to monitor any risk of sludge contamination.

Component 4: Stormwater management
Flows in excess of the plant peak design flow will overflow by gravity (weir discharging) to the storm water holding tank in compliance with DoE Storm water Overflow criteria. The stormwater holding tank will be built with two submersible pumps working in duty/standby mode which will direct stormwater back to the CSO chamber to be treated on the treatment process once inlet flows drop to a set level before discharging through the existing constructed wetlands. In the remote case of overflow on the stormwater tank, an outfall pipe will convey the stormwater to the outfall chamber while retaining most of the stormwater on the tank.

Component 5: Decommissioning works
The existing primary Imhoff tanks and trickling filters and humus tanks and associated infrastructure will be decommissioned and removed from the site. The existing stormwater overflow pipework to the constructed

wetland system will be replaced with new pipework. The constructed wetland system will remain in place as is.

Component 6: Solar system

A 150KW ground mounted system for the generation of solar energy will be installed in the southeast corner of the site. This system will generate 144,391 KWh/year. The system comprises 348 no. PV modules with a surface area of 745.6m^2. The area occupied by the panels is approx. 2,200m^2 when spacing between the modules is accounted for. A storage container which will house the associated inverters and batteries for reuse of energy generated on-site will also be installed.

Further information

The existing constructed wetlands are considered to be not fit for purpose in relation to the control of BOD, ammonia and phosphorous discharge levels from the existing treatment plant. Therefore, the proposed project will implement tertiary treatment to ensure compliance for the control of these parameters. Following tertiary treatment, the discharge will be diverted, through new pipework to the same location as the existing discharge point. The existing constructed wetlands will be left *in situ* and continue to receive any excess flow from the stormwater holding tanks.

The works will be in compliance with:

- Environmental Protection Agency (EPA) Wastewater Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007).
- Urban Wastewater Treatment Regulations, 2001 (S.I. No. 254/2001).
- Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272 of 2009).
- The works are in compliance with the ELV's documented in the waste water discharge licence (Licence register No. D0437-01) for this agglomeration.
- Department of Environment Urban Wastewater Treatment Directive (91/271/EEC). Procedures and Criteria in relation to Storm Water Overflows.

All elements of the project components described above are shown in Appendix 1 and figure 4.2.

The maximum outflow parameters following treatment will provide for 75% of the assimilative capacity of the receiving watercourse (the Brogeen River), to meet with WFD high ecological status, and are given in table 4.2.

Table 4.2 Maximum outflow parameters after treatment

Parameter	**WwTP Emission Limit Values (ELV's) after treatment**	**As per existing EPA discharge licence**
BOD (mg/l)	12	15
COD (mg/l)	125	125
Suspended solids (mg/l)	25	25
Ammonia- Total (as N) (mg/l)	0.5	0.5
Orthophosphate (as P) (mg/l)	0.25	0.3

The proposed project will implement tertiary treatment to ensure compliance for the control of these parameters. Discharge will be diverted, following tertiary treatment, through new pipework to the discharge point. It should be noted that the discharge point is 22.5 meters from the final exit into the Brogeen River. From this point, discharge flows through a channel (see figures A2.5 to A2.9) into the Brogeen River. The nearest construction point for pipework is at the existing (surface point into the channel) which is 22.5 meters from the river bank.

The existing constructed wetlands will be left *in situ* and continue to receive discharge, should it occur, from the storm water tank.

Figure 4.2. Overview of proposed new site infrastructure.

5. Receiving environment

5.1 Overview

The proposed project is located 0.4km north of the village of Boherbue, Co. Cork (figure 5.1). This area is characterised by improved agricultural grassland (GA1) with areas of wet grassland (GS4) and is delimited by hedgerows (WL1), treelines (WL2) and drainage ditches (FW4). The agricultural grassland is currently used for both grazing and tillage and a number of small farmsteads are present. Pockets of commercial conifer plantation (WD4) are present to the west and north of the WwTP. The land in the immediate vicinity of the WwTP slopes downward towards the Brogeen River, the location of the WwTp discharge point. The Brogeen River at this location is a second order watercourse with its source 3.8km north west of the discharge point in an area of commercial conifer plantation. It is joined by two additional first order watercourses (the Rea-Allen and Knocknacurragh), which also pass-through areas of commercial forestry, before reaching the WwTP discharge point.

The subsoil at the location of the WwTp and its immediate environs is comprised of shale and sandstone till (Namurian) and is a low permeability subsoil. This area is described as a Locally Important Aquifer - Bedrock which is moderately productive only in local zones.


Legend
Blackwater River (Cork/Waterford) SAC (Site code: 002170)
Existing WwTP/ Proposed project location
Upgrade to Boherbue WWTP
Location overview
Date: 12.1.2021
World Imagery - Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
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Figure 5.1

5.2 Ecology of the receiving environment

A site walkover was conducted on January 11th 2021 to review the ecology of the site in the context of the proposed project. A separate survey to assess the site and environs for the presence of Invasive Alien Species (IAS) was carried out on March 23rd 2021. The site layout of the existing WwTP/location of proposed project is shown in figure 5.2 and described here. Additional site images showing the various habitats present are provided in Appendix 2.

The existing WwTP is comprised of the waste water treatment infrastructure (Administration buildings, and plant) situated in an area of hardstand (Buildings and artificial surfaces: BL3) and lawn (Amenity grassland improved: GA2), see figure 5.2. From the WwTP the existing treated effluent flows from the outlet point and through a series of reed beds which, following the main slope of the land are formed on a series of three levels, as shown in figure 5.2. Waste water from the lowest level discharges approximately 15 meters south of the Brogeen River.

The reed beds are dominated by a monoculture of Common Reed (*Phragmites australis*). Earthen berms covered by grass are present around the perimeter of the reed beds. Areas of wet grassland with abundant rushes (*Juncus effusus*) are present within the site, while Gorse is present around much of the drier raised perimeter areas. Drainage ditches (FW4) and a palisade fence surrounds the site

The Brogeen River is one of a number of watercourses that drain into the River Blackwater (Munster). The Brogeen River drains into the Allow River just south of Kanturk Town before joining the Blackwater River, 3.5km (hydrologically) to the south. All of the aforementioned watercourses are within the River Blackwater (Cork/Waterford) SAC.

The section of the Brogeen river into which the WwTP discharges is a second order watercourse and meanders considerably along its length. It has a good riparian buffer zone in parts which is dominated by either scrub and/or mature trees. However, the riverbank at the discharge point of the WwTP is lacking a significant scrub/tree riparian zone on either side of the river with only scattered individuals of Alder (*Alnus glutinosa*) and willow (*Salix* sp.) present and is characterised by wet grassland. Bank erosion due to the meandering nature of the river is visible at this location.

The riparian zone along most of the length of the Brogeen River is very overgrazed due to poor fencing which allows access to the river bank by cattle. Access to the river for drinking purposes by livestock, which has contributed to bank erosion, collapse and siltation and has been recorded as a significant pressure on this watercourse. The nearest location where Salmon are found is downstream of Derrygalun Bridge, approximately 6.8km downstream of the WwTP discharge point (I.R.D. Duhallow, 2015). While some areas of gravel are present, in the scour channel at the centre of the channel the Brogeen is generally characterised by a soft sediment river bed in this area. This area (soft sediments) may provide suitable habitat for juvenile lamprey species but is not considered suitable spawning habitat for salmon.

While the area along the river bank and its environs provides suitable habitat for otter, no couches, slides or holts were recorded adjacent to the WwTP.

No rare or unusual species of flora were noted. Himalayan balsam (*Impatiens glandulifera*) was not noted at the section of the Brogeen river adjacent to the WwTp but was recorded further east of the site. Japanese knotweed (*Fallopia japonica*) was not recorded.

The River Blackwater is one of the largest rivers in Ireland, draining a major part of the southern Ireland and five ranges of mountains. The River Blackwater (Cork/Waterford) SAC consists of the freshwater stretches of the River Blackwater as far upstream as Ballydesmond, Co. Cork and its many tributaries to the tidal stretches within Youghal Harbour, Co's Cork and Waterford. The SAC is designated for a wide range of terrestrial, freshwater and marine habitats and species.

Figure 5.2. Existing site infrastructure and habitats

6. Appropriate Assessment Screening

6.1 European Sites

Following a review of the project scope of works, construction methods and post construction operation, the zone of influence of the proposed project is considered to include all habitats within the direct footprint of the construction site, and the habitats and species within the Blackwater River Cork/Waterford SAC.

