October 2023

Supporting Information for Screening for Appropriate Assessment

Geotechnical Investigation at proposed 250m Offshore Renewable Energy capable Quay Extension at the Port of Waterford, Belview, Co. Kilkenny

On behalf of

Port of Waterford

MALONE O'REGAN ENVIRONMENTAL

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Supporting Information for Screening for Appropriate Assessment
Geotechnical Investigation at proposed 250m ORE capable Quay Extension on 250m at the Port of Waterford, Belview, Co. Kilkenny
Port of Waterford

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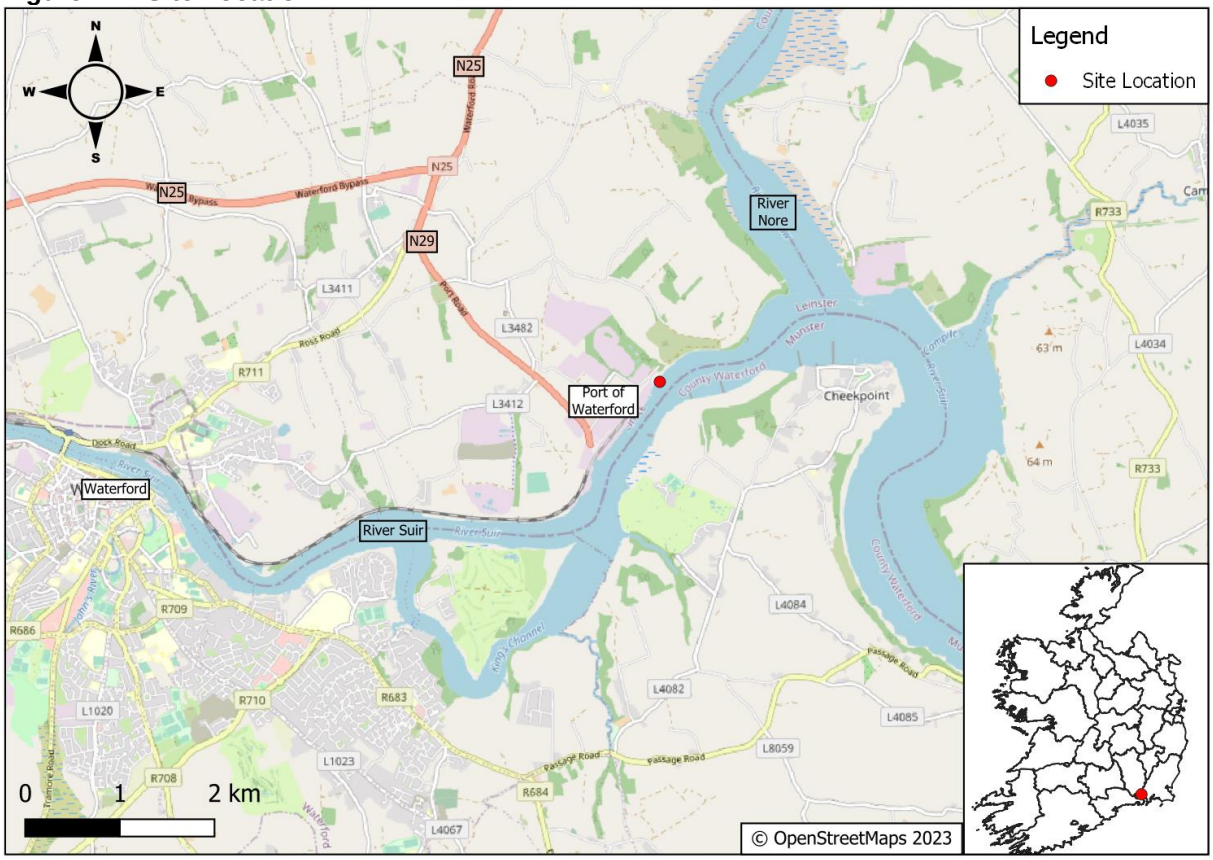
1 INTRODUCTION

Malone O'Regan Environmental (MOR) have been commissioned by the Port of Waterford ('the Applicant') to undertake an Appropriate Assessment to assess the likely significant effects, if any, of a proposed geotechnical investigation required to support the design of a proposed 250m Offshore Renewable Energy (ORE) capable quay extension ('the proposed works') in the River Suir at the Port of Waterford, Belview, Co. Kilkenny (OSI Reference ITM 666422; 613637) on nearby sites with European conservation designations (i.e., European sites).

The proposed works will be located on a site in the River Suir that is ca. 2.48 hectares (ha) in size and borders the townland of Gorteens, Co. Kilkenny, ca. 5.3km east of Waterford City and is shown in Figure 1-1 ('the Site').

This report has been prepared to provide information to inform the Appropriate Assessment of whether the proposed works will, on its own or in-combination with other plans / projects have a significant effect on European sites that fall within the Zone of Influence (ZoI) of the Site in the absence of appropriate mitigation measures.

Figure 1-1: Site Location



1.1 Statement of Authority

The report was reviewed and approved by [redacted] Principal Environmental Consultant. [redacted] has over 6 years' experience working in the ecological consultancy sector, including the preparation of Appropriate Assessments, habitat surveys and specialist protected species surveys.

1.2 Regulatory Context

The following guidance documents were adhered to for the preparation of this NIS report:

- *Appropriate Assessment for Screening for Development Management,* The Office of the Planning Regulator [1];
- *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*, European Commission [2, 3];
- *Guidelines for Ecological Impact Assessment in the UK and Ireland*, Chartered Institute of Ecology and Environmental Management [4];
- *Managing Natura 2000 Sites:* The Provision of Article 6 of the Habitats Directive 92/43/EEC [5]*;*
- *Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities,* DoEGLH [6]; and,
- *Appropriate Assessment under Article 6 of the Habitats Directive; Guidance for Planning Authorities. Circular NPW 1/10 and PSSP 2/10*, DoEGLH [7].

This Natura Impact Statement (NIS) was prepared in accordance with and in compliance with the following legislation:

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna better known as "The Habitats Directive". This provides the framework for legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000.

For completeness, the Planning and Development Act 2000 (as amended) states that "European site" means:

a. A candidate site of Community Importance;
b. A site of Community Importance, F815 [(ba) a candidate Special Area of Conservation];
c. A Special Area of Conservation (SAC);
d. A candidate Special Area of Conservation (cSAC); or,
e. A Special Protection Area (SPA)

These are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/EEC as amended 2009/149/EC) (better known as "The Birds Directive").Article 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect Natura 2000 sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment.

> *"Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans and projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implication for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public"*

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures. First, the project should aim to avoid any negative impacts on European sites by

identifying possible impacts early in the planning stage and designing the project in order to avoid such impacts. Second, mitigation measures should be applied, if necessary, during the Appropriate Assessment (AA) process to the point, where no adverse impacts on the site(s) remain. If the project is still likely to result in adverse effects, and no further practicable mitigation is possible, it is rejected. If no alternative solutions are identified and the project is required for imperative reasons of overriding public interest (IROPI test) under Article 6 (4) of the Habitats Directive, then compensation measures are required for any remaining adverse effect.

1.3 Stages of Appropriate Assessment

There are four distinct stages to undertaking an AA as outlined in current European Union (EU) and Department of Environment, Heritage and Local Government (DOEHLG) guidance:

Stage 1: Screening

This process identifies the potential impacts of a plan or project on a European site, either alone or in combination with other plans and projects and considers whether these impacts are likely to be significant. If potentially significant impacts are identified the plan or project cannot be screened out and must proceed to Stage 2.

Stage 2: Appropriate Assessment

Where potentially significant impacts are identified, an assessment of the potential mitigation of those impacts is required; this stage considers the appropriateness of those mitigation measures in the context of maintaining the integrity of the European sites. If potential significant impacts cannot be eliminated with appropriate mitigation measures, the assessment must proceed to Stage 3.

Stage 3: Assessment of Alternatives Solutions

This process examines alternative ways to achieve the objectives of the plan or project that avoid adverse impacts on the integrity of the European site if mitigation measures are deemed insufficient.

Stage 4: Imperative Reasons of Overriding Public Interest (IROPI)

Assessment where no alternative solution exists for a plan or project and where adverse impacts remain. This includes an assessment of compensatory measures, where in the case of projects or plans, can be considered necessary for IROPI.

2 METHODOLOGY

2.1 Determining Zone of Influence

The starting point for this assessment was to determine the Zone of Influence. The Zone of Influence comprises of the area which the proposed works may potentially affect the conservation objectives (or qualifying interests) of a European site.

Guidance in Appropriate Assessment of plans and projects in Ireland notes that a distance of 15km is recommended for the identification of relevant European sites [6]. However, guidance from the NPWS recommends that the distance should be evaluated on a case-by case basis with reference to the nature, size and location of the project, the sensitivities of the ecological receptors, and the potential for in-combination effects (cumulative) [7]. For some projects the distance could be greater than 15km, and in some cases less than 100m.

Definition of the zone of influence for the proposed works includes evaluating the following:

- Identification of the European sites that are situated within, in close vicinity or downstream within the zone of influence of the proposed works;
- Identification of the designated habitats and species and Conservation Objectives for the identified European sites;
- Identification of the environmental conditions that stabilise and increase the qualifying interests of the European sites towards favourable conservation status;
- Identification of the threats/impacts – actual or potential that could negatively impact the conservation objectives for the European sites;
- Identifying the activities of the proposed works that could give rise to significant adverse impacts; and,
- Identification of other plans or projects, for which in-combination impacts would likely have significant adverse effects.

2.1.1 Source-Pathway-Receptor Model

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

The likely effects of the proposed works on any European site have been assessed using a source-pathway-receptor model. A source-pathway-receptor model is a standard tool used in environmental assessment [8] [9]. The model comprises of:

- A *source*: any potential impacts from the proposed works, e.g., the runoff of sediment / construction pollution.
- A *pathway*: the means or route by which a source can affect the ecological receptor.
- A *receptor*: the qualifying interests and / or special conservation interests of the European sites.

In order to establish the Zone of Influence of the proposed works, the likely key environmental impacts / changes associated with the proposed works were determined having regard to the project characteristics set out in Section 3.3 of this report. Zone of Influence for various potential impact pathways are discussed in Section 5.

2.2 Desk Based Studies

A desk-based review of information sources was completed, which included the following sources of information:

- Review of aerial maps of the Site and surrounding area;
- The National Parks and Wildlife Service (NPWS) website was consulted with regard to the most up to date detail on conservation objectives for the European sites relevant to this assessment [10];
- The Kilkenny County Council Planning Portal to obtain details about existing / proposed developments in the vicinity of the Site [11];
- The Waterford County Council Planning Portal to obtain details about existing / proposed developments in the vicinity of the Site [12];
- The Wexford County Council Planning Portal to obtain details about existing / proposed developments in the vicinity of the Site [13];
- The Department of Housing, Local Government and Heritage's planning portal – the National Planning Application Database to obtain details about existing / proposed developments in the vicinity of the Site [14];
- The National Biodiversity Data Centre (NBDC) website was consulted with regard to species distributions [15]; and,
- The EPA Maps website was consulted to obtain details about watercourses in the vicinity of the Site [16].

2.3 Field Based Studies

2.3.1 Otter Surveys

A bankside otter survey was carried out at the Site and the wider area on the 19th of April 2023 by two (2No.) suitably qualified and experienced MOR ecologists. The survey took place at low tide when the mudflats were fully exposed and accessible.

The survey aimed to identify and examine areas where otter might occur by noting any evidence of otter observed. Evidence of otter searched for included:

- Holts (features log piles, caves and cavities);
- Slides (flattened areas of mud or vegetation);
- Couches (resting areas where the grasses or bank substrates have been flattened);
- Paw prints;
- Evidence of foraging (usually in the form of feeding remains such as fish scales and shellfish); and,
- Spraints (faeces containing food remains); and,
- Anal jellies & smears (gelatinous secretions that is typically brown in colour with the characteristic otter odour).

The survey also took note of the general habitat description, habitat evaluation, weather conditions, human impact and other notable species.

