January 2024

Assessment of Impact on the Maritime Usage Report – Volume 1

Navigation Maintenance Dredging 2026-2033

On behalf of

Port of Waterford

MALONE O'REGAN ENVIRONMENTAL

QUALITY
I.S. EN ISO 9001:2015
NSAI Certified

MALONE O'REGAN

Form ES - 04

MALONE O'REGAN ENVIRONMENTAL

[redacted]

Title: Assessment of Impact on the Maritime Usage Report – Volume 1, Navigation Maintenance Dredging 2026-2033, Port of Waterford

Job Number: E2042

Prepared By: [redacted] **Signed:** [redacted] _____

Checked By: **Signed:** _____

Approved By: **Signed:** _____

Revision Record

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
01	31/01/24	ER Report – Vol 1	FINAL	AK	KOR	KOR

Assessment of Impact on the Maritime Usage Report – Volume 1
Navigation Maintenance Dredging 2026-2033
Port of Waterford

Contents

FIGURES

TABLES

APPENDICES

Volume 2:

Appendix A: Dredging Area Drawing

Appendix B: 2023 Sediment Test Results

Appendix C: Proposed Maintenance Dredging Dry Tonnages

Appendix D: Licensed Disposal Site Drawing

Appendix E: Consultation Responses

Volume 3:

Appendix F: Benthic Assessment of Disposal Site

Appendix F-1: Disposal Site Photographic and Visual Survey (August 1996)

Appendix F-2: Disposal Site Photographic and Visual Survey (November 1996)

Appendix F-3: Disposal Site Photographic Survey (January 1999)

Appendix F-4: Marine Sediment and Benthic Studies (November 2017)

Appendix F-5: Disposal Site Photographic Survey (September 2020)

Volume 4:

Appendix G: Modelling of Waterford Estuary and Maintenance Dredging Operations

Appendix G-1: Port of Waterford: Dredge Disposal Numerical modelling of disposal plumes (ABPmer, 2023)

Appendix G-2: Waterford Estuary: Plough Assessment (ABPmer, 2017)

Appendix G-3: Dredging of Duncannon Bar (Delft, 2000)

Appendix G-4: Dredging of Suir and Barrow Rivers (Delft, 2001)

1 INTRODUCTION

Malone O'Regan Environmental (MOR) have been commissioned by the Port of Waterford ('the Applicant') to undertake an Assessment of the Impact on the Maritime Usage Report (AIMU) in respect of ongoing maintenance dredging and disposal activities and for slightly extended areas of dredging at Cheekpoint Lower Bar, Cheekpoint Harbour and O'Brien's Quay ('the Proposed Dredging Activities') in the Middle Suir Estuary, Lower Suir Estuary, Barrow-Suir-Nore Estuary and Waterford Harbour ('the Waterford Estuary') (OS ITM 668819 612137). This report comprises of 4No. volumes with the main report presented in Volume 1, with the supporting appendices presented in Volume 2, Volume 3 and Volume 4.

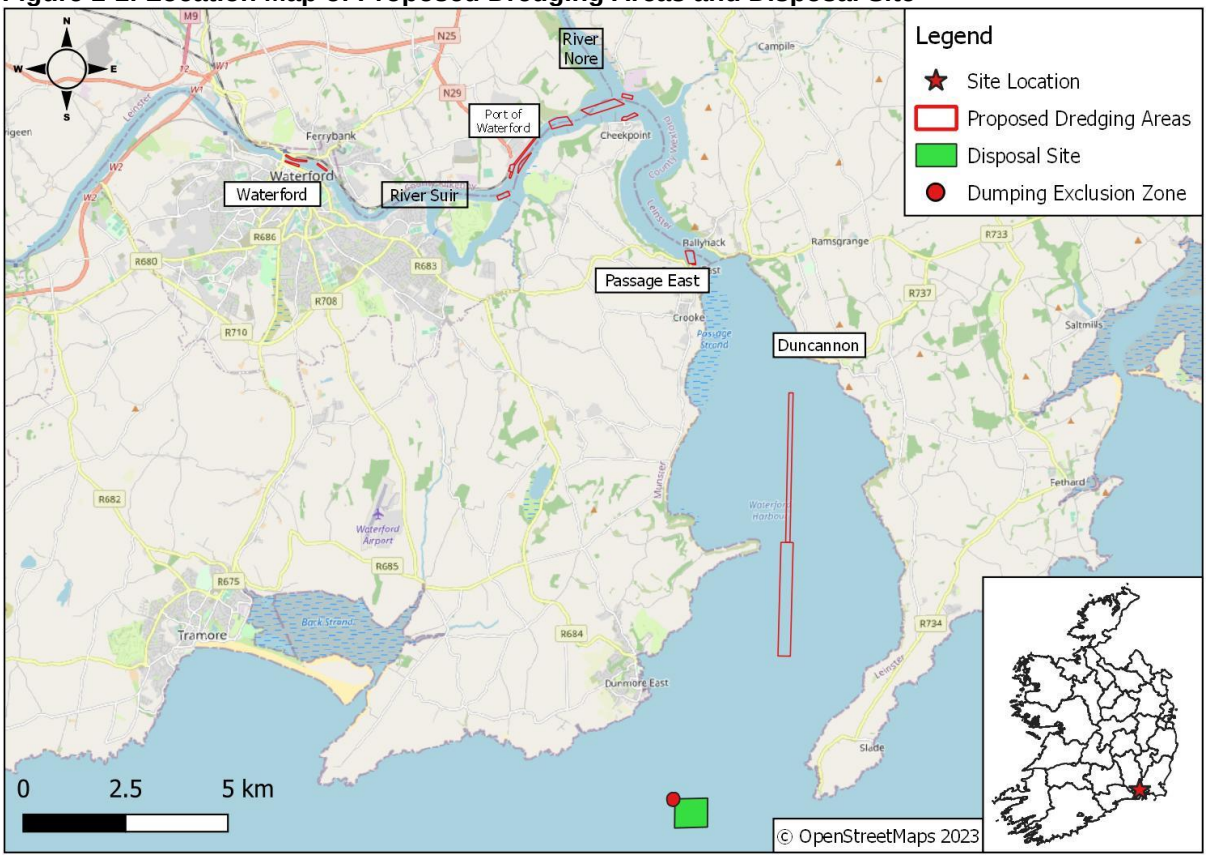
This report has been prepared in support of a Dumping at Sea (DaS) Permit application to be submitted to the Environmental Protection Agency (EPA) and a licence application to be submitted to the Maritime Area Regulatory Authority (MARA) for a Licence to Carry Out Specified Maritime Usages in the Maritime Area under the Maritime Area Planning Act (2021) ('Maritime Licence').