This zone of influence has been decided based on expert judgement relative to the scale and scope of the project, corridors of connectivity (hydrological links and indirect source-path-receptor links) and potential cumulative impacts during the construction and operation of the proposed project. No source-path-receptor links have been identified between the proposed project and any additional European sites. Therefore, with due consideration to the scale and scope of the project, impacts on the conservation objectives of these additional sites are not considered possible and have not been further considered in this report.

The Blackwater River (Cork/Waterford) SAC, EU site code: 002170, includes most of the freshwater stretches of the Munster Blackwater River as well as the estuarine component at Youghal. The tidal influence of the site extends almost to Cappoquin, Co. Waterford which is approximately 26km upstream of the entrance to Youghal Harbour. The Munster Blackwater River rises at Knockanefune in Kerry ad flows through Cork before entering the sea at Youghal Harbour. The main tributaries associated with the system, and which are included in the SAC, are the Rivers Lickey, Bride, Allow and Awbeg. A wide range of habitats and species associated with the rivers are included within the site, including substantial areas of woodland (deciduous, mixed), scrub, wet grassland, swamp and marsh vegetation, bog, saltmarshes, intertidal sand and mud flats and subtidal estuarine sands and their associated communities. Areas of improved grassland, arable land and coniferous plantations are included in the site for water quality reasons. Notable associated species include Freshwater pearl mussel, White-clawed crayfish, three Lamprey species, Twite shad, Salmon and Otter. The qualifying interests for which the site is selected are listed in table 6.1.

Table 6.1: Qualifying interests for which Backwater River (Cork/Waterford) SAC is selected.

Backwater 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]
Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]
Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0]
Margaritifera margaritifera (Freshwater Pearl Mussel) [1029]
Austropotamobius pallipes (White-clawed Crayfish) [1092]
Petromyzon marinus (Sea Lamprey) [1095]
Lampetra planeri (Brook Lamprey) [1096]
Lampetra fluviatilis (River Lamprey) [1099]
Alosa fallax fallax (Twaite Shad) [1103]
Salmo salar (Salmon) [1106]
Lutra lutra (Otter) [1355]
Trichomanes speciosum (Killarney Fern) [1421]

The Blackwater River (Cork/Waterford) SAC consists of the entire freshwater stretches of the Munster Blackwater and its many tributaries. It also includes the marine and costal habitats within Youghal Harbour. A number of terrestrial habitats and species adjacent to the river are also included within the site. An overview of the habitats and species within the Blackwater River (Cork/Waterford) is provided in section 6.2.

6.2 Overview of habitats and Species within the Blackwater River (Cork/Waterford SAC)

The Brogeen River is within the Munster Blackwater Catchment (Hydrodynamic Area 18). 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 Munster Blackwater catchment comprises 28 sub-catchments and the Brogeen River is within sub-catchment 18-1 (Brogeen_SC_010). The Brogeen River into which the WwTP discharges is designated as “Q4-Good status” and “Not at Risk” in the most recent River Q values (EPA, 2018). Station (18B060100 upstream of the WwTP and & 18B060300 downstream of the WwTP) are in satisfactory condition with Good ecological quality.

The Munster Blackwater drains into Youghal Harbour. Youghal Harbour is characterised by a range of estuarine habitats in the upper reaches as far north as Cappoquin and more open marine waters, mudflats and sandflats towards the mouth. The current conservation status of the marine habitats (Estuaries and Mudflats and sandflats not covered by seawater at low tide) is described as “Favourable” (Scally *et al*, in press).

Estuaries [1130]

The estuarine habitat within the SAC extends from the mouth of Youghal Harbour as far north as Cappoquin. It is of conservation importance for a range of subtidal sediment communities and Mussel (*Mytilus edulis*) beds. The main pressures on this habitat are listed as agricultural activities generation marine pollution, Marine aquaculture generating marine pollution, other invasive alien species (other than species of Union concern), Residential or recreational activities and structures generating marine pollution (excl. marine macro-and micro-particular pollution and also "unknown pressures". (NPWS, 2019). In some estuaries, increased sedimentation as a result of surface waters via storm overflows or urban run-off surrounded by or downstream of large urban settlements is noted as a cause of impact but this impact is not recorded within the Blackwater River (Cork/Waterford SAC). The conservation status of this habitat within Blackwater River (Cork/Waterford SAC) is recorded as "Favourable". However, the Lower Blackwater estuary and Youghal Bay are being impacted by excess nutrients, which is leading to problems with phytoplankton and macroalgae, respectively (EPA, 2018).

Mudflats and sandflats not covered by seawater at low tide [1140]

Tidal flats are recorded along the margins of Youghal Harbour as far north as Newport East. Here they are represented by a range of intertidal sediment community complexes, small areas of Eel grass beds (*Zostera noltii*) and extensive areas of Mussel (*Mytilus edulis*) beds. The main pressures on this habitat are the same as those recorded for the Estuarine habitat described above. The conservation status of this habitat within Blackwater River (Cork/Waterford SAC) is recorded as "Favourable". However, the Lower Blackwater estuary and Youghal Bay are being impacted by excess nutrients, which is leading to problems with phytoplankton and macroalgae, respectively (EPA, 2018).

Perennial vegetation of stony banks [1220]

The distribution of this coastal habitat with the SAC is currently unknown. While it is recorded as being present at Ferrybank towards the mouth of Youghal Harbour it is unlikely to extend much further north within the SAC than Youghal bridge due to the lack of shingle substrate beyond this point.

Salicornia and other annuals colonising mud and sand [1310]

The distribution of this coastal habitat with the SAC is currently unknown. It is currently recorded for Foxhole, BlackBog and Tourig. As a pioneering saltmarsh community, it is considered that it is unlikely to occur much further north than Newport East due to lack of suitable habitat for its formation.

Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] and Mediterranean salt meadows (Juncetalia maritimi) [1410]

These two saltmarsh communities are present within Youghal Harbour as far north as Newport East but mainly in the area around Foxhole and Blackbog. The area of saltmarsh habitat is small within the SAC but where present is represented by a typical saltmarsh community and zonation.

Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]

The distribution of this coastal habitat with the SAC is currently unknown. The basis of its designation was on plant species recorded from the Blackwater River contained within historic NPWS files. The main problems for river habitats in Ireland are damage through hydrological and morphological change, eutrophication and other water pollution. The EPA is also continuing to highlight the decline in high quality rivers. While not all variants of the river habitat require low nutrient conditions, this trend is a significant concern. Agriculture and municipal and industrial discharges are the most significant sources of nutrient and organic pollution (NPWS, 2019).

Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0} and Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]

These two woodland habitats are present at a range of locations through the entire SAC. However, they are not present along the Brogeen River.

Margaritifera margaritifera (Freshwater Pearl Mussel)

The Freshwater Pearl Mussel is known from the main Blackwater River, two tributaries (Owentaraglin and Allow) and the Licky River, which discharges to the Upper Blackwater Estuary. 168km encompasses the length of channel from the most upstream records of the freshwater pearl mussel to the most downstream records of live mussels, and contained within the freshwater pearl mussel catchment boundaries. The Blackwater population is believed to be composed entirely of aged adults, with no evidence of recruitment for at least 20 years (DEHLG, 2010a). No juvenile mussels were found in the Allow and 8.3% of the population was no more than 65mm in length in 2009 (DEHLG, 2010b).

The Brogeen River is within a Freshwater pearl mussel catchment. However, it is not recorded as being within the known distribution or having suitable habitat for the species. The nearest connected watercourse, with known habitat suitable to support Freshwater pearl mussel is within the River Allow, 13.4km (hydrologically) to the east of the WwTP discharge point (See figure 6.1). Before it reaches this point nine additional first order watercourses join the Brogeen River (table 6.2). The nearest recorded suitable habitat for Freshwater Pearl Mussel, within the River Allow, is 18km from the WwTP discharge point.

Freshwater pearl mussels are particularly vulnerable to the impacts of sediment mobilisation and poor water quality. The species' poor conservation status and severe declines have resulted from habitat deterioration caused by a combination of hydrological and morphological changes, sedimentation and enrichment (NPWS, 2019).

Table 6.2. Watercourses connected to the Brogeen River prior to its confluence with the River Allow.