2.3.2 Survey Limitations

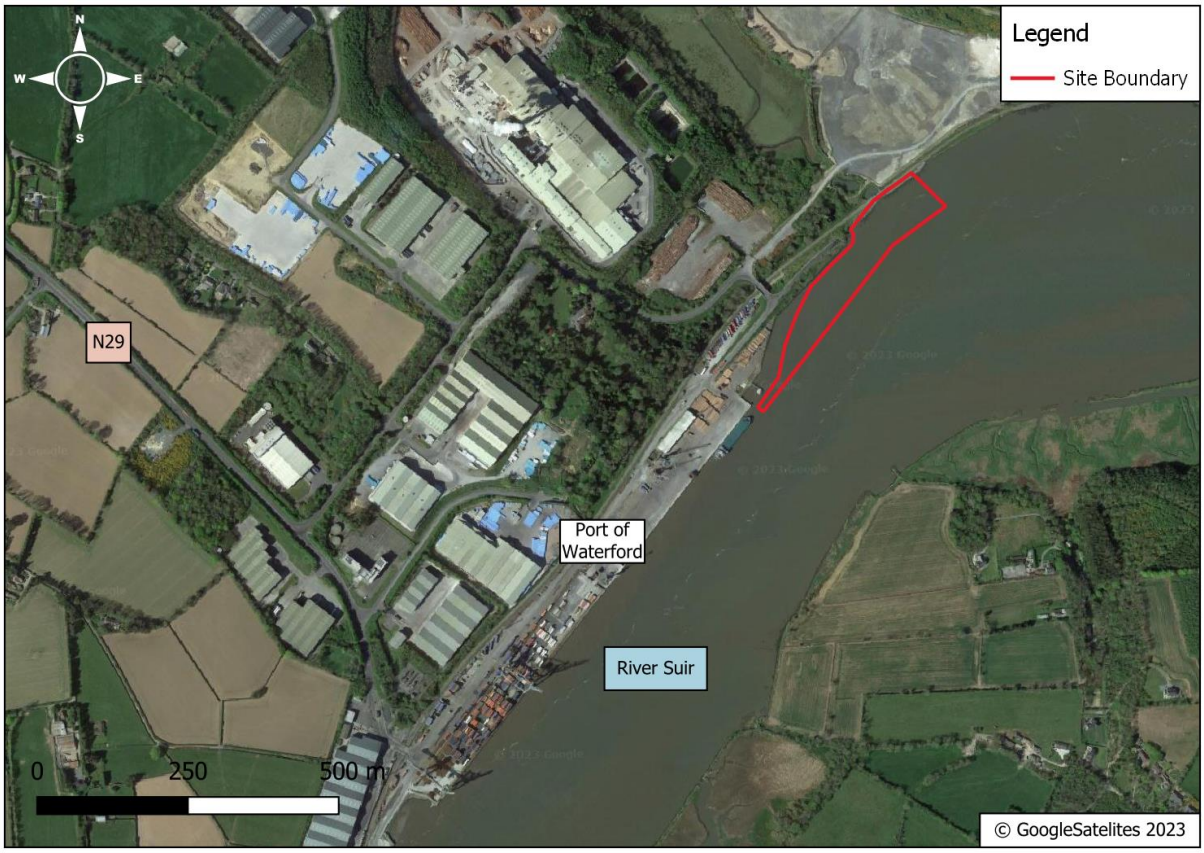
No survey limitations were encountered.

3 DESCRIPTION OF THE PROJECT

3.1 Site Context

The Site is located in an area adjacent to the shoreline within the River Suir in an area ca. 2.48 ha in size. This area is located within the area adjacent to the active Port of Waterford. The Site is access via Belview Port of Waterford, which is off the N29 national road.

Figure 3-1: Site Context and Overview



3.2 Watercourses within the Vicinity of the Site

The Site is situated within the Suir WFD Catchment [Catchment_ID: 16] and the Blackwater [Kilmacow]_SC_010 subcatchment [Subcatchment_ID: 16_29] [16].

The Site is located within one (1No.) watercourse and there is one (1No.) hydrological features of note within close proximity to the Site.

1. River Suir

The Site is located within the River Suir known as the Lower Suir Estuary by the EPA [16]. This river flows in a northeast direction for ca. 1.5km and then converges with the River Barrow and forms the Barrow Suir Nore Estuary according to the EPA [16]. This watercourse then flows south into the Waterford Harbour ca. 12.6km downstream and then the Eastern Celtic Sea a further ca. 6.5km downstream.

The Site is located within a section of the River Suir that forms part of the Lower River Suir SAC and flows into the River Barrow and River Nore SAC ca.1.1km downstream.

Under the Water Framework Directive (WFD) 2000/60/EC, the EPA classifies the status and the risk of not achieving good water quality status for all waterbodies in Ireland [16]. According to the river waterbody WFD 2016-2021, the most up-to-date data at the time of writing this

report, the water quality within the River Suir (Lower Suir Estuary), the Barrow Suir Nore Estuary and Waterford Harbour are all considered to be '*moderate'* and *'at risk'* of not receiving *'good'* water quality [16]. The Eastern Celtic Sea is considered to have '*high*' water quality and is considered '*not at risk*' [16].

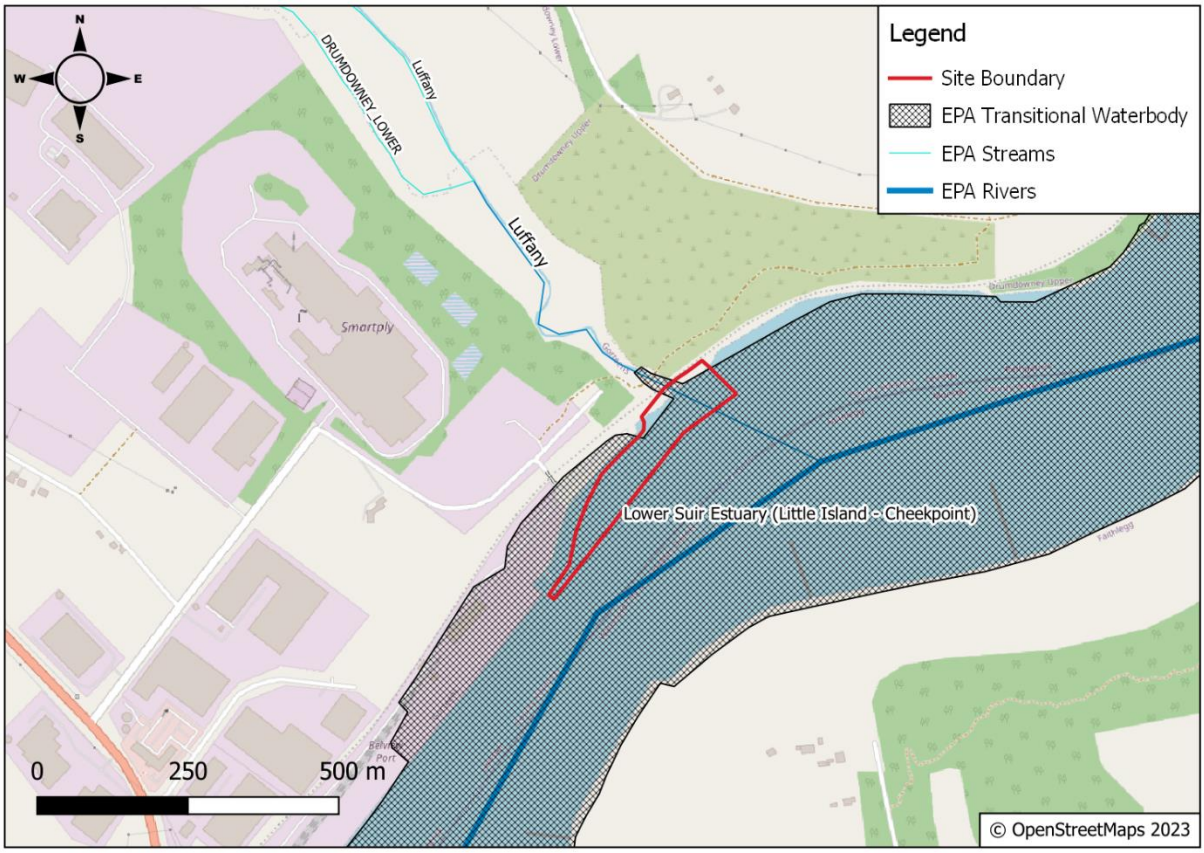
2. Luffany River

The confluence of the Luffany River and the River Suir is located adjacent to the Site boundary, as shown below in Figure 3-2.

Under the Water Framework Directive (WFD) 2000/60/EC, the EPA classifies the status and the risk of not achieving good water quality status for all waterbodies in Ireland [16]. According to the river waterbody WFD 2016-2021, the most up-to-date data at the time of writing this report the water quality within the Luffany River is considered to be '*moderate,'* and the status of this river is considered to be under *'review'* [16].

The location of the key surface water features in the vicinity of the Site are illustrated in Figure 3-2 below.

Figure 3-2: Watercourses in the Vicinity of the Site



3.3 Description of the Proposed Development

The Applicant intends to apply for a licence to carry out specified maritime usages in the maritime area for a geotechnical site investigation at the proposed ORE berth location at the Port of Waterford. The site investigation will consist of:

- Drilling ca. ten (10No.) boreholes ca. 200mm in diameter;
- Drilling ca. ten (10No.) coreholes ca. 200m in diameter; and,
- Associated sampling and testing.

The proposed borehole and corehole locations are illustrated Appendix A.

Boreholes will provide the required information about the overburden soils essential to the design of the structural piling system, the fendering system and the construction of the revetment. The equipment for excavating boreholes will be a cable percussive drilling rig such as a Dando 2000/3000. The borehole is advanced through a casing, 200mm in diameter, by using a cutting tool.

Coreholes will result in the recovery of a length of rock between two and four metres in length and 150mm to 200mm in diameter. The rock will undergo a suite of laboratory tests to determine strength, fractures and other geological information which will allow the wharf substructure (i.e., the piles) to be designed. The equipment used for extracting coreholes will include a GEO 205 drill rig or similar using triple tube core drilling techniques and air-mist coolant. The corehole is advanced using a diamond drill.

All equipment that will be used for the drilling work will be placed on a barge. All drilling works will be through the river into underlying soils and rock. Access to the Site will be from Belview Port.

Further details are provided in the preliminary method statement in Appendix B.

3.4 Drilling Noise Level

The noise generated from the proposed drilling is difficult to predict as it will be influenced by a variety of factors such as the nature of the riverbed, i.e., whether drilling will be sediment or bedrock.

Drilling is defined as a non-pulse sound type [17]. Drilling is generally acknowledged to produce moderate levels of continuous omnidirectional sound at low frequency (several tens of Hz to several thousand Hz and up to ca. 10 kHz) [17]. Drilling can produce underwater pressure levels generally within the 145-190 dB re 1µPa @ 1m [17].

3.5 Construction Procedure

During the proposed works potential environmental impacts will be short-term and localised. Nonetheless, all works will comply with the relevant legislation, construction industry guidelines and best practice in order to reduce potential environmental impacts associated with the works. Where remaining potential impacts have been identified, additional mitigation measures will be employed to reduce, as far as practicable potential impacts.

The following guidance will be referred to and will be followed during the proposed works to prevent environmental pollution that may occur within the area:

- C532 – Control of Water Pollution from Construction, Guidance for Consultants and Contractors [18];
- C584 – Coastal and Marine Environmental Site Guide for Protection of Water Quality and in turn Aquatic Life, During the Construction Phase of the Works [19];
- C741 - Environmental Good Practice on Site (4th edition) [20];
- C774 – Coastal and Marine Environmental Site Guide (Second Edition) [21];
- Guidance for the Treatment of Otters Prior to the Construction of National Road Schemes [22];
- BS 5930: 2015 – Code of Practice for Ground Investigations; and,

- All works will be undertaken in accordance with the Inland Fisheries Ireland (IFI) '*Requirements for the Protection of Fisheries Habitat during Construction and Development'* [23].

It is anticipated that the works will take approximately three (3No.) weeks to complete. Works will take place from 08:00 to 17:00 Monday to Friday and 08:00 to 13:00 on Saturday. No works will take place on Sundays or at night-time.

3.6 Monitoring Works

An Ecological Clerk of Works (ECoW) / suitably qualified Marine Mammal Observer (MMO) will inspect the Site in advance of works commencing and will undertake Site inspections as required during the works to ensure that they are completed in accordance with the mitigation measures detailed within this NIS, the Non-Statutory Environmental Report (NSER) and the Annex IV Species Risk Assessment.

The ECoW / MMO will also either deliver or provide the resident engineer with sufficient environmental information to deliver a Site induction to all personnel working onsite.

4 RECEIVING ENVIRONMENT

The proposed works will take place within the River Suir, and a majority of the Site boundary is consistently covered by estuarine waters; however, areas of mudflats and stonewalls / rock located within the northern section of the Site.

4.1 Desk Based Study Results

Table 4-1 provides a summary of records of legally protected or otherwise notable species protected under the Lower River Suir SAC and River Barrow and River Nore SAC that occur within 2km of the Site (Grid Squares: S6711, S6611, S6414, S6514, S6615, S6714, S6614, S61L, S61R) [15].

CIEEM's guidelines recommend that consideration be given to the biodiversity conservation value of the species that occur within this zone of influence (as appropriate) [4].

Table 4-1: NBDC Records for Species Designated for the Lower River Suir SAC and the River Barrow and River Nore SAC within 2km of the Site (S48G)

Common Name	*Scientific Name*	Date of Last Record *	Designation
European Otter	*Lutra lutra*	20/06/2013	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex II and IV

*Note that only species recorded within the past 10 years were included in this table. The parameter of 10 years was chosen to allow for habitat adaption and modification, it is considered that any records over 10 years old are not representative of the current distribution of species populations.

4.2 Field Based Studies

4.2.1 Otter Survey

Otter Habitat Preference

Otters are predominantly found in aquatic habitats along rivers, estuaries, canals and in still water bodies such as lakes. An individual otter usually maintains multiple Holts and Couches within its territory, which can extend up to 15km. Holts are located underground and can take many forms, they use natural crevices, associated with the roots of trees that grow along the river and lake banks or use burrows previously made from other animals. A holt will typically have multiple entrances which will allow otters to escape when disturbed. Couches are resting places above ground.

Otter can breed year-round, but primarily give birth in the spring and summer months with broods consisting of 2-3 cubs.

Otters are nocturnal animals and can be described as crepuscular. At night and in dark / silty water, the otter relies on their highly sensitive whiskers which detect their prey. In clear waters they utilise their strong eyesight to locate prey usually along the bottom of the waterbodies. Otters are described as opportunistic predators with a broad varied diet, such as salmonids, eel, small fish species and invertebrate.