This AIMU has been prepared due to the fact that routine maintenance dredging applications are not listed activities in Annex I or Annex II of the EIA Directive (Directive 2011/92/EU as amended by Directive 2014/52/EU), and therefore, an Environmental Impact Assessment Report (EIAR) is not required.

This AIMU includes environmental appraisal of the Proposed Dredging Activities on each relevant area of potential environmental impact and proposed mitigation measures to deal with any negative effects (if required).

This report has been prepared to provide the Competent Authority with the relevant information to allow them to make an informed decision of the potential impact of the Proposed Dredging Activities on the receiving environment.

Figure 1-1: Location Map of Proposed Dredging Areas and Disposal Site



1.1 Need for the Project

The Port of Waterford is a key port for shipping to and from the south-east of Ireland. The location of the Port of Waterford means that it is Ireland's closest multi-model port to mainland Europe and has transport links with Ireland's major cities.

The Port of Waterford currently comprises some 960m of marginal quays at Belview and 280m of layby quay at Waterford City centre, the Frank Cassin Wharf, currently used for cruise vessels on an occasional basis. The Port of Waterford has an area of 265 hectares (ha) designated 'Belview Port Zone' that includes open and covered storage areas and warehouses. The Port of Waterford current operations focus on bulk, general cargoes and container handling through its licenced stevedores. The Port can accommodate large vessels, with ships drafts of up to 9m and lengths of up to 190m.

The Port of Waterford is designated as a Port of National Significance (Tier 2) within the terms of the National Ports Policy as it is responsible for at least 2.5% of overall tonnage through Irish ports, has clear demonstrable potential to handle higher volumes of unitised traffic, and has the existing transport links to serve a wider, national marketplace beyond their immediate region. The Port of Waterford is the fifth largest of the State commercial ports in terms of total tonnage handled and the facilities are considered an infrastructure asset of national importance. The Southern Assembly Regional Spatial and Economic Strategy (RSES) supports the development of the port as a major international gateway and its achievement of Tier 1 status.

The Waterford Estuary, located in southeast Ireland, is a semi-enclosed coastal water body open to sea through an entrance ca. 4.25km wide between Hook Head and Dunmore East. Just north of the mouth of the estuary is Creadan Head, in which a series of beaches and tidal flats are located and extend north to Passage East. The water surface area covers approximately 80km^2, being for the most part relatively shallow riverine sections, however, a series of deep pockets occur within Waterford Estuary. Two major rivers join into the Waterford Estuary, the River Suir and the River Barrow. These rivers are both influenced by the tidal cycle within the estuary. The River Suir is tidal ca. 60km upstream from the entrance at Hook Head. The River Barrow and the River Nore, which is linked to the River Barrow, are both tidal for ca. 55km to St. Mullins on the River Barrow and to Inistioge on the River Nore.

The Port of Waterford's authority limits extends 6.5km south of a line between Hook Head and Falskirt Rock, encompassing the majority of the estuary. The Port's waterway consists of a primary navigational channel, to the main terminal at Belview, for the safe transit of trade vessel.

The estuary is extremely complex and dynamic in its sediment movement and because of this sedimentation is highly variable. However, ABPmer have undertaken extensive modelling of the sediment movement within the estuary and therefore, the general sediment movements are predicable within the estuary. Sedimentation in the upper estuary is dominated by the tides, with greater sedimentation during a spring tide, due to the greater amount of energy present. Flood tides transport sediment up the estuary in the water column or as bed load. However, the majority of the ebb tide flows are not strong enough to keep the material in suspension and push the sediment back down the estuary. Therefore, the sediment accumulates in the areas of lowest velocity. The outer estuary sedimentation is primarily storm driven and thus variable.

Overall, the navigation channel into Port of Waterford has good water depths. However, as a result of the sediment input from storm events, the Duncannon and Cheekpoint sand bars, and the ongoing maintenance of the berths at Belview, regular dredging is required to ensure of the navigation channel remains fit for purpose and safe to use.