No. (as per figure 5.3)	Name	Watercourse Order
1	Brogeen	2nd
2	Gortateeboy	1st
3	Kippagh 18	1st
4	Dromanarrigle	1st
5	Gortearagh	1st
6	Ballyhoolahan_middle	1st
7	Aghaneenagh	1st
8	Farrangeel	1st
9	Cloongeel	1st
10	Killeenleagh 18	1st

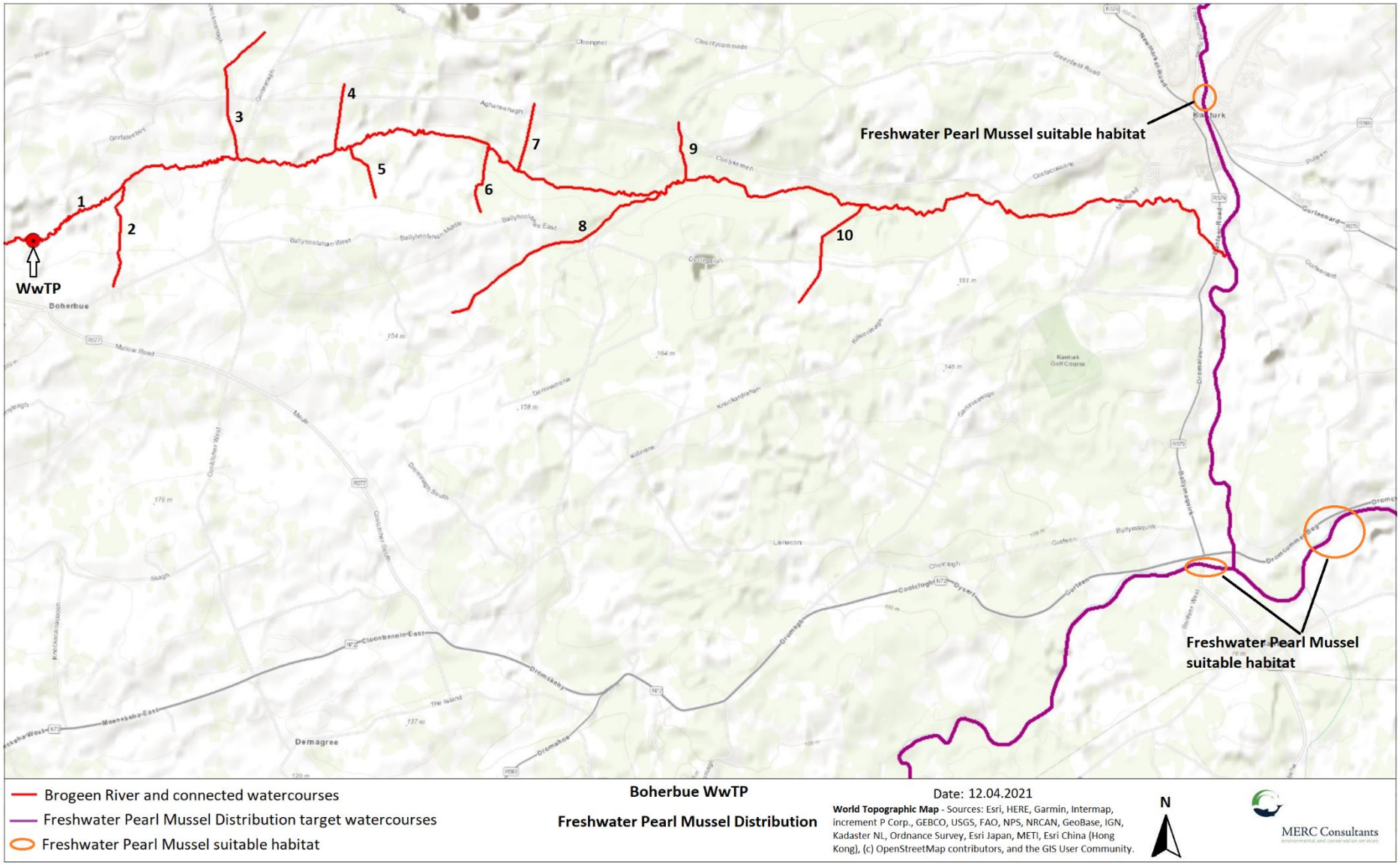

Figure 6.1 Freshwater Pearl Mussel Distribution and connectivity.

Austropotamobius pallipes (White-clawed Crayfish)

White-clawed Crayfish is recorded from the length of the Awbeg River with large numbers occurring upstream of Buttevant. The nearest records for this species to the WwTp are within the Blackwater River west of the town of Mallow, approximately 30km (hydrologically) to the east of the WwTp. It is also considered likely to occur elsewhere within the catchment where suitable habitat and water chemistry are present.

The main threat to White-clawed crayfish is from the twin impacts of non-indigenous crayfish species (NICS) and Crayfish Plague which is a water-borne disease specific to freshwater crayfish caused by the oomycete *Aphanomyces astaci*. While The white-clawed crayfish is generally associated with good quality waters this is not necessarily the case in Ireland where it can occur in water of lower quality, down to a Q value of around 3 (NPWS, 2019).

Petromyzon marinus (Sea Lamprey), *Lampetra fluviatilis* (River Lamprey) and *Lampetra fluviatilis* (Brook lamprey)

Brook/River Lamprey (juveniles: the difference between the two species is not detectable at the juvenile stage) and Sea lamprey (juvenile) are recorded from a number of locations within the Munster Blackwater River and its tributaries. Sea lamprey are recorded throughout the system as far upstream as its source, although not within the Brogeen River. While records for Brook/River Lamprey are also present throughout the system including within the Brogeen River. All of the aforementioned species require clean gravels and small stones for spawning. Diffuse source of pollution is considered to be having localised impacts on populations of all three lamprey species. The main sources of nutrient input being agriculture (slurry and chemical fertilisers) and sewage (waste water treatment plants) (NPWS, 2019).

Alosa fallax fallax (Twaite shad)

There is very limited information on the distribution of this species in the Blackwater catchment. While it is known to be present within the system its upstream migration is poorly known. Among other anthropogenic impacts, enrichment and nutrient pollution from various sources can result in profusions of macrophytes and filamentous algae, obscuring gravel substrates in spawning areas for this species and potentially diminishing their value as egg development habitats. Reduced water quality can impact on both larval and adult stages (NPWS, 2019).

Salmo salar (Salmon)

The main channel of the Blackwater River is a designated Salmonoid River (EU Commission, 1988). Salmon are recorded approximately 6.5km downstream of the WwTP at Derrygalun Bridge (Blackwater SAMOK LIFE, 2015). Among numerous other anthropogenic impacts, water quality deterioration from agricultural production, domestic waste-water treatment systems and forestry which are key sources of both rural diffuse and point-source pollution. While urban waste-water pressures which are a cause of point-source pollution (NPWS, 2019).

6.3 Source Path Receptor analysis

The first step in screening for appropriate assessment is to identify which European sites are likely to be within the ZOI of a proposed project. The second step is to identify receptors within the identified site/s

which might be affected by project related impacts. This was carried out by applying the SPRC model. As the Blackwater River (Cork/Waterford) SAC was the only European site identified to be within the ZOI of the proposed project, all qualifying interests within this site were examined to ascertain if a source/pathway existed and if so, what sensitive receptors might be affected (table 6.3).

Table 6.3 Source, path receptor matrix

Source	Path	Receptor
Construction phase groundworks: Sediment mobilisation	Soil and water	Freshwater ecosystems Freshwater dependent species
Construction phase groundworks: Concrete washout, hydrocarbon spillage and washout	Soil and water	Freshwater ecosystems Freshwater dependent species
Construction phase groundworks: Introduction of Invasive Alien Species (IAS)	Soil and water	Terrestrial habitats
Operation: Water quality deterioration	Water	Freshwater ecosystems Freshwater dependent species Marine habitats and associated species

The final step of the assessment is to establish the range (ZOI) over which any of the identified path/receptors could extend. There is no direct spatial overlap between any element of the proposed project and the features of interest for which Blackwater River (Cork/Waterford) SAC is designated. However, construction and operation related impacts have the potential to give rise to impacts to a number of sensitive receptors within the site. A summary of each of the qualifying interests for the site and those receptors sensitive to impact within the ZOI is given in table 6.4. Those qualifying interests considered to be within the ZOI where further assessed relative to their potential for impact.

Table 6.4 Qualifying features within the ZOI of the proposed project for which Blackwater River SAC is selected.