Onsite Habitat Suitability Results

The Site is comprised primarily of the River Suir. A majority of the Site is consistently covered by water; however, areas of mudflats and stonewalls / rock located within the northern section of the Site.

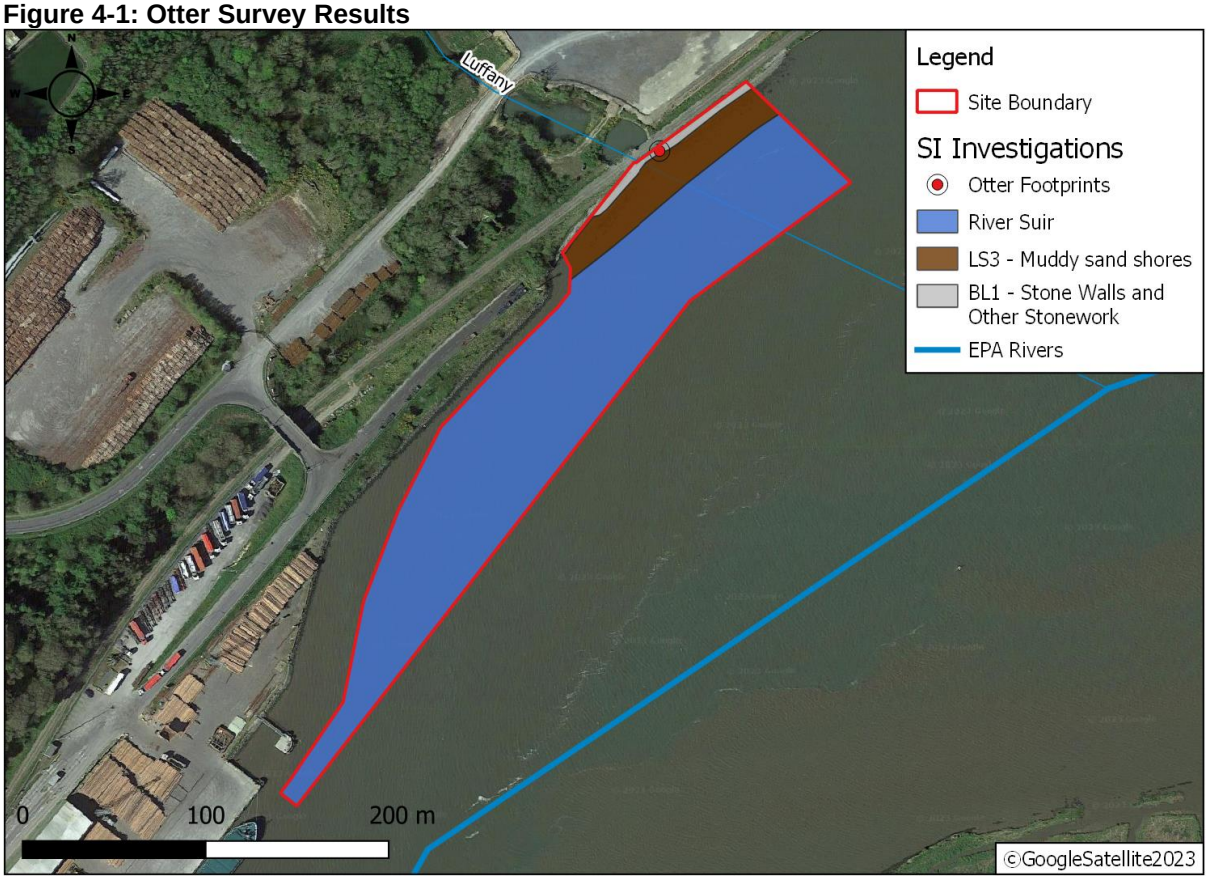
The NBDC does hold records for otters within 2km of the Site [15]. During the targeted otter survey, otter footprints were identified in the mudflat leading towards the Luffany Stream. No holt or couches were noted as part of the completed survey and given the lack of suitable

habitat for holting / couching; the Site was considered unsuitable for these purposes. Furthermore, the River Suir offers suitable prey species for foraging otter.

However, it should be noted that otter are currently utilising areas of the River Suir within close proximity to the active Belview Port. Therefore, it can be concluded that these otters are habituated to anthropogenic activities.

Overall, it is concluded that the Site is not suitable for holting / couching otter but does provide commuting and foraging habitat for this species.

Figure 4-1: Otter Survey Results



4.2.2 Invasive Species

No invasive species were identified during the surveys.

5 IDENTIFCATION OF EUROPEAN SITES

In accordance with the European Commission Methodological Guidance [5] a list of European sites that can be potentially affected by the proposed works has been compiled. Guidance for Planning Authorities prepared by the Department of Environment Heritage and Local Government [6] states that defining the likely zone of impact for the screening and the approach used will depend on the nature, size, location and the likely significant effects of the project. The key variables determining whether or not a particular European site is likely to be negatively affected by a project are:

- The physical distance from the project to the European site;
- The presence of impact pathways;
- The sensitivities of the ecological receptors; and,
- The potential for in-combination effects.

All SPAs and SACs within 15km have been considered to assess their ecological pathways and functional links. As acknowledged in the OPR guidelines [1], few projects have a zone of influence this large, however the identification of European sites within 15km has become widely accepted as the starting point for the screening process. For this reason, all SPAs and SACs in 15km have been identified for consideration as part of the screening.

There are six (6No.) European sites located within 15km of the Site - these are identified in Figure 5-1 and Table 5-1.

Figure 5-1: Site Location and European Designated Sites within 15km

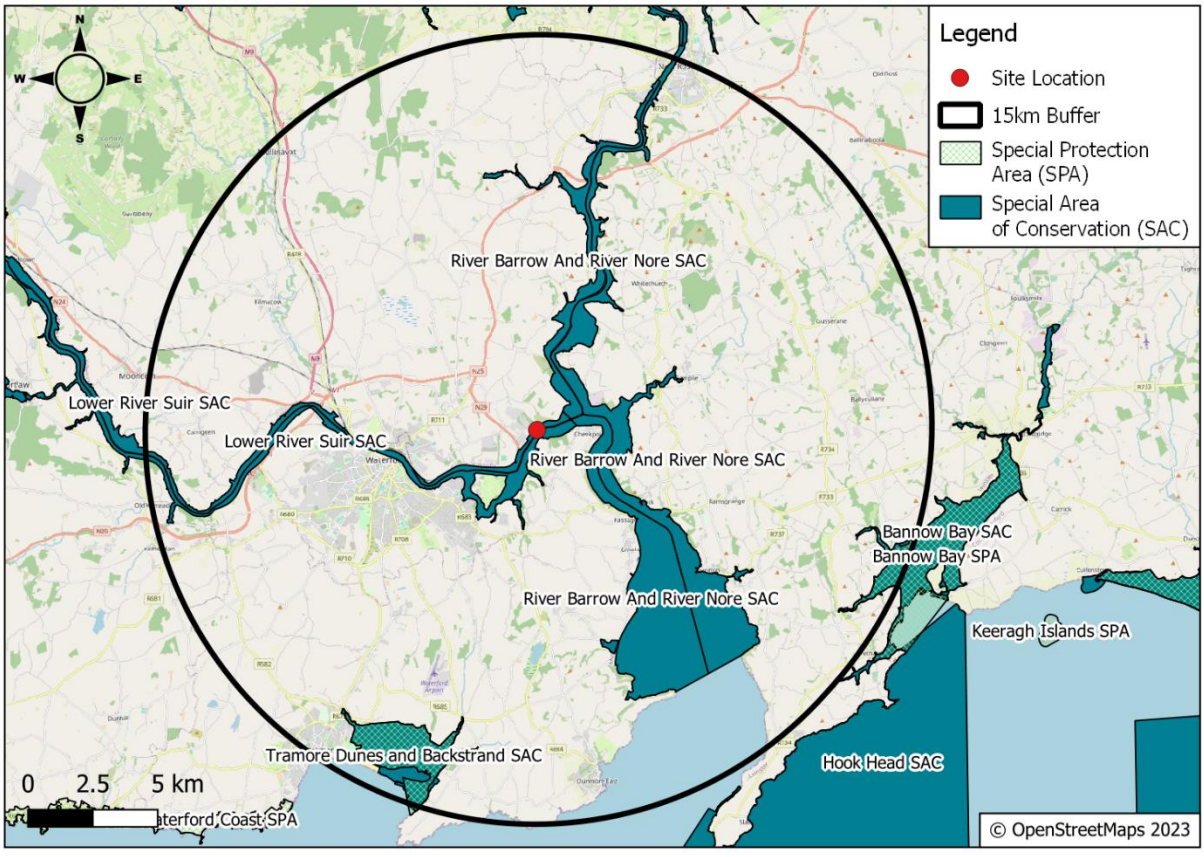


Table 5-1: European Designated Sites within 15km of the Site

Site Name	Code	Distance (km) & Direction	Qualifying Interests
Special Areas of Conservation (SAC)			
Lower River Suir	002137	Within	• 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 British Isles [91A0] • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] • Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] • Otter (*Lutra lutra*) [1355] • Atlantic salmon (*Salmo salar*) [1106] • Sea lamprey (*Petromyzon marinus*) [1095] • Brook lamprey (*Lampetra planeri*) [1096] • River lamprey (*Lampetra fluviatilis*) [1099] • Twaite shad (*Alosa fallax*) [1103] • Freshwater pearl mussel (*Margaritifera margaritifera)* [1029] • White-clawed crayfish (*Austropotamobius pallipes*) [1092]
River Barrow and River Nore	002162	1.1km NE	• Estuaries [1130] • Mudflats and Sandflats not covered by seawater at low tide [1140] • Salicornia and other annuals colonizing 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] • European dry heaths [4030] • Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] • Petrifying springs with tufa formation (Cratoneuron) [7220] • Old sessile oak woods with Ilex and Blechnum in British Isles [91A0] • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] • Otter (*Lutra lutra*) [1355] • Atlantic salmon (*Salmo salar*) [1106] • Sea lamprey (*Petromyzon marinus*) [1095] • Brook lamprey (*Lampetra planeri*) [1096] • River lamprey (*Lampetra fluviatilis*) [1099] • Twaite shad (*Alosa fallax*) [1103] • White-clawed crayfish (*Austropotamobius pallipes*) [1092] • Freshwater pearl mussel (*Margaritifera margaritifera)* [1029] • Nore Freshwater pearl mussel (*Margaritifera durrovensis*) [1990]

Site Name	Code	Distance (km) & Direction	Qualifying Interests
			• Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016] • Killarney Fern (Trichomanes speciosum) [1421]
Tramore Dunes and Backstrand	000671	11.3km SW	• Mudflats and Sandflats not covered by seawater at low tide [1140] • Annual vegetation of drift lines [1210] • Perennial vegetation of stony banks [1220] • Salicornia and other annuals colonizing mud and sand [1310] • Atlantic salt meadows (*Glauco-Puccinellietalia* maritimae) [1330] • Mediterranean salt meadows (Juncetalia maritimi) [1410] • Embryonic shifting dunes [2110] • Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120] • Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]
Bannow Bay	000697	13km SE	• Estuaries [1130] • Mudflats and Sandflats not covered by seawater at low tide [1140] • Annual vegetation of drift lines [1210] • Perennial vegetation of stony banks [1220] • Salicornia and other annuals colonizing mud and sand [1310] • Atlantic salt meadows (*Glauco-Puccinellietalia* maritimae) [1330] • Mediterranean salt meadows (Juncetalia maritimi) [1410] • Mediterranean and thermo-Atlantic *halophilous* scrubs (*Sarcocornetea fruticosi*) [1420] • Embryonic shifting dunes [2110] • Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120] • Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]
Special Protection Area (SPA)			
Tramore Back Strand	004027	11.3km SW	• Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] • Golden Plover (*Pluvialis apricaria*) [A140] • Grey Plover (*Pluvialis squatarola*) [A141] • Lapwing (*Vanellus vanellus*) [A142] • Dunlin (*Calidris alpina*) [A149] • Black-tailed Godwit (*Limosa limosa*) [A156] • Bar-tailed Godwit (*Limosa lapponica*) [A157] • Curlew (*Numenius arquata*) [A160] • Wetland and Waterbirds [A999]
Bannow Bay	004033	13.6km SE	• Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] • Shelduck (*Tadorna tadorna)* [A048] • Pintail (*Anas acuta*) [A054] • Oystercatcher (*Haematopus ostralegus*) [A130] • Golden Plover (*Pluvialis apricaria*) [A140] • Grey Plover (*Pluvialis squatarola*) [A141]

Site Name	Code	Distance (km) & Direction	Qualifying Interests
			• Lapwing (*Vanellus vanellus*) [A142] • Knot (*Calidris canutus*) [A143] • Dunlin (*Calidris alpina*) [A149] • Black-tailed Godwit (*Limosa limosa*) [A156] • Bar-tailed Godwit (*Limosa lapponica*) [A157] • Curlew (*Numenius arquata*) [A160] • Redshank (*Tringa totanus*) [A162] • Wetland and Waterbirds [A999]

5.1 Conservation Objectives

European and national legislation places a collective obligation on Ireland and its citizens to maintain a favourable conservation status at areas designated as candidate Special Areas of Conservation. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

According to the EU Habitats Directive, favourable conservation status of a habitat is achieved when:

- Its natural range, and area it covers within that range, is stable or increasing;
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the near future; and,
- The conservation status of its typical species is favourable as defined below.