1.2 Supporting Documentation

In support of the applications, a number of environmental assessments were undertaken and are referred to within this document. These reports include:

- Benthic Survey Report;
- Fish Report;
- Aquaculture Assessment Report;
- Underwater Archaeological Impact Assessment;
- Appropriate Assessment - Stage 2: Nauta Impact Statement (NIS);
- Supporting Information for Screening Appropriate Assessment (SISAA);
- Annex IV Species Risk Assessment; and,
- Review and Analysis of the Turbidity Data Before & During the Plough Dredging Campaign of Early 2023.

These separate reports and the further information provided in the attached appendices should be read in conjunction with this AIMU report.

1.3 Scope of this Report

The following topics have been considered in this AIMU:

- Biodiversity (Flora and Fauna);
- Water Quality;
- Aquaculture;
- Soils, Geology and Hydrogeology;
- Air Quality;
- Climate;
- Noise;
- Cultural Heritage;
- Population and Human Health;
- Landscape and Visual; and,
- Material Assets – Waste.

2 PROPOSED DREDEGING DETAILS

2.1 Proposed Dredging Areas

In total there are 16No. areas that are included in these applications ('Proposed Dredging Areas'). This includes 3No. locations known as 'Primary Dredge Areas' that experience a high degree of sedimentation and therefore, over time, trigger the requirement for a maintenance dredging campaign to be undertaken. The Primary Dredge Areas therefore require dredging at least twice a year and these include Belview Berths, Cheekpoint Lower, and Duncannon Channel. There are also 13No. that require less frequent dredging (referred to as 'Secondary Dredge Areas'). The areas to be included in the forthcoming application may be broken down as presented below in Table 2-1 and Figure 2-1, and illustrated in Appendix A.

The Proposed Dredging Activities includes primarily areas directly related to trade vessels (berths) and access to the Port of Waterford (navigational channel); however, it also includes areas that are maintained for smaller harbour users, such as Cheekpoint Harbour, which is a community harbour facilitating local fishing and recreational vessels. It is considered unlikely that the responsible parties for each of these areas would have the resources required to seek a permit / licence individually. Whilst areas such as these are not the responsibility of the Port of Waterford, the Port recognises their importance to minor businesses and the general public and is happy to collaborate with them to ensure the licencing of the maintenance activities of the Waterford Estuary as a whole is streamlined.

It should be noted that 13No. of the areas included in this application are the same size and location as those previously authorised under previous permits held by the Port of Waterford. However, there are 3No. areas of slightly extended dredging and/or ploughing of ca. 9.97ha that the Port of Waterford are seeking, which will include:

- Cheekpoint Lower Bar: The Cheekpoint Lower Bar forms at the confluence of the River Suir and the River Barrow, which is a highly dynamic area and has the highest rate of sedimentation within the estuary. This sedimentation builds across the Port's navigational channel over time, resulting in reduced water depths. This area has been dredged and ploughed for decades to counteract this natural process and maintain the required level of navigation safety/access; however, since 2019, ploughing has been undertaken more regularly at Cheekpoint Lower Bar. Ploughing has been undertaken during each spring tide as, after significant onsite assessments, this is when the sedimentation rate is highest due to increased tidal energy being present. Background turbidity levels are also naturally high during spring tides. Ploughing during spring tides prevents sediment from consolidating in the area as it keeps fluid material moving on the tides. Effectively this methodology is prevention rather than cure. This method has been successful over the past 2No. years, reducing the Port's dredging campaigns, using a trailing suction hopper dredger, from 3No. per year to 2No. per year whilst maintaining a higher standard of navigation channel through this area. However, a by-product of this activity is a build-up of material at the outer extents of the licensed dredge box, which has resulted in 2No. ridges at either end on the limit/outside of the licensed area. Therefore, the extension will allow the plough to work in longer trails and utilise the deep scour depressions on either side of the bar area to prevent this build-up;
- Cheekpoint Harbour to maintain local access to the community jetty;
- O'Brien's Quay to prevent sedimentation at this berth. The previously licensed area matched the confines of the declared berth; however, this has hindered the extent of maintenance dredging works that can be undertaken, as the plough / draghead must be lifted before the end of the berth is reached. Which has resulted in sedimentation at the upstream end due to the slope that has formed. Therefore, the extension will