Qualifying interest	**Preliminary assessment**	**Rational**
Estuaries [1130]	Screened in	Benthic habitat within the ZOI
Mudflats and sandflats not covered by seawater at low tide [1140]	Screened in	Benthic habitat within the ZOI
Perennial vegetation of stony banks [1220]	Screened out	Coastal habitat outside of the ZOI
Salicornia and other annuals colonising mud and sand [1310]	Screened out	Coastal habitat outside of the ZOI
Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]	Screened out	Coastal habitat outside of the ZOI
Mediterranean salt meadows (Juncetalia maritimi) [1410]	Screened out	Coastal habitat outside of the ZOI
Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]	Screened in	Freshwater habitat within the ZOI
Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	Screened out	Terrestrial species outside ZOI
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0]	Screened out	Terrestrial species outside the ZOI
Margaritifera margaritifera (Freshwater Pearl Mussel) [1029]	Screened in	Freshwater species within the ZOI
Austropotamobius pallipes (White-clawed Crayfish) [1092]	Screened in	Freshwater species within the ZOI
Petromyzon marinus (Sea Lamprey) [1095]	Screened in	Freshwater species within the ZOI
Lampetra planeri (Brook Lamprey) [1096]	Screened in	Freshwater species within the ZOI
Lampetra fluviatilis (River Lamprey) [1099]	Screened in	Freshwater species within the ZOI
Alosa fallax fallax (Twaite Shad) [1103]	Screened in	Freshwater species within the ZOI
Salmo salar (Salmon) [1106]	Screened in	Freshwater species within the ZOI
Lutra lutra (Otter) [1355]	Screened in	Freshwater species within the ZOI
Trichomanes speciosum (Killarney Fern) [1421]	Screened out	Terrestrial species outside the ZOI

6.4. Cumulative Impacts

While a single development may not in itself cause a significant impact on the conservation objectives of a site, a combination of projects within a localised area may cause a negative impact on a site. Therefore, the cumulative impacts of a project or plan in association with other projects and plans must be taken into consideration when assessing the possible impacts of a development.

While there are a multitude of pressures in every waterbody, the significant pressures are those pressures which need to be addressed in order to improve water quality. Many waterbodies have multiple significant pressures. The EPA has carried out an assessment to determine which pressures are significant within each catchment in Ireland.

No significant pressures have been identified for the Brogeen River which was recorded as “not at Risk” and “Good Status” in the 2012-2015 reporting cycle (EPA, 2019). The Brogeen River drains into the Allow River 13.4km (hydrologically) to the east of the WwTP discharge point. The following significant pressures have been recorded for the Allow River downstream if its confluence with the Brogeen River

- **Impacts from hydromorphology:** which include sediment/siltation pollution and alteration to the physical environment. Significant hydromorphology pressures are subcategorised into channelization, embankment, dams, barriers, weirs, locks, culverts, land drainage, overgrazing and bank erosion.
- **Impacts from urban waste water:** which include nutrient and organic pollution. Urban Waste Water pressures are subcategorised into combined sewer overflows, Agglomeration *PE >10,000, Agglomeration *PE 2001 to 10,000, Agglomeration *PE 1001 to 2000, Agglomeration *PE 500 to 1000 and Agglomeration *PE <500. *(population equivalence)

A search of Cork County Council online planning applications does not indicate any current or historic developments along the Brogeen River (domestic or commercial) that could contribute to any in-combination impacts.

The Blackwater River (Cork/Waterford) SAC drains an extremely large catchment spanning three counties and draining a total area of 3,310km². As noted above impacts from hydromorphology and urban waste water are significant pressures on this watercourse. Without mitigation it is considered likely that the proposed project could act in-combination with these and possibly a variety of additional catchment wide pressures to further impact the conservation status of the qualifying interests of this SAC.

The National River Basin Management Plan 2018 – 2021 seeks to ensure full compliance with the Water Framework Directive (WFD). This requires restoring water quality to at least good status, the prevention of deterioration in water quality, implementation of objectives for designated protected areas and an overall focus on protection of water quality. In line with this requirement Cork County Councils Draft County Development Plan 2022-2028 notes that while existing waste water plants meet the Urban Waste Water Treatment Directive (UWWTD) standards, a number of plants discharging to sensitive waters do not meet the higher Emission Limit Values (ELVs) limits set by the Environmental Protection Agency (EPA) through their licensing system. This is currently the case with the Boherbue WwTP. An objective of the Draft County Development Plan 2022-2028 is to "upgrade the WwTP to protect environment and quality of receiving water and to facilitate growth".

Conclusion

In-combination impacts as a result of changes to hydromorphology, without mitigation are considered possible during the construction phase. This may result as a consequence of sediment mobilised during construction entering the Brogeen River. No in-combination impacts as a result of urban waste water are considered possible as the proposed project seeks to improve the quality of the discharged effluent to meet the River Basin Management Plan requirements and ELV levels which are set by EPA in context of wider catchment pressures.

6.5 Screening conclusion

Following a review of the proposed project a screening assessment, following the guidelines of *Assessment of plans and projects significantly affecting Natura 2000 sites* - Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC has been conducted.

The conclusion of this assessment is that the proposed project, without mitigation, may have the potential to lead to significant adverse effects on the conservation objectives of the Blackwater River (Cork/Waterford) SAC. Therefore, it cannot be excluded, on the basis of objective information, that the proposed project, individually or in combination with other plans or projects, will have a significant effect on Blackwater River (Cork/Waterford SAC), site code: 002170.

Accordingly, it is concluded that an Appropriate Assessment of the proposed project is required.

7. Natura Impact Statement

7.1 Impact prediction

This section identifies and considers potential impacts; direct and indirect, on the conservation status of the qualifying interests of Backwater River (Cork/Waterford) SAC within the ZOI of the proposed project.

7.1.1 Direct and Indirect impacts

There is no direct spatial overlap between any element of the proposed project and the features of interest for which Blackwater River (Cork/Waterford) SAC is designated. However, construction and operation related impacts have the potential to give rise to impacts to a number of sensitive receptors within the site. All components of the proposed project are restricted to the existing site compound which is largely dominated by Buildings and artificial surfaces and Amenity grassland improved. Indirect impacts may occur as a result of direct or indirect linkages to those habitats within the zone of influence of a proposed project. The zone of influence of this project is considered to be the habitats and species which occur within Blackwater River (Cork/Waterford) SAC. This zone of influence has been based the application of the SPRC model relative to the scale and scope of the project, corridors of connectivity and potential cumulative impacts pre, post and during the construction phase of the project.

Operational phase

The only element of the operational phase of the proposed project that could give rise to impacts on the Blackwater River (Cork/Waterford SAC) is as a result of effluent and stormwater discharge. A modelling exercise to assess the Water Assimilative Capacity (WAC) of the receiving waterbody (the Brogeen River) based on the WwTP operating at 75% of assimilative capacity was conducted (table 7.1). The results of this modelling indicate that high ecological status will be achieved based on the proposed ELV's. Notionally clean river status is based on background concentrations of 0.26mgL^{-1} BOD, 0.005mg/L^{-1} orthophosphate and 0.008mg/L^{-1} ammonia) to determine if the proposed discharge on its own is likely to cause a significant deterioration in the status of the water body into which it enters.

Table 7.1 Boherbue WwTP WAC modelling of Water Assimilative Capacity.

Boherbue WwTP WAC				
PE	1,200			
DWF (m3/d)	345.5			Note: Rev02 Flow and Load Survey update value
DWF (m3/sec)	0.0035			
Q_{95} (m^3/sec)	0.0283			Note: Rev02 EPA Hydrotool 2021
Parameter	**BOD**	**Ortho Phosphate**	**Ammonia**	
C_{max} (mg/l)	2.6	0.075	0.14	Surface Water Regulations - Good Status 95% flow
C_{max} (mg/l)	2.2	0.045	0.09	Surface Water Regulations - High Status 95% flow

Using Notional Clean River parameters, Suggested ELV to meet Cmax				
Parameter	**BOD**	**Ortho Phosphate**	**Ammonia**	
C_{max} (mg/l) using 75% of Cmax-Cclean	1.72	0.035	0.070	
C_{clean} (mg/l)	0.26	0.005	0.008	Notional Clean River parameters
ELV	12	0.25	0.5	Proposed adjustment to ELV for OrthoP to meet Cmax
Predicted River Concentration (mg/l	1.7	0.035	0.069	
Less than Cmax - High Status at 75%	Yes	Yes	Yes	Reduced ELV for OrthoP does meet standards required ie Cmax

There is no potential for significant adverse effects as a result of the stormwater discharge, any storm water that exceeds the capacity of the stormwater holding tanks will drain to the existing constructed wetlands considerably reducing the potential of any residual stormwater to reach the receiving waterbody.

Construction phase

The majority of the construction related activity will be located at the site of the existing WwTP, approximately 225 south of the nearest watercourse (Brogeen River). However, some elements of the project e.g. the construction of new pipework to the discharge exit (22.5m south of the final discharge point into the Brogeen River) may result in sediment mobilisation with the potential for run-off.