The favourable conservation status of a species is achieved when:

- Population data on the species concerned indicate that it is maintaining itself.
- The natural range of the species is neither being reduced or likely to be reduced for the near future; and,
- There is, and will continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Conservation objectives for all identified European SAC Sites are as follows:

> *'To maintain or restore the favourable conservation condition of the Annex I habitat(s) and the Annex II species for which the SAC has been selected.'*

The full reports for the conservation objectives for the Lower River Suir SAC[1], River Barrow and River Nore SAC[2] Tramore Dunes and Backstrand SAC[3], Bannow Bay SAC[4], Tramore Back Strand SPA[5] and Bannow Bay SPA[6] can be found on the NPWS website.

[1] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002137.pdf
[2] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002162.pdf
[3] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000671.pdf
[4] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000697.pdf
[5] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004027.pdf
[6] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004033.pdf

5.2 Identification of European Sites within ZoI

Habitat Loss / Degradation

The Site is located within an area adjacent to the Port of Waterford and is used primarily for activities relating to the Port. The benthic sediments within the Port of Waterford area are known from previous surveys undertaken by Aquafact and are described as muddy sands and is classified as belonging to the JNCC habitat SS.SMU.SMuVS.CapTubi *Capitella capitata* and *Tubificoides spp.* in reduced salinity infralittoral muddy sediment (EUNIS Code: A5.325) [24]. Furthermore, according to Infomar Data, the benthic habitat within the Site boundary is described as '*coarse sediment,'* and the area within the immediate vicinity of the Site boundary is described as '*coarse sediment'* and '*sands*' [25]. This habitat is not classified as designated habitat under the Lower River Suir SAC, in which the Site is located. Therefore, there is no potential for direct habitat loss as a result of the proposed works, given that there are no designated habitats located within the Site boundary.

However, the Site is hydrologically connected to the Lower River Suir SAC and the River Barrow and River Nore SAC. Therefore, there is potential for indirect habitat loss and degradation via potential water quality deterioration. For further details see water quality impairment below. Further consideration will be given to assess potential habitat loss and degradation due to water quality impairment within the Lower River Suir SAC and the River Barrow and River Nore SAC as a result of the proposed works.

Therefore, these two (2No.) European sites will be screened in for further consideration.

Water Quality Impairment

Potential water quality impacts would typically be associated with the release of sediment and other pollutants to surface water during the works, therefore the ZoI would be considered to include the receiving waterbodies within and downstream of the Site during the proposed works within 5km. The Lower River Suir SAC and the River Barrow and River Nore SAC are within the 5km ZoI. Therefore, further consideration will be given to this European site and its qualifying features of interest to assess potential impacts arising from water quality impairment as a result of the proposed works.

Air Quality Impairment

According to the Institute of Air Quality Management (IAQM) Guidelines, the potential adverse effects from dust occur to ecological receptors from dust associated with construction works within a distance of 50m from the boundary of the Site [26]. However, the proposed works will constitute only underwater works. Therefore, there is no potential for dust to arise as part of the proposed works and as such potential dust impacts have been screened out from further consideration.

Noise / Disturbance

Noise from the construction activity has the potential to cause disturbance to resting, foraging and commuting qualifying species of the European sites. As there will be in-river works required for the proposed works, there is potential for underwater noise impacts beyond the immediate vicinity of the Site.

<u>Ambient Noise</u>

Individual species will provoke different behavioural responses to disturbances at different distances from the source of disturbance.

- Transport Infrastructure Ireland (formally the National Roads Authority) has produced a series of best practice planning and construction guidelines for the treatment of

certain protected mammal species (i.e. otter), which indicate that disturbance to terrestrial mammals would not extend beyond 150m [27]; and,

- Studies have noted that different types of disturbance stimuli are characterized by different avifaunal reactions, however, in general a distance of 300m can be used to represent the maximum likely disturbance distance for waterfowl [28].

The ZoI for noise / disturbance is therefore established as the Site with a 300m buffer.

The habitats onsite are suitable for otter which are a designated species for the Lower River Suir SAC and the River Barrow and River Nore SAC. Therefore, given the Site is located within the Lower River Suir SAC, this European site will be scoped in for further consideration.

Underwater Noise on Fish

Underwater noise and vibration impacts on designated fish may cause the following:

- Behavioural effects (Substantial change in behaviour for the animals exposed to a sound, i.e., changes in swimming behaviour and orientation, communication between individuals of the same species and detection of predators / prey);
- Masking effects (i.e., the reduction in the detectability of a given sound as a result of the simultaneous occurrence of another sound);
- Temporary Threshold Shift (TTS) in hearing (short-or long-term changes in hearing sensitivity that may or may not reduce fitness);
- Recoverable tissue injury (injuries including hair cell damage, minor internal or external hematoma etc. Injuries that are noy likely to result in mortality.); and,
- Mortality and potential mortal injury (immediate or delayed death)

Fish species can typically be classified into the following groups:

- Fish species that lack a swim bladder - such as flatfish and lamprey. These fish have a lower hearing ability than many other fish species and, as such, rely on the detection of particle motion (the oscillatory displacement of fluid particles in a sound field) [29];
- Fish species with swim bladders with no connection to the inner ear – such as cod, eel or Atlantic salmon. These fish have better hearing and can also detect particle motion [29]; and,
- Fish species with an extension of the swim bladder that terminates within the inner ear – such as herring or Twaite shad. These species are able to hear sounds over a far greater range than other species and can detect both particle motion and sound pressure (a form of stress measured in term of force / unit area).

Underwater activities such as higher energy pulse sounds produced by underwater explosions, a seismic air-gun arrays or impact pile driving operations are considered to have a high impact to the aquatic environment. These activities can introduce single or multiple sound pulses with rapid rise times and at sound pressure levels (SPLs) exceeding 220-250 dB re: 1 µPa [17]. However, drilling is considered to be less impactful on the aquatic environment but is understood to produce moderate levels of continuous omnidirectional sound at low frequency (several tens of Hz to several thousand Hz and up to c.10 kHz). Source sound pressure levels have generally been reported to lie within the 145-190 dB re: 1 µPa range [17].

For fish, the most relevant criteria for injury are considered to be those contained in ASA S3/SC1.4 TR-2014, Sound Exposure Guidelines for Fishes and Sea Turtles [30]. The guidelines set out criteria for injury due to different sources of noise. The most relevant to the

proposed works are considered to be those for injury due to continuous noise (which are applicable for drilling, shipping and vessel movements).

Table 5-2: Suggested criteria for proposed mortality, potential injury, temporary threshold shift (TTS), masking and behavioural effects for fish due to continuous sound. Relative risk (High, Moderate, Low) is given for animals at three distances from the source defined in relative terms: N - near; I - intermediate; F - far [30]

Type of Animal	Mortality & Potential Mortal Injury	Impairment			Behavioural Effects
		Recoverable Injury	TTS	Masking	
Fish with no swim bladder (particle motion detection)	(N) Low (I) Low (F) Low	(N) Low (I) Low F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low
Fish: where swim bladder is not involved in hearing (particle motion detection)	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low
Fish: where swim bladder is involved in hearing (primarily pressure detection)	N) Low (I) Low (F) Low	170 dB rms for 48h	158 dB rms for 12h	(N) High (I) High (F) High	(N) High (I) Moderate (F) Low
Eggs and larvae	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low	(N) Moderate (I) Moderate (F) Low

Based on the suggested criteria, it is considered unlikely that any fish species will be mortally impacted by the proposed works. However, given the possibility of temporary threshold shift, masking and behavioural effects to designated fish species, the Lower River Suir SAC and the River Barrow and River Nore SAC will be screened in for potential underwater noise impacts.

Underwater Noise on Otter

Otters are known to have acute sense of sight, smell and hearing for which they rely on for traveling through muddy water and for foraging [30]. The potential impacts that are likely to occur to otter are not well studied, and as such the levels of Temporary Threshold Shift (TTS)[7] and Permanent Threshold Shift (PTS)[8] for otter are not known.

The Site is located within the waters immediately adjacent to an existing port, therefore, the area is currently subjected to anthropogenic noise from port related activities. As such, it can be concluded that otter within the vicinity of the Site are subject to anthropogenic noise sources and are habituated to anthropogenic noise.

However, taking a precautionary approach, it is considered that the noise from the proposed works will have the potential to adversely affect otter. Therefore, otter designated under the Lower River Suir SAC and the River Barrow and River Nore SAC will be screened in for potential underwater noise impacts.

[7] TTS may result in a reduction in hearing sensitivity but is not permanent.
[8] PTS may result in auditory injuries and in some cases can lead to death.

Identification of European Sites

The boundaries of six (6No.) are located within 15km from the Site. The Site is located within the Lower River Suir SAC. The Site is hydrologically linked to the River Barrow and River Nore SAC.

Given the short duration of the proposed works, distance separating the Site from the Tramore Dunes and Backstrand SAC, Bannow Strand SAC, Tramore Back Strand SPA, and Bannow Bay SPA, and the intervening lands separating the Site from the European sites and the lack of impact pathways, it is considered that the proposed works will not result in adverse effects to these European sites, and they have therefore been screened out from further consideration.

The following European sites listed in Table 5-3 have been screened in for further consideration to assess potential adverse effects resulting from the proposed works.

Table 5-3: European Designated Sites within ZoI

Site Name	Code	Distance at closest point and source-pathway-receptor link
Lower River Suir SAC	002137	The Site is located within the Lower River Suir SAC, see Figure 5-1. Given the location of the Site within the SAC, potential water quality impairment that could result in habitat degradation and potential ambient and underwater noise disturbance will be taken forward for further consideration.
River Barrow and River Nore SAC	002162	The Site is located 1km southwest of the River Barrow and River Nore SAC, see Figure 5-1. Therefore, given the hydrological connection to the SAC, potential water quality impairment that could result in habitat degradation and potential ambient and underwater noise disturbance will be taken forward for further consideration.

The screening assessment for individual designated habitats and species for each of the European sites and the potential for them to be adversely affected by the proposed works are presented in Section 6 below.

6 STAGE 1 SCREENING: IDENTIFICATION OF POTENTIAL SIGNIFICANT IMPACTS

6.1 Summary Appropriate Assessment Screening for all European Sites

A detailed summary of the potential effects on each of the European sites is listed in Table 6-1. This summary details the European site, their qualifying interests and the conclusion on whether a likely significant effect is predicted or cannot be excluded.

Table 6-1: European Designated Sites within ZoI

Site Name	Code	Qualifying Interests	Distance and Direction from the Site	Source-pathway-receptor link	Consideration Further
Lower River Suir SAC	002137	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	The nearest potential Atlantic salt meadows habitat to the Site is ca. 330m east upstream of the Site and the nearest confirmed Atlantic salt meadow is known to located 3.6km southwest downstream of the Site [31].	This habitat is located along the banks of the River Suir, the nearest record of this potential habitat is ca. 330m southwest upstream of the Site. There is a hydrological connection between the Site and this habitat.	Yes - potential impact as a result of water quality impairment as a result of pollution during the proposed works, i.e., sediment or pollution runoff.
		Mediterranean salt meadows (*Juncetalia maritimi*)	This habitat has not been mapped in detail for the Lower River Suir SAC and the total area of this habitat is not currently known within the SAC [32]. The survey did not identify this habitat within the boundary of the Site nor within the immediate vicinity of the Site.	Although the exact distribution of this habitat within the SAC is not known, it is considered likely that this habitat is located along the banks of the River Suir. Therefore, taking a precautionary approach, it is considered that there is a potential hydrological connection between the Site and this habitat.	Yes - potential impact as a result of water quality impairment as a result of pollution during the proposed works, i.e., sediment or pollution runoff.
		Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	The habitat survey did not identify this habitat onsite or within the immediate vicinity of the Site. The distribution of this habitat throughout this SAC is currently unknown [32].	As this is a freshwater habitat, there are no impact pathways from the Site to any suitable waterbodies within the vicinity of the Site.	No effects predicted
		Old sessile oak woods with Ilex and Blechnum in British Isles	The nearest Old sessile oak woods with Ilex and Blechnum in British Isles to the Site is recorded as being ca. 53.5km northwest upstream of the Site.	Given the distance between the Site and this habitat and the fact that this habitat is located upstream of the Site, it is considered that there is no impact pathway between the Site and this habitat.	No effects predicted

Site Name	Code	Qualifying Interests	Distance and Direction from the Site	Source-pathway-receptor link	Consideration Further
		Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	The nearest Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* to the Site is recorded as being ca. 2.1km northwest upstream of the Site.	Given the distance between the Site and this habitat and the fact that this habitat is located upstream of the Site, it is considered that there is no impact pathway between the Site and this habitat.	No effects predicted
		Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	The distribution of this habitat within the SAC is currently unknown [32]. However, the lowland type communities of the habitat are considered to occur 20.8km west upstream of the Site.	Given the distance between the Site and this habitat and the fact that this habitat is located upstream of the Site, it is considered that there is no impact pathway between the Site and this habitat.	No effects predicted
		Taxus baccata woods of the British Isles	This habitat has not been mapped in detail for the Lower River Suir SAC [32]. According to the Conservation Objectives, there are two stands of Yew woods within the SAC [32]. These stands occur on limestone ridges at Shanbally and Cahir Park, the nearest of which is over 60km northwest from the Site [32].	Given the distance between the Site and this habitat and the fact that this habitat is located upstream of the Site, it is considered that there is no impact pathway between the Site and this habitat.	No effects predicted
		Otter (*Lutra lutra*)	Large river catchments, including the River Suir catchment, are considered to be among the more important SACs for otter. The NBDC holds records for otter within a 2km boundary of the Site [15], and otter surveys completed onsite revealed the presence of otters and suitable habitat.	Otters are known to occur within the Lower River Suir SAC and the Site is considered suitable for commuting and foraging otters and the survey identified footprints along the mudflat. Therefore, it is considered that there is potential for impacts to occur as a result of a potential pollution events or elevated noise levels during the proposed works.	Yes - potential impact as a result of water quality impairment as a result of pollution during the proposed works, i.e., sediment or pollution runoff, and potential disturbance from noise.