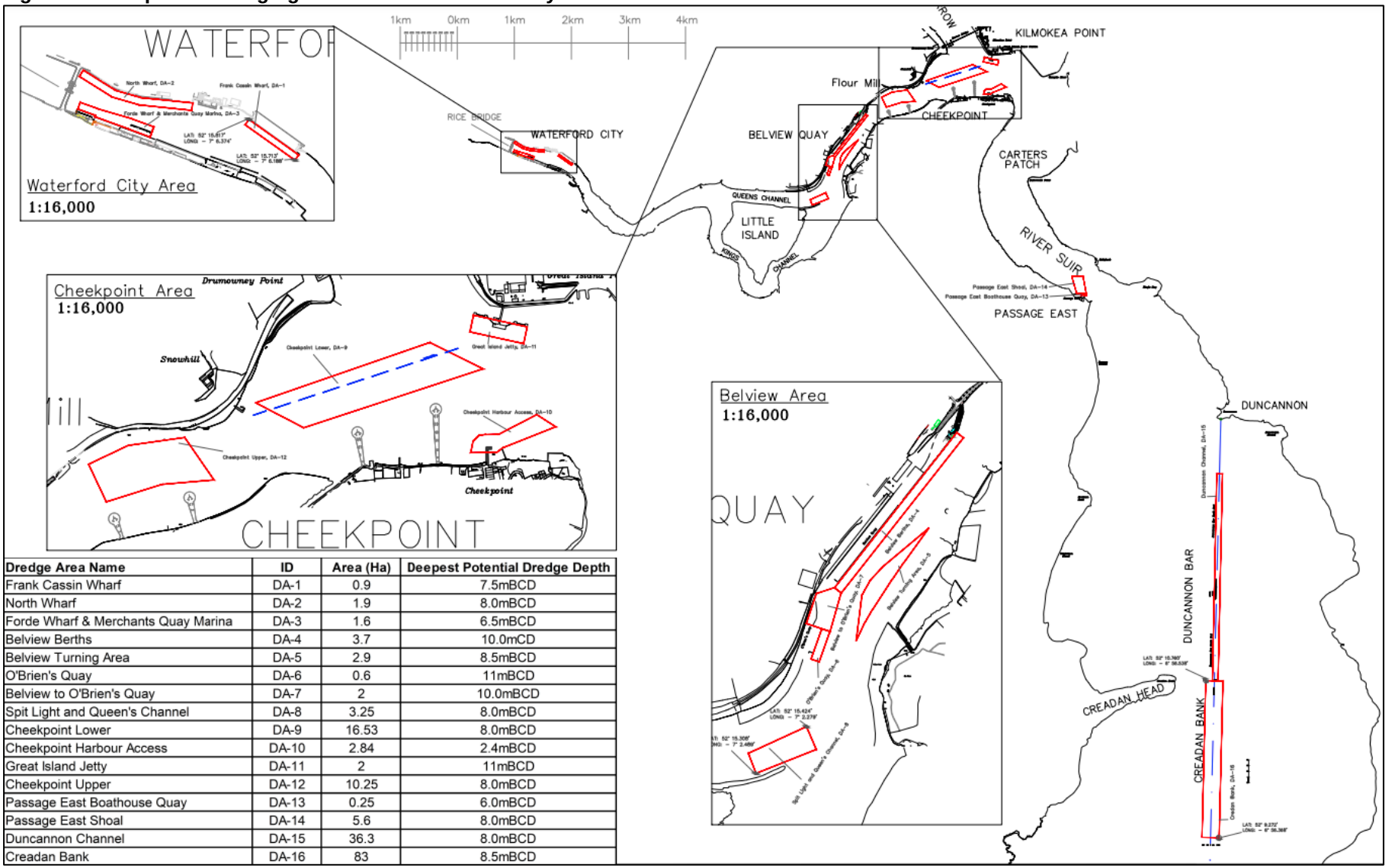
extend the licensed area upstream by 30m to ensure the plough / dredger can operate efficiently and maintain the entire area of the berth adequately.

Further information on these extended areas for plough dredging is discussed below.

Table 2-1: Proposed Dredging Areas to be Maintained by Port of Waterford (Note: grey shaded rows indicate proposed extended areas)

Dredging Areas	Dredge Area Name	Current Permitted Area (ha)	2026-2033 Area (ha)
Primary Dredge Areas	Duncannon Channel	36.0	36.0
	Cheekpoint Lower	8.4	16.53
	Belview Berths	3.7	3.7
Secondary Dredge Areas	Belview Turning Area	2.9	2.9
	Belview to O'Brien's Quay	2.0	2.0
	Cheekpoint Harbour Access	0.8	2.84
	Cheekpoint Upper	10.3	10.3
	Creadan Bank	83.0	83.0
	Frank Cassin Wharf	0.9	0.9
	Forde Wharf & Merchants Quay Marina	1.6	1.6
	Great Island Jetty	2.0	2.0
	North Wharf	1.9	1.6
	O'Brien's Quay	0.5	0.6
	Passage East Boathouse Quay	0.3	0.3
	Passage East Shoal	5.6	5.6
	Spit Light and Queen's Channel	3.3	3.3
Total Area		**163.2**	**173.17**

Figure 2-1: Proposed Dredging Areas to be Maintained by Port of Waterford



Dredge Area Name	ID	Area (Ha)	Deepest Potential Dredge Depth
Frank Cassin Wharf	DA-1	0.9	7.5mBCD
North Wharf	DA-2	1.9	8.0mBCD
Forde Wharf & Merchants Quay Marina	DA-3	1.6	6.5mBCD
Belview Berths	DA-4	3.7	10.0mCD
Belview Turning Area	DA-5	2.9	8.5mBCD
O'Brien's Quay	DA-6	0.6	11mBCD
Belview to O'Brien's Quay	DA-7	2	10.0mBCD
Spit Light and Queen's Channel	DA-8	3.25	8.0mBCD
Cheekpoint Lower	DA-9	16.53	8.0mBCD
Cheekpoint Harbour Access	DA-10	2.84	2.4mBCD
Great Island Jetty	DA-11	2	11mBCD
Cheekpoint Upper	DA-12	10.25	8.0mBCD
Passage East Boathouse Quay	DA-13	0.25	6.0mBCD
Passage East Shoal	DA-14	5.6	8.0mBCD
Duncannon Channel	DA-15	36.3	8.0mBCD
Creadan Bank	DA-16	83	8.5mBCD

2.2 Sediment Characteristics

The Port of Waterford collected and analysed 18No. sediment samples to determine potential contamination and the physical nature of the sediment to be dredged. The samples were collected within the Waterford Estuary and the Port of Waterford commissioned the Socotec to analyse the samples. However, it should be noted that a sufficient sample could not be attained from sample location MD10 due to mussels. Therefore, only limited physical and chemical testing was completed for sample location MD10. In addition, there was not sufficient sediments obtained to undertake physical testing on samples MD4 and MD16. The Marine Institute was informed of all sampling and testing that was undertaken to facilitate their review and approval of the results and continuation of dredging activities under the current permit.