A review of the potential for impact, relative to construction works and post-construction operation on those habitats and species considered to be within the zone of influence of the proposed project, is provided in table 7.2.

The review indicates that, in the absence of mitigation, impacts on the qualifying interests of the Blackwater River (Cork/Waterford) SAC may arise from construction related activities.

Table 7.2 Summary of impact prediction

Backwater River (Cork/Waterford) SAC (Site code: 002170)			
Feature of interest	**Potential for impact**	**Assessment of impact**	**Screening assessment**
Estuaries [1130]	Sediment mobilisation and surface run-off as a result of construction of the new components of the WwTP. Hydrocarbon run-off due to accidental spillage. Certain marine communities are vulnerable to impacts from changes in sediment structure and eutrophication. Such changes can arise from an increase in both sediment deposition and associated nutrient/chemical load.	<u>Construction</u> The estuarine habitat of the SAC is approximately 100km east of the construction site of the WwTP. The distance travelled by mobilised sediments, in a variety of contexts, is poorly known and modelling results by various published research differs considerably. However, it is considered that due to the upstream distance of the proposed project and the scale and scope of the works downstream, impacts as a result of the project alone will not lead to any adverse effects on the estuaries habitat of this SAC. Any accidental run-off causing hydrocarbon ingress into the freshwater habitat leading to subsequent downstream adverse effects on the Estuarine habitat are also not considered possible due to the scale and scope of the project relative to the downstream distance of this habitat.	No potential for significant adverse effects.
	Increased eutrophication of estuarine habitat due to operational discharges.	<u>Post construction operation</u> Discharge from the WwTP will be subject to tertiary treatment. The final effluent discharge levels for suspended solids and nutrients are lower than the maximum allowable levels provided for in the Urban Waste Water Treatment Directive (2001) and in compliance with those prescribed by the EPA. Considering the final nutrient and sediment discharge levels and distance from the estuarine habitat, it is considered that no adverse effects on this habitat will result from the operation of the WwTP.	No potential for significant adverse effects.

Mudflats and sandflats not covered by seawater at low tide [1140]	Sediment mobilisation and surface run-off as a result of construction of the new components of the WwTP. Hydrocarbon run-off due to accidental spillage. Certain marine communities are vulnerable to impacts from changes in sediment structure and eutrophication. Such changes can arise from an increase in both sediment deposition and associated nutrient/chemical load.	<u>Construction</u> The mudflats and sandflats habitat of the SAC is approximately 100km east of the construction site of the WwTP. The distance travelled by mobilised sediments, in a variety of contexts, is poorly known and modelling results by various published research differs considerably. However, it is considered that due to the upstream distance of the proposed project and the scale and scope of the works downstream, impacts as a result of the project alone are will not lead to to any adverse effects on the mudflats and sandflats habitat of this SAC. Any accidental run-off causing hydrocarbon ingress into the freshwater habitat leading to subsequent downstream adverse effects on the mudflats and sandflats habitat are also considered not possible due to the scale and scope of the project relative to the downstream distance of this habitat.	No potential for significant adverse effects.
	Increased eutrophication of mudflats and sandflats habitat due to operational discharges.	<u>Post construction operation</u> Discharge from the WwTP will be subject to tertiary treatment. The final effluent discharge levels for suspended solids and nutrients are lower than the maximum allowable levels provided for in the Urban Waste Water Treatment Directive (2001) and in compliance with those prescribed by the EPA. Considering the final nutrient and sediment discharge levels and distance from the mudflats and sandflats habitat, it is considered that no adverse effects on this habitat will result from the operation of the WwTP.	No potential for significant adverse effects.
Perennial vegetation of stony banks [1220]	No potential for impact. Habitat does not occur within the zone of influence of the proposed project.	N/A	No potential for significant adverse effects.

Salicornia and other annuals colonising mud and sand [1310]	No potential for impact. Habitat does not occur within the zone of influence of the proposed project.	N/A	No potential for significant adverse effects.
Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]	No potential for impact. Habitat does not occur within the zone of influence of the proposed project.	N/A	No potential for significant adverse effects.
Mediterranean salt meadows (Juncetalia maritimi) [1410]	No potential for impact. Habitat does not occur within the zone of influence of the proposed project.	N/A	No potential for significant adverse effects.
Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]	No potential for impact. Distribution and occurrence of this habitat is currently unknown within this site. Nonetheless, no project related impacts have been identified that could lead to likely adverse effects on the conservation objectives (Habitat distribution and habitat area) for this habitat.	N/A	No potential for significant adverse effects.
Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	No potential for impact. Habitat does not occur within the zone of influence of the proposed project.	N/A	No potential for significant adverse effects.
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0]	No potential for impact. Habitat does not occur within the zone of influence of the proposed project.	N/A	No potential for significant adverse effects.
Margaritifera margaritifera (Freshwater Pearl Mussel) [1029]	Sediment mobilisation and surface run-off as a result of construction of the new components of the WwTP. Hydrocarbon run-off due to accidental spillage.	<u>Construction</u> Any decline in water quality, even at a very localised scale, is considered to represent a threat to the available habitat for this species and is contrary to the conservation objective to restore the habitat for this species particularly with regard to restoring substratum quality i.e., stable cobble and gravel substrate with very little fine material and no artificially elevated levels of fine sediments.	Potential for impact uncertain without mitigation.

	Increased eutrophication of watercourse due to operational discharges.	<u>Post construction operation</u> Discharge from the WwTP will be subject to tertiary treatment. The final effluent discharge levels for suspended solids and nutrients are lower than the maximum allowable levels provided for in the Urban Waste Water Treatment Directive (2001) and in compliance with those prescribed by the EPA. The results of WAC modelling indicate that High ecological river status will be achieved based on the proposed ELV's. Considering the final nutrient and sediment discharge levels, deterioration in water quality as a result of eutrophication, resulting from the operation of the WwTP will not occur. On the contrary one of the objectives of the upgrade to the WwTP is to improve the quality of the discharged effluent to meet the treatment standards specified in its current Wastewater Discharge Licence (WwDL).	No potential for significant adverse effects.
Austropotamobius pallipes (White-clawed Crayfish) [1092]	Sediment mobilisation and surface run-off as a result of construction of the new components of the WwTP. Hydrocarbon run-off due to accidental spillage.	<u>Construction</u> White-clawed Crayfish are not recorded from the Brogeen River. However, any decline in water quality, even at a very localised scale, is considered to represent a threat to the available habitat for this species.	Potential for impact uncertain without mitigation.
	Increased eutrophication of watercourse due to operational discharges.	<u>Post construction operation</u> Discharge from the WwTP will be subject to tertiary treatment. The final effluent discharge levels for suspended solids and nutrients are lower than the maximum allowable levels provided for in the Urban Waste Water Treatment Directive (2001) and in compliance with those prescribed by the EPA. The results of WAC modelling indicate that High ecological river status will be achieved based on the proposed ELV's. Considering the final nutrient and sediment discharge levels it is considered that deterioration in water quality, as a result of eutrophication, will not result from the operation of the WwTP.	No potential for significant adverse effects.

Petromyzon marinus (Sea Lamprey) [1095]	Increased sedimentation resulting from construction related activities e.g., sediment mobilisation. Accidental spillage of hydrocarbons and subsequent run-off during construction activities	<u>Construction</u> The extent and distribution of spawning habitat (clean gravel and small stones) can be impacted by sediment deposition. Any sediment mobilised has the potential to smoother spawning beds for this species and subsequently lead to a decline in the extent and distribution of suitable spawning beds. Potential barriers for migrating lamprey include anthropogenic physical barriers and chemical barriers e.g., oxygen depletion or discharge of noxious pollutants. Accidental spillage of hydrocarbons has the potential to create a physical barrier to this species.	Potential for impact uncertain without mitigation.
	Increased eutrophication of watercourse due to operational discharges.	<u>Post construction operation</u> Potential barriers for migrating lamprey include anthropogenic physical barriers and chemical barriers e.g., oxygen depletion or discharge of noxious pollutants. Discharge from the WwTP will be subject to tertiary treatment. The final effluent discharge levels for suspended solids and nutrients are lower than the maximum allowable levels provided for in the Urban Waste Water Treatment Directive (2001) and in compliance with those prescribed by the EPA. The results of WAC modelling indicate that High ecological river status will be achieved based on the proposed ELV's. Considering the final nutrient and sediment discharge levels it is considered that no physical barriers to this species, as a result of eutrophication, will result from the operation of the WwTP.	No potential for significant adverse effects.