Site Name	Code	Qualifying Interests	Distance and Direction from the Site	Source-pathway-receptor link	Consideration Further
		Freshwater pearl mussel (*Margaritifera margaritifera*)	Mussel habitat is widespread in the Clodiagh, with mussels almost continually present in low numbers from downstream of Clonea to above Portlaw [33]. The species was not recorded to be abundant within any area of the SAC [33]. The NBDC holds records for Freshwater pearl mussel within the River Suir catchment [15]. However, there are no recent records held by NBDC for the species within a 2km boundary of the Site [15]. The species is known to occur within the Clodiagh catchment, which is 26.9km upstream of the Site at its nearest point [32].	Although this species has not been recorded within 2km of the Site, this species is known to occur within the River Suir during parts of its life cycle. Therefore, it is considered that there is potential for this species to be present within the wider area.	Yes - potential impact as a result of water quality impairment as a result of pollution during the proposed works, i.e., sediment or pollution runoff.
		Atlantic salmon (*Salmo salar*)	The NBDC holds no records for salmon within 2km of the Site [15]. Moreover, the distribution of this species is currently not mapped within the SAC [32].	Although this species has not been recorded within 2km of the Site, this species is known to occur within the River Suir during parts of its life cycle. Therefore, it is considered that there is potential for this species to be present within the wider area.	Yes - potential impact as a result of water quality impairment as a result of pollution during the proposed works, i.e., sediment or pollution runoff, and potential disturbance from underwater noise.
		Sea lamprey (*Petromyzon marinus*)	The NBDC holds records for sea lamprey within the River Suir catchment [32]. Although there are no records held by NBDC for the species within 2km of the Site [15].	Although this species has not been recorded within 2km of the Site, this species is known to occur within the River Suir during parts of its life cycle. Therefore, it is considered that there is potential for this species to be present within the wider area.	Yes - potential impact as a result of water quality impairment as a result of pollution during the proposed works, i.e., sediment or pollution runoff, and potential disturbance from noise.

Site Name	Code	Qualifying Interests	Distance and Direction from the Site	Source-pathway-receptor link	Consideration Further
		Brook lamprey (*Lampetra planeri*)	The NBDC holds records for brook lamprey within the River Suir catchment [32]. Although there are no records held by NBDC for the species within 2km of the Site [15].	Although this species has not been recorded within 2km of the Site, this species is known to occur within the River Suir during parts of its life cycle. Therefore, it is considered that there is potential for this species to be present within the wider area.	Yes - potential impact as a result of water quality impairment as a result of pollution during the proposed works, i.e., sediment or pollution runoff, and potential disturbance from noise.
		River lamprey (*Lampetra fluviatilis*)	The NBDC holds records for river lamprey within the River Suir catchment [15]. Although there are no records held by NBDC for the species within 2km of the Site [15].	Although this species has not been recorded within 2km of the Site, this species is known to occur within the River Suir during parts of its life cycle. Therefore, it is considered that there is potential for this species to be present within the wider area.	Yes - potential impact as a result of water quality impairment as a result of pollution during the proposed works, i.e., sediment or pollution runoff, and potential disturbance from noise.
		Twaite shad (*Alosa fallax*)	The NBDC holds no records twaite shad within 2km of the Site [15]. This species was however recorded in the Lower River Suir and River Barrow and Nore estuary by Inland Fisheries Ireland [34] **Invalid source specified.**.	Although this species has not been recorded within 2km of the Site, this species is known to occur within the River Suir during parts of its life cycle. Therefore, it is considered that there is potential for this species to be present within the wider area.	Yes - potential impact as a result of water quality impairment as a result of pollution during the proposed works, i.e., sediment or pollution runoff, and potential disturbance from noise.
		White-clawed crayfish (*Austropotamobius pallipes)*	This white-clawed crayfish occurs extensively on the River Suir and its tributaries [32]. The species has been recorded on almost the entire length of the non-tidal section of the River Suir main channel [32]. The NBDC holds no records for white-clawed crayfish within 2km of the Site [15]. The nearest record held for white-clawed crayfish to the Site is ca. 12.5km upstream of the Site.	This freshwater species does not occur in the tidal sections of the SAC. The nearest record for this species is located ca. 12.5km upstream from the Site. Therefore, there is no impact pathway between the Site and this species.	No effects predicted.

Site Name	Code	Qualifying Interests	Distance and Direction from the Site	Source-pathway-receptor link	Consideration Further
River Barrow and River Nore SAC	002162	Estuaries	The Conservation Objectives Report shows that this habitat is located ca. 1.4km downstream of the Site [35].	This habitat is located with the lower region of the River Barrow and River Nore SAC, the nearest record of this habitat is ca. 1.4km downstream of the Site. Therefore, there is a hydrological connection between the Site and this habitat.	Yes - potential impact as a result of water quality impairment as a result of pollution during the proposed works, i.e., sediment or pollution runoff.
		Mudflats and Sandflats not covered by seawater at low tide	The nearest mudflats and sandflats habitat to the Site is ca. 1.4km downstream of the Site [35].	The nearest record of this habitat is ca. 1.4km east downstream of the Site. Therefore, there is a hydrological connection between the Site and this habitat.	Yes - potential impact as a result of water quality impairment as a result of pollution during the proposed works, i.e., sediment or pollution runoff.
		Salicornia and other annuals colonizing mud and sand	This habitat is limited to the lower regions of the River Barrow and River Nore SAC and this habitat was not identified onsite [35]..	This habitat is limited to the lower regions of the River Barrow and River Nore SAC and this habitat was not identified onsite. However, it is considered that there is a hydrological connection between the Site and this habitat.	Yes - potential impact as a result of water quality impairment as a result of pollution during the proposed works, i.e., sediment or pollution runoff.
		Atlantic salt meadows (*Glauco-Puccinellietalia maritimae)*	The nearest Atlantic salt meadows to the Site is ca. 3.2km downstream of the Site [35].	This nearest record of this habitat is ca. 3.2km northeast downstream of the Site and is located along the shoreline. Therefore, there is a hydrological connection between the Site and this habitat.	Yes - potential impact as a result of water quality impairment as a result of pollution during the proposed works, i.e., sediment or pollution runoff.
		Mediterranean salt meadows (*Juncetalia maritimi)*	The nearest Mediterranean salt meadows to the Site is ca. 3.2km northeast downstream of the Site [35].	This nearest record of this habitat is ca. 3.2km northeast downstream of the Site and is located along the shoreline. Therefore, there is a hydrological connection between the Site and this habitat.	Yes - potential impact as a result of water quality impairment as a result of pollution during the proposed works, i.e., sediment or pollution runoff.

Site Name	Code	Qualifying Interests	Distance and Direction from the Site	Source-pathway-receptor link	Consideration Further
		Reefs	The nearest Reefs to the Site is ca. 13.3km downstream of the Site [35].	Although this habitat is located 13.3km southeast downstream, it is still considered that there is a hydrological connection between the Site and this habitat.	Yes - potential impact as a result of water quality impairment as a result of pollution during the proposed works, i.e., sediment or pollution runoff.
		Water courses of plain to montane levels with *the Ranunculion fluitantis* and *Callitricho - Batrachion* vegetation	The distribution of this habitat within the SAC is currently unknown, however, this habitat was not identified onsite or within the immediate vicinity of the Site during the habitat survey [35].	As this is a freshwater habitat, there are no impact pathways from the Site to any suitable waterbodies within the vicinity of the Site. Therefore, this is no impact pathway between the Site and this habitat.	No effects predicted.
		European dry heaths	The distribution of this habitat within the SAC is currently unknown, however, this habitat was not identified onsite or within the immediate vicinity of the Site during the habitat survey.	This terrestrial habitat is not located onsite or within the vicinity of the Site. There are no impact pathways connecting the Site to this habitat given its terrestrial nature.	No effects predicted.
		Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	The distribution of this habitat within the SAC is currently unknown, however, this habitat was not identified onsite or within the immediate vicinity of the Site during the habitat survey.	This terrestrial habitat is not located onsite or within the vicinity of the Site. There are no impact pathways connecting the Site to this habitat given its terrestrial nature.	No effects predicted.
		Petrifying springs with tufa formation (Cratoneuron)*	The only known occurrence of this habitat is located along the River Nore, between Thomastown and Inistioge, which is 35.4km upstream of the Site [35].	This terrestrial habitat is not located onsite or within the vicinity of the Site. There are no impact pathways connecting the Site to this habitat given its terrestrial nature.	No effects predicted.

Site Name	Code	Qualifying Interests	Distance and Direction from the Site	Source-pathway-receptor link	Consideration Further
		Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	The nearest recorded location of this habitat is located ca. 9.2km upstream of the Site [35].	This terrestrial habitat is not located onsite or within the vicinity of the Site. There are no impact pathways connecting the Site to this habitat given its terrestrial nature.	No effects predicted.
		Alluvial forests with *Alnus glutinosa and Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)*	The nearest recorded location of this habitat is located ca. 8.7km upstream of the Site [35].	This terrestrial habitat is not located onsite or within the vicinity of the Site. There are no impact pathways connecting the Site to this habitat given its terrestrial nature.	No effects predicted.
Tramore Dunes and Backstrand SAC	000671	Mudflats and Sandflats not covered by seawater at low tide	This habitat is located over 10km south of the Site [36].	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted
		Annual vegetation of drift lines	This habitat is confined to a small area ca. 14km south of the Site at its closest point.	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted
		Perennial vegetation of stony banks	The distribution of this habitat within the SAC is currently unknown [36].	While the distribution of this habitat is unknown, it can be concluded that is no hydrological connection or any other impact pathway between the Site and this habitat as there are no impact pathways between the Site and the SAC.	No effects predicted
		Salicornia and other annuals colonizing mud and sand	This habitat is confined to a small area in west of this SAC, ca. 13.3km southwest of the Site at its closest point.	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted
		Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	This habitat is located ca. 11.7km southwest of the habitat at its closest point [36].	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted

Site Name	Code	Qualifying Interests	Distance and Direction from the Site	Source-pathway-receptor link	Consideration Further
		Mediterranean salt meadows (*Juncetalia maritimi*)	This habitat is confined to two (2No.) small areas within this SAC, ca. 11.7km and 12.7km away from the Site.	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted
		Embryonic shifting dunes	This habitat is present ca. 13.5km south of the Site at its closest point. [36]	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted
		Shifting dunes along the shoreline with *Ammophila* arenaria (white dunes)	This habitat is present ca. 14km south of the Site at its closest point [36].	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted
		Fixed coastal dunes with herbaceous vegetation (grey dunes)	This habitat is present ca. 13.5km south of the Site at its closest point [36].	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted
Bannon Bay SAC	000697	Estuaries	This habitat is located over 15km east of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted
		Mudflats and sandflats not covered by seawater at low tide	This habitat is located over 10km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted
		Annual vegetation of drift lines	This habitat is located over 15km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted
		Perennial vegetation of stony banks	This habitat is located over 15km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted

Site Name	Code	Qualifying Interests	Distance and Direction from the Site	Source-pathway-receptor link	Consideration Further
		Salicornia and other annuals colonising mud and sand	This habitat is located over 10km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted
		Atlantic salt meadows	This habitat is located over 10km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted
		Mediterranean salt meadows	This habitat is located over 10km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted
		Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*)	This habitat is located over 10km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted
		Embryonic shifting dunes	This habitat is located over 15km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted
		Shifting dunes along the shoreline with Ammophila arenaria (white dunes)	This habitat is located over 15km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted
		Fixed coastal dunes with herbaceous vegetation (grey dunes)	This habitat is located over 15km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this habitat.	No effects predicted
Tramore Back Strand SPA	004027	Light-bellied Brent Goose (*Branta bernicla hrota*)	This European Site is located over 11.3km southwest of the Site at its closest point [36].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted

Site Name	Code	Qualifying Interests	Distance and Direction from the Site	Source-pathway-receptor link	Consideration Further
		Golden Plover (*Pluvialis apricaria*)	This European Site is located over 11.3km southwest of the Site at its closest point [36].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
		Grey Plover (*Pluvialis squatarola*)	This European Site is located over 11.3km southwest of the Site at its closest point [36].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
		Lapwing (*Vanellus vanellus*)	This European Site is located over 11.3km southwest of the Site at its closest point [36].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
		Dunlin (*Calidris alpina*)	This European Site is located over 11.3km southwest of the Site at its closest point [36].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
		Black-tailed Godwit (*Limosa limosa*)	This European Site is located over 11.3km southwest of the Site at its closest point [36].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
		Bar-tailed Godwit (*Limosa lapponica*)	This European Site is located over 11.3km southwest of the Site at its closest point [36].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
		Curlew (*Numenius arquata*)	This European Site is located over 11.3km southwest of the Site at its closest point [36].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
		Wetland and Waterbirds	This European Site is located over 11.3km southwest of the Site at its closest point [36].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
Bannon Bay SPA	004033	Light-bellied Brent Goose (Branta bernicla hrota)	This European Site is located over 13.6km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted

Site Name	Code	Qualifying Interests	Distance and Direction from the Site	Source-pathway-receptor link	Consideration Further
		Shelduck (Tadorna tadorna)	This European Site is located over 13.6km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
		Pintail (Anas acuta)	This European Site is located over 13.6km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
		Oystercatcher (Haematopus ostralegus)	This European Site is located over 13.6km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
		Golden Plover (Pluvialis apricaria)	This European Site is located over 13.6km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
		Grey Plover (Pluvialis squatarola)	This European Site is located over 13.6km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
		Lapwing (Vanellus vanellus)	This European Site is located over 13.6km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
		Knot (Calidris canutus)	This European Site is located over 13.6km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
		Dunlin (Calidris alpina)	This European Site is located over 13.6km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
		Black-tailed Godwit (Limosa limosa)	This European Site is located over 13.6km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted

Site Name	Code	Qualifying Interests	Distance and Direction from the Site	Source-pathway-receptor link	Consideration Further
		Bar-tailed Godwit (Limosa lapponica)	This European Site is located over 13.6km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
		Curlew (Numenius arquata)	This European Site is located over 13.6km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
		Redshank (Tringa totanus)	This European Site is located over 13.6km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted
		Wetland and Waterbirds	This European Site is located over 13.6km southeast of the Site at its closest point [37].	There is no hydrological connection or any other impact pathway between the Site and this species.	No effects predicted

6.2 Stage 1 – Analysis of 'In-Combination' Effects

The Habitats Directive requires competent authorities to make an appropriate assessment of any plan or project which is likely to have a significant effect alone or in-combination with other plans and projects.