The physical composition of the material sampled is fairly consistent throughout Waterford Estuary (51% sand, 33% mud, and 16% gravel). Based on the comprehensive data set it can be concluded that the sediment to be dredged will essentially be clean sediment, comprising sand, silt and gravel. None of the samples exceeded the upper level (Level 2 Thresholds), which is the threshold of contaminant concentration above which biological effects are anticipated to occur. These results are consistent with all historical testing undertaken.

The 2023 sediment test results are provided in Appendix B.

2.3 Description of the Proposed Dredging Activities

The Applicant intends to apply for an eight year DaS permit from the EPA and a Maritime Licence from MARA to dredge and dump at sea (2026-2033 inclusive). The maintenance dredging programme will consist of:

- Dredging of approximately 823,513 wet tonnes of spoil annually to maintain the Navigation Channel;
- Disposal of the dredged material at the existing licenced offsite disposal site; and,
- 3No. areas of extended dredging and/or ploughing at Cheekpoint Lower Bar, Cheekpoint Harbour, and O'Brien's Quay.

The proposed dredging methodologies are outlined below.

2.3.1 Dredging Methodologies

The dredging methodology utilised will vary depending on the following characteristics:

- Seabed / water depth;
- Access / manoeuvring within the area;
- Sediment type;
- Volume of sediment; and,
- Timeframe for the works.

The primary dredging method will be by Trailing Suction Hopper Dredger (TSHD), supported by a bed leveller. Allowances will also be made for the utilisation of Mechanical Dredging and Plough Dredging. In some areas, multiple strategies may be required to be engaged. Descriptions of each dredging activity are provided in the sections below and Table 2-2 outlines the dredging activity proposed at each location.

Table 2-2: Proposed Dredging Activity at each Location

Dredging Areas	Dredge Area Name	Dredging Activity		
		Loading		Plough
		TSHD	Mechanical	
Primary Dredge Areas	Duncannon Channel	✓		✓
	Cheekpoint Lower	✓		✓
	Belview Berths	✓	✓	✓
Secondary Dredge Areas	Belview Turning Area	✓	✓	✓
	Belview to O'Brien's Quay	✓	✓	✓
	Cheekpoint Harbour Access	✓	✓	✓
	Cheekpoint Upper	✓		✓
	Creadan Bank	✓		✓
	Frank Cassin Wharf			✓
	Forde Wharf & Merchants Quay Marina			✓
	Great Island Jetty	✓	✓	✓
	North Wharf			✓
	O'Brien's Quay	✓	✓	✓
	Passage East Boathouse Quay	✓	✓	✓
	Passage East Shoal	✓	✓	✓
	Spit Light and Queen's Channel			✓

2.3.1.1 Trailing Suction Hopper Dredging

Due to the specific characteristics of the Port of Waterford the TSHD is the primary dredging method used to maintain the design depth of the navigational channels, and the other accessible areas of the Port's berths. The areas to be dredged will be identified regularly by hydrographic survey.

To start the dredging operations, the TSHD will sail to the area to be dredged. Once in the vicinity of its dredging area, the TSHD will lower the draghead(s) to the seabed and dredging can commence. The centrifugal dredge pump, installed inside the dredger, takes up a mixture of water and soil through the draghead, and suction pipe, and pumps the mixture into its integral hopper. The sediment will settle in the hopper and, if advantageous, only the water is discharged through an adjustable overflow system. When the draught of the vessel reaches the dredging loading mark or when circumstances do not allow for further loading, dredging will cease, and the suction pipe hoisted on deck. The dredger will fill its hopper in each of the identified dredging areas as efficiently as possible.

Upon filling its hopper, the dredger will sail to the licensed disposal site and slows to approximately one to two knots. The dredger will then open bottom doors, or split along its hull, to allow the release of its contents over several minutes. During the disposal operation the dredger is travelling at between one to two knots within the disposal area. Due to this the material is spread over the disposal site and ensures against accumulation of material within an isolated area (i.e., the centre of the disposal site). This process is repeated for each disposal operation with the master of the vessel referring to the previous disposal locations used, within the on-board tracking system, and selecting a new disposal location within the licensed area. By using as much of the disposal site as possible any impacts of excessive accumulation in one location from the disposal activity will be minimised.

This process will be continued until interim hydrographic surveys show that the required safe navigation depths required have been achieved and dredging can cease.

2.3.1.2 Plough Dredging

A plough vessel generally uses, if available, a bulldozer type plough to relocate material, although a standard open box plough can suffice on occasion. Sediment movement is achieved by towing a bottomless rectangular box shaped fabricated steel implement behind a powered vessel, usually a small workboat or tug. When used correctly, the plough is suspended at a controlled height from an A-frame mounted over the stern of the towing vessel. Height, or depth of submergence, is controlled by a deck mounted hoist winch. The cutting blade at the leading edge of the plough slices the surface sediment which is then contained within the sides and rear of the following plough until reaching an area where the bed level is lower than the suspended level of the plough, whereupon the contained sediment falls from the open bottom of the plough. The plough is then raised above the general seabed level and the towing vessel returns to the area from which sediment is to be moved and repeats the cycle.