Lampetra planeri (Brook Lamprey) [1096]	Increased sedimentation resulting from construction related activities e.g., sediment mobilisation. Accidental spillage of hydrocarbons and subsequent run-off during construction activities	<u>Construction</u> The extent and distribution of spawning habitat (clean gravel and small stones) can be impacted by sediment deposition. Any sediment mobilised has the potential to smoother spawning beds for this species and subsequently lead to a decline in the extent and distribution of suitable spawning beds. Potential barriers for migrating lamprey include anthropogenic physical barriers and chemical barriers e.g., oxygen depletion or discharge of noxious pollutants. Accidental spillage of hydrocarbons has the potential to create a physical barrier to this species.	Potential for impact uncertain without mitigation.
	Increased eutrophication of watercourse due to operational discharges.	<u>Post construction operation</u> Potential barriers for migrating lamprey include anthropogenic physical barriers and chemical barriers e.g., oxygen depletion or discharge of noxious pollutants. Discharge from the WwTP will be subject to tertiary treatment. The final effluent discharge levels for suspended solids and nutrients are lower than the maximum allowable levels provided for in the Urban Waste Water Treatment Directive (2001) and in compliance with those prescribed by the EPA. The results of WAC modelling indicate that High ecological river status will be achieved based on the proposed ELV's. Considering the final nutrient and sediment discharge levels it is considered that no physical barriers to this species, as a result of eutrophication, will result from the operation of the WwTP.	No potential for significant adverse effects.
Lampetra fluviatilis (River Lamprey) [1099]	Increased sedimentation resulting from construction related activities e.g., sediment mobilisation.	<u>Construction</u> The extent and distribution of spawning habitat (clean gravel and small stones) can be impacted by sediment deposition.	Potential for impact uncertain without mitigation.

	Accidental spillage of hydrocarbons and subsequent run-off during construction activities	Any sediment mobilised has the potential to smoother spawning beds for this species and subsequently lead to a decline in the extent and distribution of suitable spawning beds. Potential barriers for migrating lamprey include anthropogenic physical barriers and chemical barriers e.g., oxygen depletion or discharge of noxious pollutants. Accidental spillage of hydrocarbons has the potential to create a physical barrier to this species.	
	Increased eutrophication of watercourse due to operational discharges.	<u>Post construction operation</u> Potential barriers for migrating lamprey include anthropogenic physical barriers and chemical barriers e.g., oxygen depletion or discharge of noxious pollutants. Discharge from the WwTP will be subject to tertiary treatment. The final effluent discharge levels for suspended solids and nutrients are lower than the maximum allowable levels provided for in the Urban Waste Water Treatment Directive (2001) and in compliance with those prescribed by the EPA. The results of WAC modelling indicate that High ecological river status will be achieved based on the proposed ELV's. Considering the final nutrient and sediment discharge levels it is considered that no physical barriers to this species, as a result of eutrophication, will result from the operation of the WwTP.	No potential for significant adverse effects.
Salmo salar (Salmon) [1106]	Increased sedimentation resulting from construction related activities e.g., sediment mobilisation. Accidental spillage of hydrocarbons and subsequent run-off during construction activities	<u>Construction</u> It is considered that impacts on the conservation objectives of this species may arise as a result of the following: Sediment and surface run-off including the transport of pollutants e.g., from hydrocarbon spillage giving rise to a decline is suitable spawning habitat and water quality on which this species depends.	Potential for impact uncertain without mitigation.

	Increased eutrophication of watercourse due to operational discharges.	Post construction operation Discharge from the WwTP will be subject to tertiary treatment. The final effluent discharge levels for suspended solids and nutrients are lower than the maximum allowable levels provided for in the Urban Waste Water Treatment Directive (2001) and in compliance with those prescribed by the EPA. The results of WAC modelling indicate that high ecological river status will be achieved based on the proposed ELV's. Considering the final nutrient and sediment discharge levels it is considered that impacts to the Q values and hence water quality required for this species, as a result of eutrophication, will not result from the operation of the WwTP.	No potential for significant adverse effects.
Alosa fallax fallax (Twaite Shad) [1103]	Increased sedimentation resulting from construction related activities e.g., sediment mobilisation. Accidental spillage of hydrocarbons and subsequent run-off during construction activities	Construction It is considered that impacts on the conservation objectives of this species may arise as a result of the following: Sediment and surface run-off including the transport of pollutants e.g., from hydrocarbon spillage giving rise to a decline is suitable spawning habitat and water quality on which this species depends.	Potential for impact uncertain without mitigation.
	Increased eutrophication of watercourse due to operational discharges.	Post construction operation Discharge from the WwTP will be subject to tertiary treatment. The final effluent discharge levels for suspended solids and nutrients are lower than the maximum allowable levels provided for in the Urban Waste Water Treatment Directive (2001) and in compliance with those prescribed by the EPA. The results of WAC modelling indicate that High ecological river status will be achieved based on the proposed ELV's. Considering the final nutrient and sediment discharge levels it is considered that impacts to the Q values and hence water quality required for this species, as a result of eutrophication, will not result from the operation of the WwTP.	No potential for significant adverse effects.

Lutra lutra (Otter) [1355]	Disturbance during construction	Due to the temporary nature of the proposed works no disturbance related impacts on this species are predicted. The project related infrastructure will be confined to the existing WwTP site. No permanent infrastructure will be placed on the river bank which could give rise to damage or loss to the available otter habitat. No couching sites and holts are present on the river bank adjacent to the WwTP.	No Impact predicted
Trichomanes speciosum (Killarney Fern) [1421]	No potential for impact. Species does not occur within the zone of influence of the proposed project.	N/A	No Impact predicted

7.2 Mitigation

Based on the potential for significant adverse effects on a number of habitats and species within the Blackwater River Cork/Waterford the following mitigation measures are proposed.

7.2.1 Construction phase

- A designated area within the site compound shall be established for the storage of plant, machinery and materials during the construction phase of the project. The off-site compound will be suitable located with due regard for the receiving environment and in particular the sensitive receiving waters.
- All plant and machinery shall be refuelled at a dedicated refuelling area within the site compound with appropriate spill controls in place.
- All plant and machinery shall be regularly checked for leaks.
- Any hydrocarbons on the project site shall be contained within a bunded container or area.
- A spill kit to deal with any accidental spillage of hydrocarbons must be available at the project site
- Measures to mitigate silt mobilisation and subsequent potential for run-off are specified under section 7.2.2 below.
- The roles and responsibilities of construction and associated staff regarding the protection of the receiving environment shall be clearly set out and documented.
- An Outline Construction Environmental Management Plan (OCEMP) has been prepared for the proposed project. A CEMP shall also be prepared for the project and all of the mitigation proposed in this NIS shall be clearly set out in the CEMP. The final CEMP shall be approved by a suitably qualified ecologist.

7.2.2 Management of silt

The first step to prevent silt from entering the Brogeen River is to minimise the generation of silt laden run-off through planning of construction activities by working during clement weather and minimising the storage of sediment producing material. Where silt laden run-off is generated, it shall be prevented from entering the Brogeen River. Specifically, the following actions shall be taken:

- Excavation shall be undertaken during clement weather to minimise run-off.
- Back filling of all trenching as work proceeds and removal of excess material shall be implemented.
- Areas where vegetation is to be stripped shall be carried out using a phased approach during construction.
- Stockpiles of excavated earth to control silt run-off shall be avoided. Where it is necessary to stockpile excavated material, the location of the stockpiled material shall be sealed with silt barriers at the base.
- Backfilling shall be undertaken immediately after the specified operations preceding it have been completed.
- Reseeding of previously grassed areas will take place as soon as possible following construction.
- Silt fencing shall be erected, as described below, along the boundary of the Brogeen River (see appendix 3).

  Two barriers (5m apart, leaving existing vegetation between to act as a further silt barrier) of geotextile silt fencing will be installed approximately 10 m back from the bank of the Brogeen River,

at the location shown in appendix 3. The fabric of the silt fence will be trenched-in and backfilled, and the soil compacted around it.

The outfall pipeline connects into the existing headwall which is set back from the river. The location of the silt fence (10m back from the river bank) shall also serve as an exclusion zone between proposed project works and the Brogeen River. No works will take place within this exclusion zone.

The contractor will appoint an ecological clerk of works who, in liaison with the project Engineer, will supervise and maintain silt control measures, monitor their effectiveness, and plan for and provide contingency measures to be deployed in the event of mitigation failure or mitigation underperformance. Weekly inspections and inspections following weather events shall be carried out.

7.2.3 Invasive Alien Species

No IAS are known to occur at the proposed project site. However, the following mitigation should be employed to ensure the site remains free of IAS during the construction phase.