A review of the Kilkenny County Council Planning Portal [11], the Waterford City and County Council Planning Portal [12], and the Wexford County Council Planning Portal [13] did not identify any current or previous granted plans or projects in the immediate vicinity that are considered likely in-combination with the proposed works to result in significant impacts on the Lower River Suir SAC and River Barrow and River Nore SAC.

Although there are a number of developments located within the Lower River Suir SAC and the River Barrow and River Nore SAC it is unlikely that the proposed works will contribute to any in-combination effects with these developments. This conclusion is based on the following:

- The minimal, short-term and localised in nature;
- The works will only involve the drilling of ca. ten (10No.) boreholes and ca. ten (10No.) coreholes; and,
- The works will only take approximately three (3No.) weeks to complete.

It is therefore considered that the proposed works are unlikely to have any significant in-combination contribution to possible significant effects on Tramore Dunes and Backstrand SAC, Bannow Strand SAC, Lower River Suir SAC, River Barrow and River Nore SAC, Tramore Back Strand SPA, and Bannow Bay SPA

This statement is supported by:

I. The industrial setting of the local environment; and,

II. The localised and short-term nature of the proposed works.

II. The localised and short-term nature of the proposed works.

6.3 Stage 1 – AA Screening Conclusion

A detailed assessment of the layout and nature of the proposed works, the construction methods to be employed and the overall activities that will occur at the Site has been carried out and the potential for significant effects on European sites and qualifying features of interest within a 15km radius of the Site has been examined in detail.

The boundaries of four (4No.) designated sites, Tramore Dunes and Backstrand SAC, Bannow Strand SAC, Tramore Back Strand SPA and Bannow Bay SPA, were screened out given the distances separating the Site from these European sites and lack of impact pathways. It could be objectively concluded that the proposed works will not, either alone or in combination with other plans or projects, be likely to have significant effects on those sites.

The Site is located within the Lower River Suir SAC, and a hydrological connection was identified between the River Barrow and River Nore SAC and the Site. Therefore, the Lower River Suir SAC and River Barrow and River Nore SAC were taken forward for further detailed consideration, Stage 2 - Appropriate Assessment. Using professional experience, guidance and judgement, the following factors have been considered on identifying potential significant impacts on the identified European sites:

- Qualifying interests;
- Special conservation interests;
- Conservation objectives;

- The nature of the onsite habitats; and,
- The location of the Site.

The screening process has examined the potential for the proposed works cause to significant effects on the European sites and the qualifying features of interest as per the screening determination in Section 6.1.

Taking a precautionary approach, the screening exercise has identified the following designated habitats and species for the Lower River Suir SAC:

Habitats

- Atlantic salt meadows
- Mediterranean salt meadows

Species

- Freshwater pearl mussel
- Sea lamprey
- Brook lamprey
- River lamprey
- Twaite shad
- Salmon
- Otter

Taking a precautionary approach, the screening exercise has identified the following designated habitats and species for the River Barrow and River Nore SAC:

Habitats

- Atlantic salt meadows
- Mediterranean salt meadows
- Estuaries
- Reefs
- Mudflats and Sandflats not covered by seawater at low tide
- Salicornia and other annuals colonizing mud and sand

Species

- Freshwater pearl mussel
- Sea lamprey
- Brook lamprey
- River lamprey
- Twaite shad
- Salmon
- Otter

These habitats and species have been brought forward for further consideration due to the potential for adverse effects, as a result of the proposed works, in the absence of the appropriate mitigation measures. Therefore, progression to Stage 2 of the Appropriate Assessment process is required.

7 STAGE 2: APPROPRIATE ASSESSMENT – NATURA IMPACT STATEMENT (NIS)

A detailed assessment of the layout and nature of the proposed works, the methods that will be employed and the overall activities that will occur at the Site during the proposed works has been carried out and the potential for significant effects on European sites and qualifying features of interest within a 15km radius of the Site has been examined in detail.

The boundaries of six (6No.) European sites are located within 15km of the Site. However, as detailed above, four (4No.) designated sites, Tramore Dunes and Backstrand SAC, Bannow Strand SAC, Tramore Back Strand SPA, and Bannow Bay SPA, can be screened out. It can be objectively concluded that the proposed works will not, either alone or in combination with other plans or projects, be likely to have significant effects on those sites.

However, the Site is located within the Lower River Suir SAC, and a hydrological connection was identified between the River Barrow and River Nore SAC and the Site, via the River Suir. Therefore, the Lower River Suir SAC and River Barrow and River Nore SAC need to be screened in for further consideration.

A detailed assessment of the potential effects on the qualifying interested of the Lower River Suir SAC and the River Barrow and River Nore SAC and appropriate mitigation for these potential effects has been undertaken in the accompanying Stage 1: Screening Appropriate Assessment & Stage 2: Natura Impact Statement (NIS) submitted in support of this application.

This NIS concluded that the effective implementation of appropriate mitigation measures will ensure that any impacts on the European sites, having regard to their conservation objectives, will be avoided during all phases of the proposed works, such that there will be no adverse effects on the integrity of any European sites. Furthermore, the NIS concluded that the proposed works will not, either alone or in combination with other plans or projects, adversely affect the integrity of Lower River Suir SAC and River Barrow and River Nore SAC or any other European site in light of the site's conservation objectives and best scientific knowledge, and no reasonable scientific doubt exists in relation to this conclusion. Accordingly, the NIS concluded that the progression to Stage 3 of the Appropriate Assessment process (i.e., Assessment of Alternatives Solutions) is not considered necessary.

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APPENDICES

APPENDIX A

DON'T SCALE DIMENSIONS

BOREHOLE / COREHOLE CO-ORDINATES

BH 1 / CH 1 E 266435.2168 N 113429.1219
BH 2 / CH 2 E 266466.7254 N 113501.8833
BH 3 / CH 3 E 266500.3719 N 113577.0874
BH 4 / CH 4 E 266529.5586 N 113581.8649
BH 5 / CH 5 E 266553.0895 N 113643.6120
BH 6 / CH 6 E 266597.6736 N 113668.2627
BH 7 / CH 7 E 266638.5441 N 113720.5109
BH 8 / CH 8 E 266677.6178 N 113769.4727

BOREHOLE CO-ORDINATES

BH 9 E 266517.8176 N 113618.8365
BH10 E 266596.6604 N 113708.3039

O.S. MAP SHEETS - 5633-B & 5633-D

AREA FOR WHICH LICENCE IS APPLIED FOR SHOWN THUS:-
= 2.48Ha approx.

BH8/CH8
BH7/CH7
BH10
BH6/CH6
BH5/CH5
BH9
BH3/CH3
BH4/CH4
BH2/CH2
BH1/CH1

NAVIGATION CHANNEL

BULK HANDLING TERMINAL

EXTENT OF EXISTING WHARVES

PROPOSED BOREHOLE LOCATIONS (200mm Ø MIN)

PROPOSED BOREHOLE / COREHOLE LOCATIONS (200mm Ø MIN)

KEY PLAN

DON'T SCALE DIMENSIONS

Health and Safety:

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS, THE SPECIFICATION AND THE SAFETY AND HEALTH PLAN.

THE APPOINTMENT OF THE PROJECT SUPERVISOR DESIGN PROCESS IS THE CLIENT'S RESPONSIBILITY.

TEMPORARY WORKS PROPOSALS AND/OR METHOD STATEMENTS TO BE SUBMITTED TO THE PSDP AND THE PSCS FOR WORKS WHICH INVOLVE PARTICULAR RISKS.

Notes:

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3. ALL DIMENSIONS IN mm UNLESS NOTED OTHERWISE.
4. THE CONTRACTOR SHALL CHECK ALL DIMENSIONS PRIOR TO COMMENCEMENT OF CONSTRUCTION. DISCREPANCIES SHALL BE REPORTED TO THIS OFFICE IN WRITING.
5. THIS DRAWING TO BE READ IN ACCORDANCE WITH ALL RELEVANT ENGINEERS' DRAWINGS AND SPECIFICATIONS.

Rev.	Description	Date	Drawn	Chkd	Appr
P	Application for a Maritime Usage Licence under the Maritime Area Planning Act 2021	20.10.2023	[redacted]		

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MALONE O'REGAN CONSULTING ENGINEERS

Offices also in: [redacted]

Client: PORT OF WATERFORD COMPANY

Job: BELVIEW PORT MASTER PLAN DELIVERY PROJECT SITE INVESTIGATION WORKS

Drawing: SITE INVESTIGATIONS LOCATION PLAN

Job No	Drg No	Stage	Revision	Scale
W20088	MA 803	PL	P	A3 1:2500

APPENDIX B

MALONE O'REGAN
CONSULTING ENGINEERS

Port of Waterford

250m ORE Capable Quay Extension at Belview Port

Geotechnical Investigations

Date: May 2023
Job No: W20088

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PRELIMINARY METHOD STATEMENT – ROTARY DRILLING 7

JACK UP BARGE 16

INTRODUCTION

The Geotechnical Investigations at Belview Port will involve mobilising a jack up marine plant which will be assembled alongside the existing quay structure in a suitable area. The Cable Percussive and Rotary Drilling Rigs will be crane lifted onto the barge and secured to the deck which will act as a work platform for the drilling works over water. Boreholes and coreholes will be carried out in accordance with the attached method statements by a trained geotechnical crew under the supervision of the specialist company's Geotechnical Engineer. The works are works limited to the specific exploratory hole locations envisaged to have a limited impact on the surrounding area with the specified. As the proposed plant involves the use of a jack up barge, the use of anchors or casting ropes other than for the safety boat is not anticipated. Very limited impact on the river bed is expected with openings limited to 50 to 200mm diameter and no spoil mounds generated as all works will be contained within metal casings. On completion of the works all plant and equipment will be returned to the quay and craned off the jack up barge which will then be disassembled and demobilised from site. The field works are anticipated to be completed in a five week period, subject to tidal movements and weather conditions.

Typical equipment and rig details for the below listed plant are included in the preliminary method statements in the following sections of this document;

- Data Sheet for Edgetch 3100P proposed to be used for the geophysical survey
- Data Sheet for proposed Cable Percussive Boring Rig (Dando 2000/3000)
- Data Sheet for proposed Rotary Coring Rig (Boart Longyear Delta Base 520)
- Details of proposed Dynamic Probing Rig (Archway Competitor 130)
- Method Statements for the above mentioned items

PRELIMINARY METHOD STATEMENT – LIGHT CABLE PERCUSSIVE BORING

INTRODUCTION

Work will be undertaken to conform to the current BS 5930 and BS 1377 standards, BDA 'Code of Safe Drilling Practice' and 'Guidance Notes for the Safe Drilling of Landfills and Contaminated Land' as appropriate and the contract specification.

INITIAL LOCALTION

The drilling rig will be set up in a manner that is safe for operating personnel. In particular the vicinity will be checked for any obvious signs of services or other hazards. Where appropriate harris fencing will be used to surround the mobilisation and assembly area. Other signage will be provided as required.

Equipment arisings and spoil will be placed so as not to present a hazard to the operatives or the general public.

The borings will be numbered precisely as outlined by the engineer on the drilling instructions.

BORING EQUIPMENT AND DIAMETER OF BORING

Boring will normally be carried out using a cable percussion rig such as a Dando 2000/3000 rig or similar, and tools, such as shells, clay cutters or chisel and sinker bars, as required. Spill kits shall accompany the rig for all works over water. Refuelling and storage of fuel for the rig shall be limited to small individual containers of maximum 25 litres each and shall be undertaken in a fully controlled manner.