Ploughing is also undertaken regularly at Cheekpoint Lower Bar. The Port of Waterford has invested considerable time and effort over the last number of years to study the sedimentation regime that occurs at Cheekpoint Lower Bar. This is because it is the primary dredging cost for the Port annually. From a variety of studies and observations, the Port have ascertained with confidence that sedimentation is significantly greater over spring tide periods. Sedimentation rates on the spring tide can commonly be 2 to 3 times greater than the neaps, and on occasion considerably more. Turbidity monitors in and around Cheekpoint have reflected this assertion as the spring tide energy mobilises significant amounts of sediment around the estuary generally. A hydrodynamic model developed by the Port has corroborated this hypothesis. Therefore, the decision was taken to undertake ploughing during spring tide periods to minimise the amount of sediment settling in the area while it was still fluid and unconsolidated. The premise of these operations is prevention rather than cure. Also, environmentally, ploughing on spring tides is also more attractive due to the naturally elevated background levels of suspended sediment that are present. The port has used this preventative technique over the past number of years in compliance with its current licence/permit. Furthermore, the Port is currently looking at long term solutions to try and minimise or negate the sedimentation and associated dredging requirement at Cheekpoint Lower Bar and is seeking to progress these options.

2.3.1.3 Mechanical Dredging

There is also the potential for utilisation of a mechanical dredger in some areas. These dredgers use a bucket lowered to the seabed to excavate the targeted sediment material which is then raised to the surface. However, these dredgers do not have any means of transporting the dredged sediment so ‘hopper barges’ are required to be filled and transit to the licensed disposal site. The areas that may require the use of a mechanical dredger are limited to quay walls and berths where material has been compressed and has consolidated to a degree that it cannot be removed by other methods of dredging. This option is not favoured

by the Port as it is significantly more expensive that the use of a TSHD/plough and it is only utilised as a last resort when conditions dictate the standard processes are technically unfeasible.

2.3.2 Duration and Frequency

The current licence (S0012-03) expires on the 31st December 2025 and therefore the Port of Waterford is seeking an 8-year duration Dumping at Sea Permit and Maritime Licence under MAP to run inclusively from 2026 to 2033. It is requested that the maintenance dredging required be allowed to be undertaken at any time during this period as identified by regular hydrographic survey.

Any maintenance operations will be dictated by the extent of sedimentation that has occurred in each area of the harbour. These rates can fluctuate significantly, based on inclement weather resulting in storm conditions and high rainfall. Severe sedimentation has occurred in the past after a storm event and a contingency is included to ensure that the Port can act immediately to reduce the build-up and allow trade to continue.

The existing dumping at sea permit does not allow ploughing to occur between the start of March and the end of June, with the exception of those sites at Cheekpoint where ploughing is restricted to spring tides periods only. Bed levelling is permitted to be undertaken at all times of the year. No change to this is proposed.

No adjustment to this regime is requested.

2.3.3 Volume and Tonnage

The provisional volumes/tonnages of material to be dredged, and the anticipated schedule, are outlined in Appendix C.

Dredging will be carried out on an as required basis, with a degree of over dredging to provide sedimentation capacity and maintain minimum safe navigational depths.

Similar to the current permit, it is requested that 823,513 wet tonnes are permitted to be placed at the offshore site annually from 2026 to 2033 inclusive. There has been no increase in the permitted quantity of sediment disposed of at the offshore site since the inception of the site; however, it should be noted that the EPA currently uses wet tonnes as opposed to the historic unit dry tonnes.

The maximum volume of material disposed of per day at the designated disposal site has been variable over the past 20 years, with the figure selected dependent on the size of the dredger being utilised. The most recent permit granted stipulates a maximum disposal rate per day of 69,079 wet tonnes for the offshore disposal site. No change is proposed to these levels as no negative environmental impacts have been noted during the period when these limits has been in place.

Sedimentation rates can vary considerably depending on the severity of weather conditions, river flow and prevailing wind direction. Severe sedimentation has occurred in the past after a storm event and a contingency is included to ensure that the Port of Waterford can act immediately to reduce the build-up and allow trade to continue. Therefore, further to this regular disposal activity, it is also requested that an annual contingency tonnage of 175,000 dry tonnes (equivalent to 275,463 wet tonnes) be allocated to this disposal site should extreme weather events cause an inundation of sediment.

Th contingency allowance is included in the application, as per the current permit, due to the inclusion of Creadan Bank on this application, which is located in an extremely dynamic area and represents a significant risk in extreme events. As per previous permits this allocation would only be deposited if the dredging of this material is required to maintain navigable depths, as evidenced by pre-dredge and post-dredge bathymetric surveys. The use of the contingency allowance would be subject to the prior written agreement of the Agency. This

contingency allowance is not requested as part of the regular annual tonnage as it is likely it will not be needed, and it would unnecessarily increase the annual permitted dumping tonnage. However, failure to include an allowance for inundation events would be irresponsible of the Port, considering the estuary's history of such events. The inclusion of the contingency figure means that an emergency application to the EPA would not being required for an extreme weather/inundation event when a quick response to the conditions may be required.

Under its current permit/licence, the port is permitted to plough dredge a maximum of 159,165 wet tonnes annually. No change to this tonnage is proposed.