- Any imported top soil should be certified as free from Japanese knotweed.
- A final IAS survey of the site should be undertaken immediately prior to construction to ensure the site has remained free of any IAS. Should any IAS be recorded, the contractor shall develop and implement an Invasive Species Management Plan designed by an appropriately qualified specialist.

In line with good practice for the prevention of spread of IAS the following guidelines should be implemented:

- Kelly, J., Maguire, C.M. and Cosgrove, P.J., Muir, R.A. (2015). Best Practice Management Guidelines Japanese knotweed *Fallopia japonica*. Prepared for NIEA and NPWS as part of Invasive Species Ireland.
  and
- NRA Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (2010).

7.2.4. Implementation of proposed mitigation

- The contractor CEMP should be reviewed by a site ecologist to ensure it meets with the mitigation detailed in this NIS.
- An Ecological Clerk of works (ECoW) should be appointed to ensure silt fencing as set out in appendix 3 of this NIS has been installed in the correct manner to avoid any potential run-off into the Brogeen River. The ECoW should inspect the silt fencing at regular intervals, as appropriate to the works being conducted and weather conditions, to ensure the silt fence is fit for purpose.

7.3 Summary of impacts with mitigation

Table 7.3 provides a summary of the potential for impacts with mitigation.

Table 7.3. Summary of the potential for impacts with mitigation

Blackwater River (Cork/Waterford SAC)		
***Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029]**		
Attribute	**Target**	**Assessment**
Habitat extent	Restore suitable habitat in more than 35km and any additional stretches necessary for salmonid spawning	**No Impact:** Negative impacts have been identified as the potential for sediment mobilisation, hydrocarbon spillage, cement washout and the introduction of IAS as a result of the construction phase of the project. Provided the proposed mitigation is implemented no project related impact on this attribute and its associated target is considered possible.
Population structure: recruitment	Restore to least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length	**No Impact:** As above. The key improvements needed for the Allow Catchment are to restore juvenile habitats to appropriate condition by simultaneously reducing nutrient and silt inputs to the river (NS2 Project, 2010). The proposed project will contribute to improving nutrient input by improving water discharge quality.
Population structure: adult mortality	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered distribution	**No Impact:** As above.
Water quality: macroinvertebrate and phytobenthos (diatoms)	Restore water quality macroinvertebrates: EQR greater than 0.90; phytobenthic: EQR greater than 0.93	**No Impact:** The proposed project has been designed to ensure water discharge quality is improved to be in compliance with the appropriate standards. No impact as a result of nutrient enrichment is foreseen (see table 7.2).
Substratum quality: filamentous algae (macroalgae), macrophytes (rooted higher plants)	Restore substratum quality-filamentous algae: absent or trace (<5%); macrophytes: absent or trace (<5%)	**No Impact:** As above.
Substratum quality: sediment	Restore substratum quality-stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment	**No Impact:** Negative impacts have been identified as the potential for sediment mobilisation, as a result of the construction phase of the project. Provided the proposed mitigation is implemented no project related impact on this attribute and its associated target is considered possible.

Hydrological regime: Flow velocity	Restore appropriate hydrological regimes	**No Impact:** The propose project does not have the potential to lead to any impacts or changes to the flow velocity of the Brogeen River.
Host fish	Maintain sufficient juvenile salmonids to host glochidial larvae	**No Impact:** Negative impacts have been identified as the potential for sediment mobilisation, hydrocarbon spillage, cement washout and the introduction of IAS as a result of the construction phase of the project. Provided the proposed mitigation is implemented no project related impact on this attribute and its associated target is considered possible.
***Austropotamobius pallipes* (White-clawed Crayfish) [1092]**		
Distribution	No reduction from baseline	**No Impact:** Negative impacts have been identified as the potential for sediment mobilisation, hydrocarbon spillage, cement washout and the introduction of IAS as a result of the construction phase of the project. Provided the proposed mitigation is implemented no project related impact on this attribute and its associated target is considered possible.
Population structure: recruitment	Juveniles and/or females with eggs in at least 50% of positive samples	**No Impact:** As above.
Negative indicator species	No alien crayfish species	**No Impact:** As above.
Disease	No instances of disease	**No Impact:** As above.
Water quality	At least Q3-4 at all sites sampled by EPA	**No Impact:** The proposed project has been designed to ensure water discharge quality is improved to be in compliance with the appropriate standards. No impact as a result of nutrient enrichment is foreseen (see table 7.2).
Habitat quality: Heterogeneity	No decline in heterogeneity or habitat quality	**No Impact:** As above.
***Petromyzon marinus* (Sea Lamprey) [1095]**		
Distribution: extent of anadromy	Greater than 75% of main stem length of rivers accessible from estuary.	**No Impact:** The propose project does not have the potential to lead to any impacts to river accessibility through the introduction of physical or artificial barriers.
Population structure of juveniles	At least three age/size groups present	**No Impact:** Negative impacts have been identified as the potential for sediment mobilisation, hydrocarbon spillage, cement washout and the introduction of IAS as

		a result of the construction phase of the project. Provided the proposed mitigation is implemented no project related impact on this attribute and its associated target is considered possible.
Juvenile density in fine sediment	Juvenile density at least 1/m²	**No Impact:** As above.
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds	**No Impact:** As above.
Availability juvenile habitat	More than 50% of sample sites positive.	**No Impact:** As above.
***Lampetra planeri* (Brook Lamprey) [1096] and *Lampetra fluviatilis* (River Lamprey) [1099]**		
Distribution:	% of river accessible	**No Impact:** The propose project does not have the potential to lead to any impacts to river accessibility through the introduction of physical or artificial barriers.
Population structure of juveniles	At least three age/size groups of brook/river lamprey present	**No Impact:** Negative impacts have been identified as the potential for sediment mobilisation, hydrocarbon spillage, cement washout and the introduction of IAS as a result of the construction phase of the project. Provided the proposed mitigation is implemented no project related impact on this attribute and its associated target is considered possible.
Juvenile density in fine sediment	Mean catchment juvenile density of brook/river lamprey at least 2/m²	**No Impact:** As above.
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds	**No Impact:** As above.
Availability of juvenile habitat	More than 50% of sample sites positive.	**No Impact:** As above.
***Alosa fallax fallax* (Twaite Shad) [1103]**		
Distribution: extent of anadromy	% of river accessible	**No Impact:** The propose project does not have the potential to lead to any impacts to river accessibility through the introduction of physical or artificial barriers.
Population structure: age classes	More than one age class present	**No Impact:** Negative impacts have been identified as the potential for sediment mobilisation, hydrocarbon spillage, cement washout and the introduction of IAS as a result of the construction phase of the project. Provided the proposed mitigation is implemented no

		project related impact on this attribute and its associated target is considered possible.
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning habitats	**No Impact:** As above.
Spawning habitat quality: Filamentous algae; macrophytes; sediment	Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plant) growth	**No Impact:** As above.
Water quality: oxygen levels	No lower than 5mg/l	**No Impact:** The proposed project has been designed to ensure water discharge quality is improved to be in compliance with the appropriate standards. No impact as a result of nutrient enrichment is foreseen (see table 7.2).
***Salmo salar* (Salmon) [1106]**		
Distribution: extent of anadromy	% of river accessible	**No Impact:** The propose project does not have the potential to lead to any impacts to river accessibility through the introduction of physical or artificial barriers.
Adult spawning fish number	Conservation Limit (CL) for each system consistently exceeded	**No Impact:** Negative impacts have been identified as the potential for sediment mobilisation, hydrocarbon spillage, cement washout and the introduction of IAS as a result of the construction phase of the project. Provided the proposed mitigation is implemented no project related impact on this attribute and its associated target is considered possible.
Salmon fry abundance	Maintain or exceed 0+ fry mean catchment wide abundance threshold value. Currently set at 17 fry/15 minute sampling.	**No Impact:** As above.
Out-migrating smolt abundance	No significant decline	**No Impact:** As above.
Number and distribution of redds	No decline in number and distribution of spawning redds due to anthropogenic causes.	**No Impact:** As above.

7.4. Residual impacts

No residual impacts of the proposed project have been identified or are considered possible.

7.5. Natura Impact Statement conclusion

This Natura Impact Statement has assessed the implications of the project, alone and in-combination with other projects or plans, on the integrity of European sites in view of the site's conservation objectives.

The potential for significant effects as a result of the proposed project have been mitigated. The NIS therefore objectively concludes that, provided the mitigation measures described in this document are fully implemented, **no adverse impact on the *features of interest* or *Conservation objectives*** of Blackwater River (Cork/Waterford) or any European site is expected, *i.e.*, the integrity of the site/s will not be adversely affected.