The minimum diameter of borings or internal diameter of casing will be 150mm and the maximum will be 200mm.

Where borings are of such depth that the advancement of a casing may become impracticable or where hard strata and obstructions are likely to be met, additional strings of casing of sufficient diameter to complete the work will be provided.

The diameter and depth of boring and the diameter and depth of all casing will be noted on the Daily Report.

WATER IN BORING AND OBSTRUCTIONS

Water will not be added unless specific permissions is given by the geotechnical specialist.

For conditions where the addition of water is permitted the driller will use the minimum amount of water necessary for advancing the boring.

In boring where hard strata or obstructions are encountered the driller will continue boring using chisel or similar approved tool for a minimum approved time (normally of 1 hour) in an attempt to penetrate the hard strata or obstruction.

BEST PRACTICE FOR SAMPLING

The preparation for the methods of taking sampling, together with their size, presentation and handling will be in accordance with British Standards BS 5930: 1981 – Code of Practice for Site Investigations.

Samples will be returned to the site office or to a safe store protected from the weather and from high or low temperatures, at the end of each shift. All samples will be protected at all times from temperatures below 5 and above 25 degrees Celsius, and from wetting or drying out due to weather exposure.

SAMPLING AND TESTING INTERVAL AND RECORDING

At each stage in soil type or change in consistency a small disturbed sample will be taken.

Sampling will be in accordance with drilling instructions issued.

The depths from which all samples are taken will be recorded on the Daily Reports.

For “undisturbed” samples the levels at the top and at the bottom of sample, and the length of sample obtained will be given or “not recovered”. A small disturbed sample will be taken from the shoe.

For “bulk disturbed” samples the limits of the samples zone will be recorded.

For SPT’s the full length of the drive will be recorded together with non recovered samples being noted.

In inspection pits a “small disturbed” sample will be taken at each change in soil type or 0.5m intervals whichever is closest. Bulk disturbed samples of granular materials or major units will be taken.

IN SITU TESTING AND MEASUREMENTS

The Standard Penetration Test (SPT) will be carried out as per BS 1377: 1990.

The SPT assembly will be lowered to the base of the hole and then any penetration due to self-weight will be recorded.

During the SPT the blows for two increments of 75mm, or the penetration after 25 blows will be recorded as the seating drive. The seating drive will be terminated after 150mm penetration or 25 blows whichever is reached first and the test drive will then be started.

After the seating drive of the SPT blows for four increments of 75mm will be recorded as the test drive. The test drive will be terminated after 300mm penetration or a total of 50 blows in the test drive, whichever if reached first and the penetration and blows and for each increment will be recorded. In the case of weak rocks a total of 100 blows for a test drive will be recorded.

A small disturbed sample from the split spoon sampler will be taken, or a bulk disturbed sample of the soil in the zone of the test if no split spoon sample is available.

DANDO 2000 MK2 AND 3000 MK2

A Geotechncal shell and auger drill rig with a host of new features carefully designed to complement the reliable, versatile nature of the tried and tested Dando 2000 and 3000.

New, more powerful clutch - Gives the driller a more responsive "snappy" feel

Improved winch guarding

Electric mast raising system - For faster, safer raising of the rig

Increased engine silencing

Composite, maintenance free crown sheave with a new sheave material - allowing for longer life without the need for maintenance or greasing

Emergency stop button

DANDO DRILLING INTERNATIONAL LTD

Dando 2000/3000 Mk 2

Specification details

Complete mobile drilling rig for operating percussion drilling tools and casing, sampling and testing equipment. Suitable for towing behind Landrover or light truck.

The mk 2 features a new clutch, giving an improved snatch capability to the rig.

Full clutch and winch guards are fitted as standard.

GENERAL SPECIFICATIONS

	2000	3000
Engine Power	18 hp (13kW) @ 1800 rpm	20 hp (15kW) @ 1600 rpm
Winch (Single Line Pull)	2000 kgf	3000 kgf
Drilling Depths and Diameters	6 inch to 250ft (150mm) (75m) 15 inch to 150ft (380mm) (45m)	6 inch to 300ft (150mm) (90m) 18 inch to 175ft (460mm) (55m)

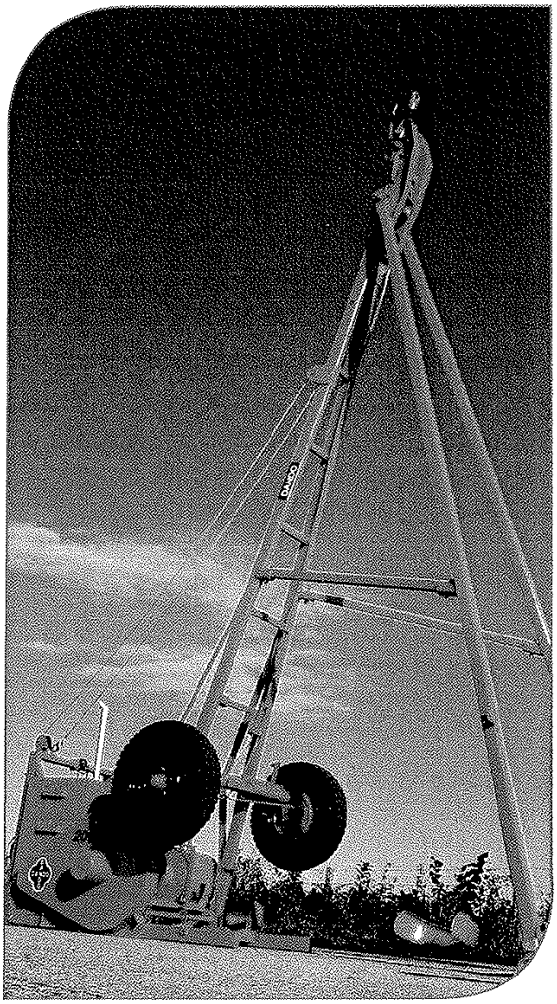
NOTE: The maximum drilling capacity is dependent on drilling conditions and type and size of tools. The figures given provide a general guide only.

	2000	3000
Derrick Working Height under sheaves	5.2m	5.2m
Overall Height derrick erected	6.65m	6.55m
Derrick loading	6000kg	9000kg
Travelling Dimensions - length	7.5m	8.5m

Shipping Specification - Engine and Winch Unit
LENGTH: 2.44m(8'0") WIDTH:1.62m(5'3")
HEIGHT:1.38m(4'6")
Shipping Specification - Mast Unit
LENGTH: 6.7M (21'9") WIDTH:1.8m(2'9")
HEIGHT:1.10m(1'6")

An independent electrically operated winch with remote cable control is fitted to the Sampson post so that the derrick legs can be raised and lowered safely.

Also including removable mud guards and overrun braking mechanism incorporating towing eye and parking brake lever.



DANDO DRILLING
INTERNATIONAL LTD

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PRELIMINARY METHOD STATEMENT – ROTARY DRILLING

INTRODUCTION

All foreman drillers will be suitable trained and experienced. Work will be undertaken to conform to the current BS 5930 and BS 1377 standards, BDA 'Code of Safe Drilling Practice' and 'Guidance Notes for the Safe Drilling of Landfills and Contaminated Land' as appropriate and the contract specification.

The geotechnical engineer will issue written instructions for each borehole before it is started.

INITIAL LOCALTION

The drilling rig will be set up in a manner that is safe for operating personnel. In particular the vicinity will be checked for any obvious signs of services or other hazards.

Equipment arisings and spoil will be placed so as not to present a hazard to the operatives or the general public.

The borings will be numbered precisely as outlined by the engineer.

Rotary drilling will be undertaken using a top drive Deltbase 520 or Soil Mech Rotary Rig.

A crane shall be utilised to lift the rotary rig onto the deck of the jack up platform. The rig shall then be chained / welded to the deck of the jack up platform.

Spill kits shall be carried by all rigs.

Fuel shall be limited to 25 litre containers and spill trays utilised when refuelling. No fuel will be stored on board the marine plant.

TYPES OF DRILLING

Rotary drilling will be carried out into the bedrock. Open hole drilling may be carried out where core drilling is not required. Borehole size will vary depending on the requirement of the project but will generally be a minimum of 150mm diameter and a maximum of 190mm in overburden. In rock the borehole size shall be approximately 100mm diameter. Typical depths for rotary drilling shall be 0 to 30m below ground level and will be determined by the geotechnical engineer.

Rotary core drilling will normally be carried out with diamond or tungsten carbide tipped bits which will be suitable for the percentage core recovery and diameters specified.

Where rotary drilling is required within weathered rock strata which include friable or soft layers, softer lenses within solid rock, or other than solid continuous strata, the driller will bring to site suitable well maintained equipment to produce cores in such strata as to meet the recovery requirements and the specification.

The drilling fluid will normally be potable water or reservoir water.

Rotary core drilling will produce cores of circular cross section of the nominal specified diameter throughout the core length. The type and state of the drill bit, feed rates and management of the drill will be such that the specified core recovery in any single run can be obtained where the condition of the rock permits.

The depth of the start and finish of the core run, the depth to the base of the casing and the diameters of the core and casing will be recorded, together with the water level whenever practicable. The flush returns, loss of flush and condition of core bit and barrel, core recovery and possible location of any core losses will also be recorded. For any overwater boreholes it is intended that the flush returns are released directly into the reservoir.

Where it is necessary to provide rock by open hole drilling from ground level or by rotary core drilling, then the rock will be proved to 1.5m depth or as otherwise instructed by the Engineer.

The core will be extruded in the same direction as it entered the barrel, without vibration and in a manner to prevent disturbance. The cores will be extruded directly into the core box or into a correctly sized detachable channel.

After extrusion all cores will be wrapped/taped in mylar and will immediately be placed in core boxes to prevent damage to the cores.

CORE BOXES, PACKAGING ARRANGEMENT, LABELLING, STORING

Core boxes will be soundly constructed in timber in other approved material, fitted with stout carrying handles, fastening and hinged lids.

Cores will be placed in the box with the shallowest core to the top left hand corner, the top being considered adjacent to the hinged section.

Depth will be indicated by durable markers at the end of each drill run. The depth at the beginning and end of each channel in the core box will likewise be labelled. Where 100% recovery has not been achieved, core spacer pieces clearly indicating the missing lengths will be placed in the boxes.

IN SITU TESTING AND MEASUREMENTS

The Standard Penetration Test (SPT) will be carried out as per BS 1377: 1990.

The SPT assembly will be lowered to the base of the hole and then any penetration due to self-weight will be recorded.

During the SPT the blows for two increments of 75mm, or the penetration after 25 blows will be recorded as the seating drive. The seating drive will be terminated after 150mm penetration or 25 blows whichever is reached first and the test drive will then be started.

After the seating drive of the SPT blows for four increments of 75mm will be recorded as the test drive. The test drive will be terminated after 300mm penetration or a total of 50 blows in the test drive, whichever if reached first and the penetration and blows and for each increment will be recorded.

A small disturbed sample from the split spoon sampler will be taken.

The details of the SPT will be recorded on the Daily Report. Th size and depth of casing and depth of water will be recorded. The number of blows for each of the 75mm increments will be recorded together with the sample length. If the full penetration is not obtained, then the number of blows and actual penetration for the increment will be recorded.

During the normal boring operations when groundwater is encountered the depth and point of entry will be noted and operations stopped for not more than 20 minutes and the depth from ground level to water level recorded at five minute intervals. The boring will then be continued unless otherwise instructed. The depth at which casing seals off the entry of water will be recorded.

If groundwater occurs as a slow seepage then the level will be noted and the boring continued.

Water levels will be recorded at the beginning and end of each shift.

At each occasion groundwater is recorded the depth of hole and sizes of casing will be noted.

Field permeability tests will be carried out under the direction of the Engineer. A record of each test will be made on the Daily Report.

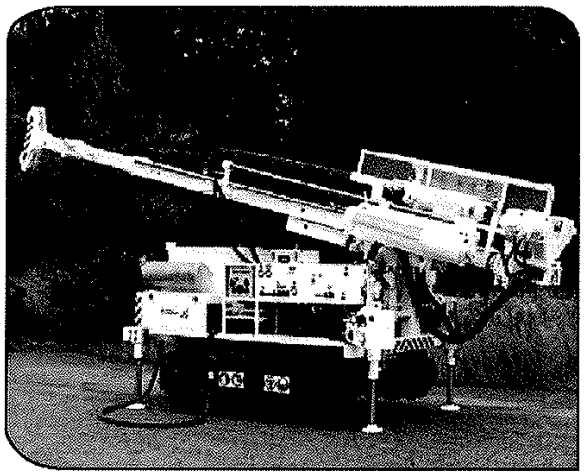
For periods where the rig is unattended / outside of work shift, then the rig shall be left standing in a manner that does not allow tidal variation to influence the works. Where a jack up is involved this will require jacking the work platform to a height beyond the influence of the tides / swell / waves.

DeltaBase 520
Technical Data Sheet

Release Date: Feb 25th, 2008

PRODUCT OVERVIEW

The DeltaBase 520 is a compact and lightweight multipurpose drill rig designed for geotechnical investigation, construction and exploration drilling. Its ability to perform a variety of different types of drilling makes the DB520 a valuable asset to any drill fleet.