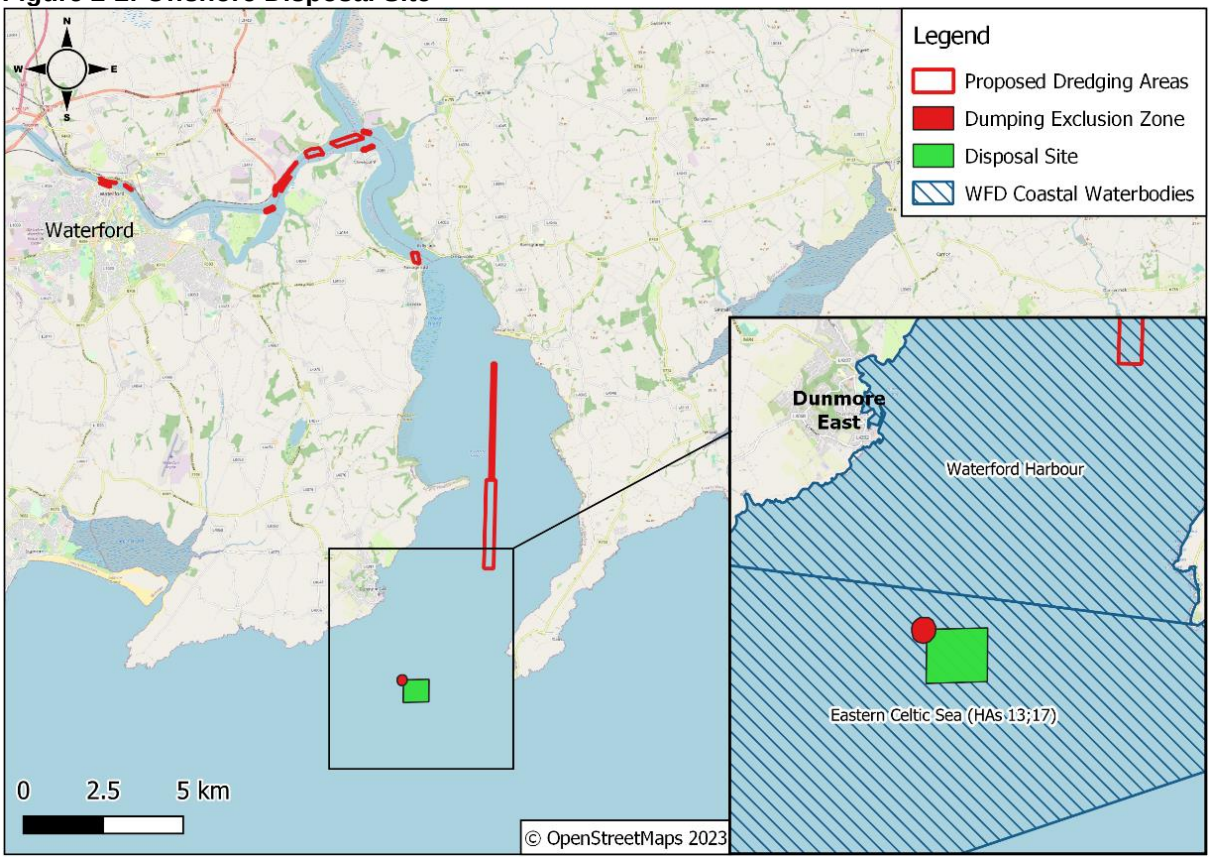
2.3.4 Offshore Disposal Site

The offshore disposal site proposed for this application has been in use since 1996. The dredging methodology, volume and local site characteristics have not changed in the intervening period, so all historical studies undertaken with respect to the disposal site and its impacts are deemed to be relevant.

The offshore disposal site is located ca. 22km south from the dredging area and ca. 2.6km southwest of Hook Head.

Figure 2-2 illustrated the location of the offshore disposal site and Appendix D.

Figure 2-2: Offshore Disposal Site



2.3.5 Assessment of Alternatives

In order to counteract the natural high sedimentation of the navigational channel, the trade and local access areas, maintenance dredging is required. As per the requirements of the Dumping at Sea Permit application, an assessment of alternatives has been undertaken and is included in Section 3 of the application.

The only current alternative to maintenance dredging activities is a 'Do Nothing' scenario. However, as discussed in Section 1.1 above the Port of Waterford is a key port for shipping to

and from the south-east of Ireland. Therefore, without maintenance dredging safe navigation through Waterford Estuary to the Port of Waterford and further upstream, would not be possible.

Furthermore, as part of this assessment of alternatives, potential alternatives to the management of dredged material have been reviewed. These potential alternatives included engineering uses, environmental enhancement uses, and agricultural and product uses. However, it is not considered feasible to utilise these alternative uses due to the fact that there is no justification for land reclamation, beach nourishment, geotubes as coastal protection, manufacturing topsoil, production of dredged aggregate, or processing the dredged material.

However, it should be noted that despite to date not identifying a suitable alternative to Dumping at Sea, the Port of Waterford has continually been involved with projects that look to find innovative solutions to dredge material management. Including projects such as the 'Civil Engineering Applications for Marine Sediments' (CEAMaS) and collaboration in a new venture entitled 'Sediment Uses as Resources In Circular And Territorial EconomieS' (SURICATES). Furthermore, the Port of Waterford continue to have ongoing communication with the local County Councils to highlight any potential project that may be suitable for collaboration on beneficial use of the dredged sediment.