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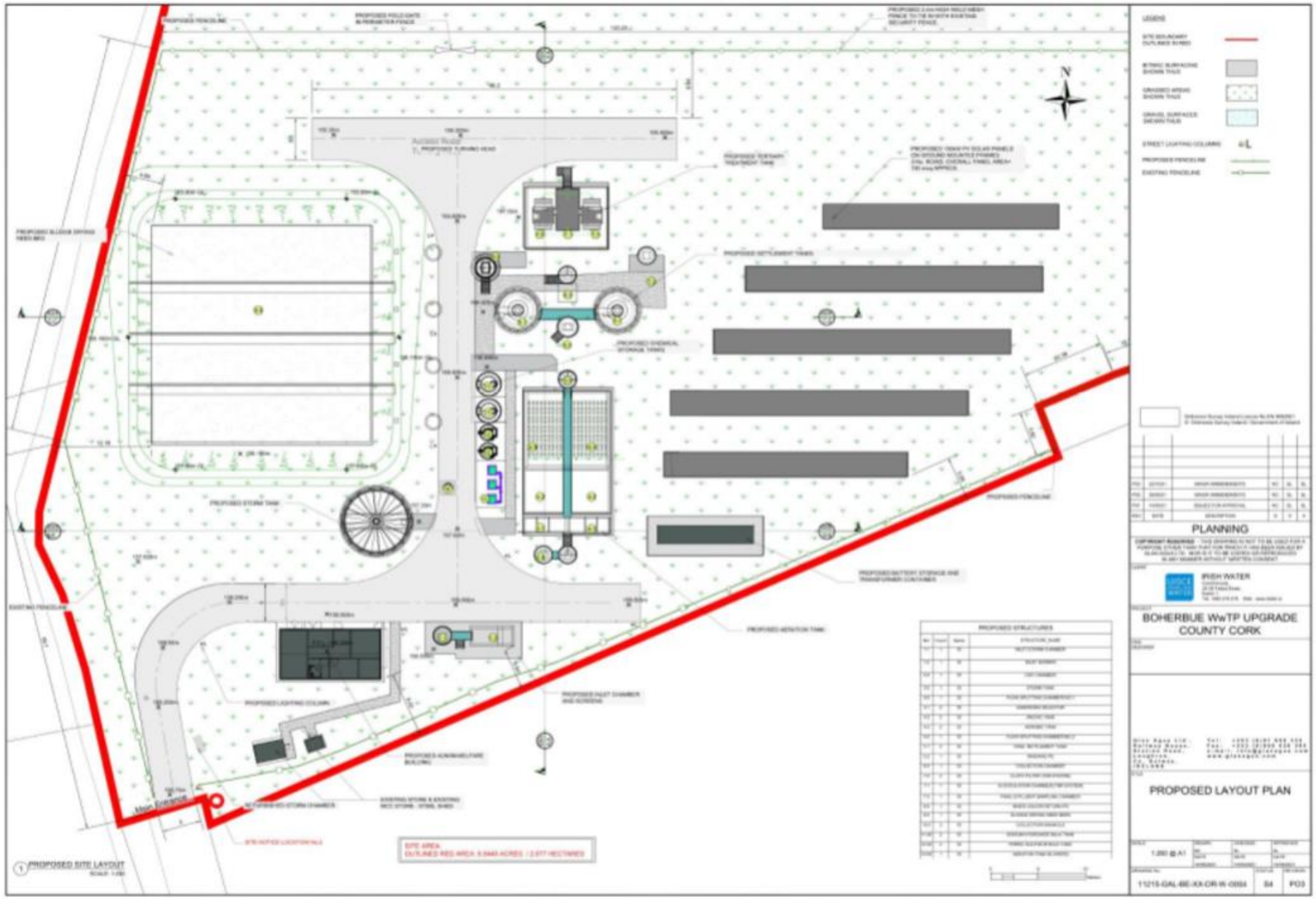
Appendix 1. Site design



Appendix 2. Site Images

A2.1 Existing WwTP.

A2.2 Existing WwTP.

A2.3 Existing constructed wetlands.

A2.4 Existing constructed wetlands.

A2.5 Internal site access to constructed wetlands.

A2.6 Existing wastewater discharge point to channel leading to Brogeen River.

A2.7 Existing wastewater discharge point to channel leading to Brogeen River.

A2.8 Channel from discharge point into Brogeen River.

A2.9 Discharge point into Brogeen River.

A2.10 Brogeen River adjacent to Discharge point.

A2.11 Brogeen River at discharge point showing gravel substrate.

Appendix 3. Location of silt fencing

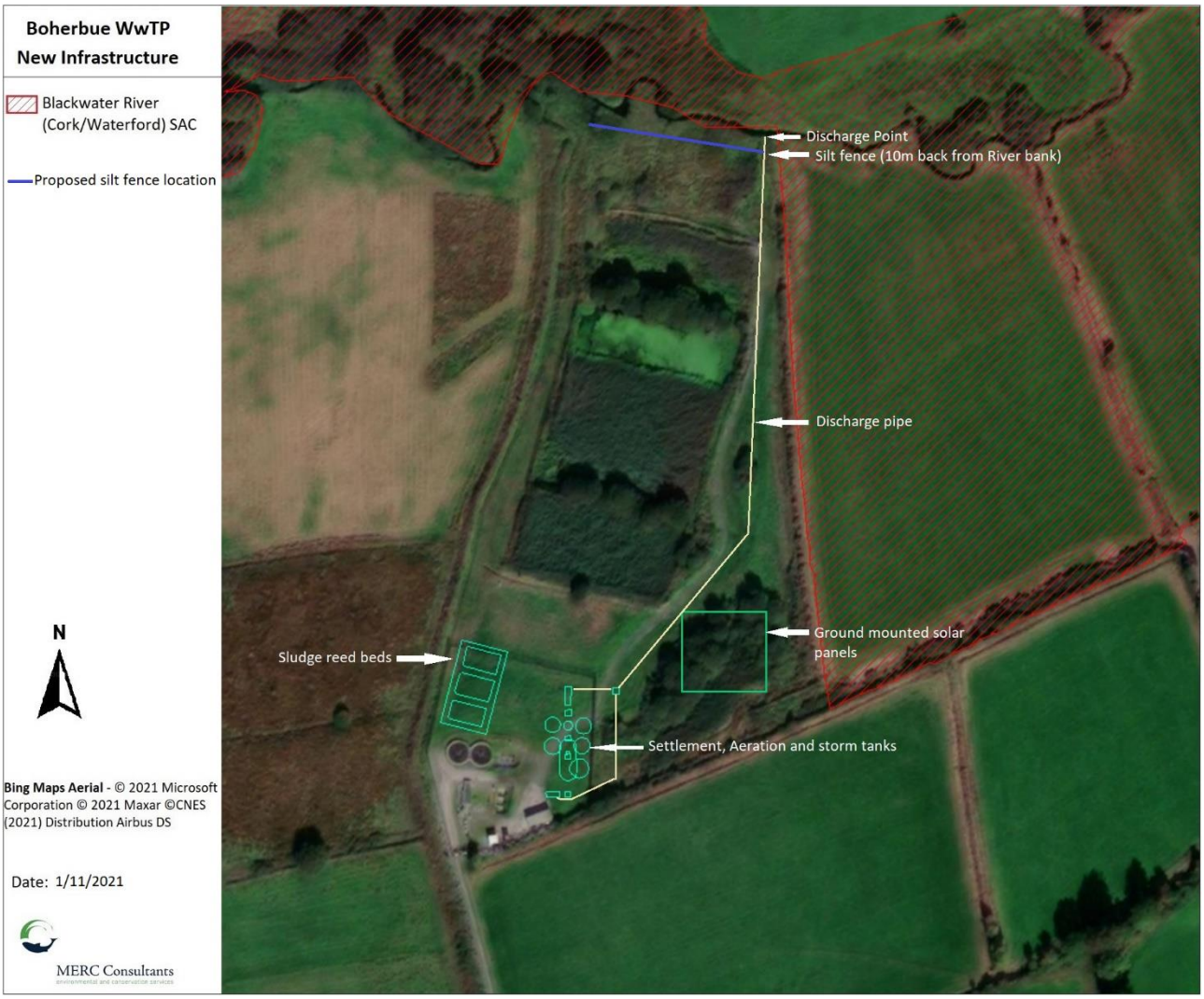


Figure A3.1. Location of silt fencing.