Features:

- Fast and easy changes between wireline coring, DTH drilling, flush rotary and auger drilling
- Automatic SPT equipment with digital blow counter
- Hydraulic mast raising and independent hydraulic jacks for fast rig mobilization
- Standard safety features including an interlocked safety cage and low speed, low torque rotation for safer rod management
- Hydraulic make and break rod clamps

STANDARD DRILLING SYSTEMS

	METRIC SYSTEM	US CUSTOMARY SYSTEM
CORE DRILLING		
NO / NO2" / NV / NV2"	210 m	690 ft
HO / HV	150 m	490 ft
PO / PV	100 m	330 ft
SQ	60 m	196 ft
ROTARY DRILLING (TRICONE)		
Hole diameter - 216 mm (8.5 in)	120 m	390 ft
AUGER DRILLING		
Hole diameter - 150 mm	15-20 m	49-65 ft
DTH DRILLING PACKAGE		
Maximum Size DTH Hammer	98 mm (3 7/8") @ max 17,2 m³ / min @ max 24 bar	
Maximum Depth Capacity	200 m	656 ft
Recommended Hole Size	115 mm	4.5 in
Maximum Hole Size	127 mm	5 in
Recommended Rod Size	76,1 mm	3 in

DTH SHOCK ABSORBER FOR ROTARY HEAD INCLUDED
Notes: Air compressor must be selected according to hammer used.
In-line oiler and shock absorber are required for DTH drilling.

DeltaBase 520
Technical Data Sheet

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TECHNICAL SPECIFICATIONS

	METRIC SYSTEM	US CUSTOMARY SYSTEM
PRIME MOVER		
Standard	Deutz D914L04 air cooled engine, COM III	
Fuel	Diesel	
No. of Cylinders	4	
Swept Volume	4,31 l	263 cu. in
Power	53 KW @ 2300 rpm	71 hp @ 2300 rpm
Fuel Tank Capacity	60 l	16 gal
Specific Fuel Comsumption	225 g/kWh	
Standard engine for work up to	1000 m @ 30°C 1700 m @ 0°C without power loss	
PRIME MOVER FOR HIGHER AMBIENT TEMPERATURE OR HIGHER ELEVATIONS - OPTIONAL EQUIPMENT		
Engine	Deutz BF4L914 air cooled engine, COM II	
Fuel	Diesel	
No. of Cylinders	4, turbocharged	
Swept Volume	4,31 l	263 cu. in
Power	72,4 kW @ 2300 rpm	97 hp @ 2300 rpm
Fuel Tank Capacity	60 l	16 gal
Specific fuel consumption	223 g/kWh	
Maximum altitude without power loss	53 kW - 1000 m @ 60°C, 2000 m @ 50°C, 3000 m @ 35°C, 4000 m @ 25°C, 5000 m @ 10°C	
ROTARY HEAD DD52		
Low Gear	4890-977 Nm / 48-25 rpm	3606-720 lb-ft / 48-250 rpm
High Gear	1859-371 Nm / 140-740 rpm	1371-273 lb-ft / 140-740 rpm
Bore - Inside Diameter	62 mm	2.44 in
Flushing Head - Inside Diameter	22 mm	0.87 in
Rotation Motors	Danfoss - variable / reversible with pressure remote	
Top drive Flange	2 3/8" API Reg PIN	
Floating spindle and flushing head included		
Hydraulic motor at max/min displacement, diesel engine at 2200 rpm		
Gear Ratio - 1st	7.68 : 1	
- 2nd	2.92 : 1	
Rotary Head Carriage with side shift		

DeltaBase 520
Technical Data Sheet

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TECHNICAL SPECIFICATIONS

	METRIC SYSTEM	US CUSTOMARY SYSTEM
HYDRAULIC SYSTEM		
Primary Pump	Parker bent axis, fixed displacement	
Maximum Flow	66 lpm @ 2200 rpm	17.5 gpm @ 2200 rpm
Maximum Pressure	250 bar	3626 psi
Secondary Pump	Cassappa gear pump	
Maximum Flow	59 lpm @ 2200 rpm	15.5 gpm @ 2200 rpm
Maximum Flow (2nd)	48 lpm @ 2200 rpm	12.5 gpm @ 2200 rpm
Maximum Pressure	175 bar	2538 psi
Oil Tank Capacity	200 l	53 g
DRILL MAST AND FEED SYSTEM		
Feed Stroke	3400 mm	11.2 ft
Feed Speed - up	21 m/min	69 ft/min
- down	34 m/min	111 ft/min
Fast Feed Speed - up	48 m/min	157 ft/min
- down	75 m/min	246 ft/min
Pull Down Force	25 kN	5620 lbf
Pull Back Force	38 kN	8550 lbf
Drilling Inclination	45° horizontal to 90° vertical down	
Mast Dump	500 mm	1.6 ft
Rod Length	3000 mm max	9.84 ft max
MAIN WINCH SH220		
Line Pull	20 kN	4500 lbf
Line Speed	44 m/min	114 ft/min
Cable Length, 12 mm	30 m	98.4 ft
ROD CLAMPS		
Maximum Diameter	220 mm	8.6 in
Maximum Clamping Capacity	175 kN	4500 lbf
Maximum Breaking Torque	20,5 kNm	15120 lb ft

DeltaBase 520
Technical Data Sheet

TECHNICAL SPECIFICATIONS

	METRIC SYSTEM	US CUSTOMARY SYSTEM
UNDERCARRIAGE		
Type	Crawler mounted triple grouser steel tracks	
Maximum Driving Speed	1,5 km/h	1.0 mph
Axis Distance	1715 mm	67.5 in
Maximum Ground Pressure	0,053 MPa	7.7 psi
Climbing Capacity	(Grade ability 60%) approximately 30^0	
Optional Undercarriage	Trailer Mounted, Skid Mounted	
MAST EXTENSION FOR LONGER ROD PULL		
Maximum Rod Pull	2 x 3 m (6 m)	19.7 ft
Fitted onto standard mast to pull 6 m rod		
Rod Storage Rack	30 pieces of 76 mm rods	
Towing Hook on Rear of Rig		
Air Connection on Rear of Rig for DTH Compressor		
OPTIONAL EQUIPMENT		
WIRELINE WINCH		
Line Pull	6,5 kN	1461 lbf
Line Speed	100 m/min	328 ft/min
Cable Length 6 mm	250 m	820 ft
MUD PUMP DP100		
Continuous Flow	90 l/min	23.7 gpm
Maximum Flow	100 l/min	26.4 gpm
Pressure	30 bar	435 psi
MUD PUMP DP200		
Continuous Flow	160 l/min	42 gpm
Maximum Flow	180-200 l/min	47-53 gpm
Pressure	30 bar	435 psi
Flushing Head with 42 mm ID included		
FMC PUMP L0918		
Flow	100 l/min	26 gpm
Pressure	45 bar	652 psi

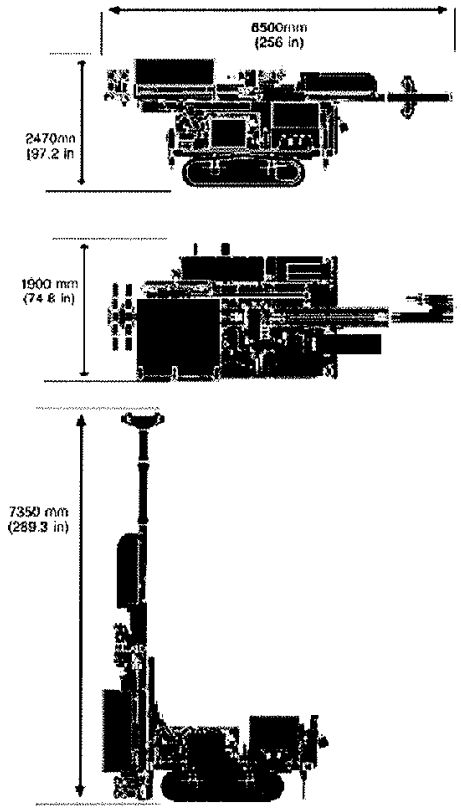
DeltaBase 520
Technical Data Sheet

TECHNICAL SPECIFICATIONS

	METRIC SYSTEM	US CUSTOMARY SYSTEM
SPT (STANDARD PENETRATION TEST) AUTO HAMMER		
Impact Rate	1-30 bpm	
Travel Length	762 mm	30 in
Hammer Weigth	63,5 kg	140 lb
CENTRALIZER - ROD GUIDE		
Exchangable Inserts for Rods	76, 89, 114, 127, 140, 168, 193, 220 mm (Choose required sizes)	
OIL LINE LUBRICATOR FOR DTH DRILLING		
Oil Tank Capacity	20 l	5.3 gal
HIGH TEMPERATURE OIL COOLER		
Upgraded oil cooler for ambient temperature over 35^0 C (95^0 F)		
NIGHT LIGHTS		
No. of Pieces	4	
JAW BODY FOR CLAMP AND BREAK OUT FOR CORING		
Jaw Plates for Coring	BQ / BW	
(choose required sizes)	NQ / NW	
	HQ / HW	
	PW	
MIST PUMP		
Flow	30 l/min	8 gpm
Pressure	200 bar	2900 psi
ACCESSORIES		
Auxiliary Work Vice	180 mm wide, 220 mm long, 120 mm deep clamp, rotating mounting base and separate rod support work bracket	
Remote Control	Radio remote control for driving	
Auxiliary Diesel Filling Pump	Electric powered diesel filling pump	
Data Logger Couplings	3 Couplings for data logger (feed pressure, rpm, mud pump pressure)	
Instrument Vandal Covers	Lockable covers for control panels and instruments	
Rubber Crawler Pads	Full set (76 pcs)	
Tool Box	With necessary set of tools for basic maintenance and lubrication	
Environmental oil in hydraulic system		

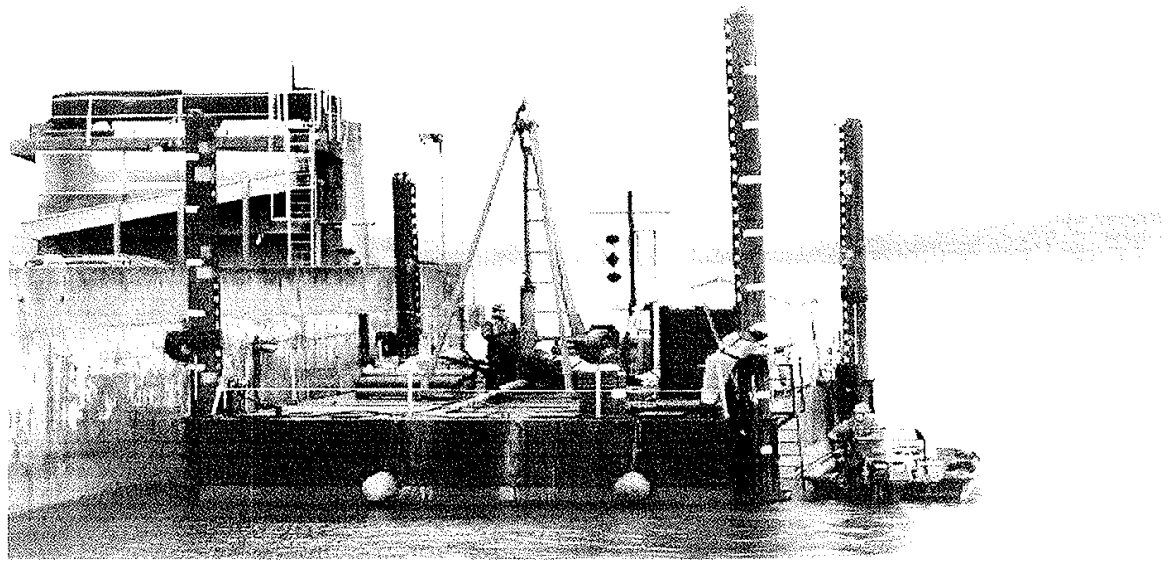
DeltaBase 520
Technical Data Sheet

DIMENSIONS AND WEIGHTS*

WEIGHT	
Operational Weight = 6500 kg (14330 lb) (approx.) Dry Weigth = 6200 kg (13670 lb)	Consisting of: Diesel Power Unit Group DEUTZ D914L04 4.10 litre 4 cylinder Hydraulic Module Main Winch c/w Cable Hydraulic Mast Raising (Independent) Lower Mast Assembly Levelling Jacks (Hydraulic) Rotary Head Crawler - triple grouser type Battery Foot Clamp and Breaking Clamp
MEASUREMENTS	
UNDERCARRIAGE Width = 1900 mm (74.8 in) Pad width = 300 mm (11.8 in) Weight = 1035 kg (2280 lb) SPT Hammer weight = 63,5 kg (140 lb) Drop stroke = 760 mm Total weight = 180 kg (397 lb)	

* Dimensions and weights may vary depending on options and should be checked before starting an operation.

JACK UP BARGE



The typical pontoon may be made up of 2 main saddle pontoons with two more floatation tanks and a bridge that joins all together which gives a working deck area of 67 sq.m. With 4 x 18m spud legs this allows it to work in depths of up to 15 metres. Twin rams on each leg give a stroke of 1.53 metres and this can give a payload of up to 13 tons. The Hydraulics is worked by two power packs which provide maximum reliability and rapid movement of the rams.

Dimensions & Specifications:

Deck Area	11m x 6m
Moulded Depth	2m
Legs	4 x 18m
Rams	Two per leg 1.53m stroke
Power pack	Twin Diesel with twin pump
Deck Load	12 tones approx.
Total Buoyancy	15 tons
Year Built	1999 (refurbished in 2008)
Dead Weight	26 tons with legs