Therefore, after consideration of the above assessment, it is deemed that disposal at sea, at the historic licensed offshore disposal site, is the Best Practical Environmental Option for the management of dredged material from the Port of Waterford. This is largely due to the lack of any feasible alternatives and the current offshore disposal site providing adequate performance logistically, economically and environmentally to the satisfaction of all of the stakeholders.

Despite the above finding, alternative options to disposal at sea will continue to be investigated by the Port of Waterford, with the goal of implementing the best social, economic and environmental dredge material management process possible.

2.4 Project Consultation

As part of the application process, the Port of Waterford prepared and disseminated a Consultation Document to 11No. consultees in October 2022 outlining the proposed maintenance dredging programme, the scope of works and assessments that would be undertaken and outlined likely mitigation measures that would be implemented. Responses were received from the Inland Fisheries Ireland (IFI), National Parks & Wildlife Service (NPWS) and Wexford County Council. Furthermore, a consultation meeting was held on the 1st February 2023 with the IFI and a consultation meeting with Bord Iascaigh Mhara (BIM) was held on the 10th February 2023. Please see Table 2-3 for consultation responses.

A copy of the Consultation Document and copies of all the responses received are included in Appendix E.

Table 2-3: Consultees and Consultation Responses

Consultee	Response Date	Response Method	Topics Raised
Inland Fisheries Ireland (IFI)	13/12/2022	Email	• Assessment of Alternatives; • Assessment of Annex II and Annex IV species; • Assessment on European eel (*Anguilla anguilla*); • Sediment chemistry analysis; and, • In the event of the activation of the Emergency Response Procedure or the occurrence of any incident with the potential to impact surface waters directly or indirectly, the Port of Waterford should notify IFI immediately.

Consultee	Response Date	Response Method	Topics Raised
	01/02/2022	Meeting	Consultation meeting was held on the 1st February 2023 to discuss the project and address potential concerns.
Bord Iascaigh Mhara (BIM)	10/02/2023	Meeting	Consultation meeting was held on the 10th February 2023 to discuss the project and address potential concerns.
National Parks & Wildlife Service (NPWS)	07/11/2022	Email	Stated that they were '*not in a position to offer this facility for pre-applications for licences and will review/respond, where possible, when the licence application is referred to the Department by the relevant consent authority.*'
Local Authority - Wexford	12/12/2022	Email	No significant comments to make on proposal.
Local Authority - Kilkenny	No response	N/A	N/A
Local Authority - Waterford	No response	N/A	N/A
Marine Institute	No response	N/A	N/A
Office of Public Works (OPW)	No response	N/A	N/A
Sea Fisheries Protection Authority	No response	N/A	N/A
Marine Survey Office	No response	N/A	N/A
National Monuments Service (NMS)	No response	N/A	N/A

3 PLANNING AND DEVELOPMENT

3.1 Statement of Consistency with the National Marine Planning Framework

Under the Maritime Spatial Planning Directive (2014/89/EU), all coastal EU Member States must prepare a maritime spatial plan, and in Ireland this plan is referred to as the National Marine Planning Framework (NMPF) [1]. The NMPF applies to the maritime area around Ireland and provides objectives, policies and visions for all marine-based activities and how these activities interact with one another. All applications for activity or development in Ireland's maritime area are considered in terms of their consistency with the objectives of the plan.

The objectives of the NMPF outlined in Section 18 '*Ports, Harbours, and Shipping'* [1] are as follows:

- *'Safeguard the operation of ports as key actors in the economic wellbeing of the State through the provision of safe and sustainable maritime transport.*
- *Facilitate a competitive and effective market for maritime transport services.*
- *Sustainable development of the ports sector and full realisation of the National Ports Policy with a view to providing adequate capacity to meet present and future demand, and to adapt to the consequences of climate change.*
- *Ensure that the strategic development requirements of Tier 1 and Tier 2 Ports, ports of regional significance, and smaller harbours are appropriately addressed in regional and local marine planning policy.'*

Furthermore, Policy 7 of Section 18 relates to specifically to maintenance dredging activities:

Ports, Harbours and Shipping Policy 7

Proposals for maintenance dredging activity will be supported where:

- *relevant decisions by competent authorities incorporate the outcome of statutory environmental assessment processes, as well as necessary compliance assessments associated with authorisations, including in relation to the planning process;*
- *there will be no significant adverse impact on marine activities or uses or the maritime area. Any potential adverse impact will be, in order of preference, avoided, minimised or mitigated;*
- *dredged waste is managed in accordance with internationally agreed hierarchy of waste management options for sea disposal;*
- *if disposing of dredged material at sea, existing registered disposal sites are used, in preference to new disposal sites; and*
- *where they contribute to the policies and objectives of this NMPF.*

The Port of Waterford Company is a commercial state body that is responsible for developing the Port of Waterford. The Port of Waterford is Ireland's closest multi-model port to mainland Europe and is a key port for shipping to and from the south-east of Ireland.

The Port of Waterford currently comprises some 960m of marginal quays at Belview and 280m of layby quay at Waterford City centre, the Frank Cassin Wharf, currently used for cruise vessels on an occasional basis. The Port of Waterford has an area of 265 hectares (ha) designated 'Belview Port Zone' that includes open and covered storage areas and warehouses. The Port of Waterford current operations focus on bulk, general cargoes and container handling through its licenced stevedores. The Port can accommodate large vessels, with ships drafts of up to 9m and lengths of up to 190m.

The Port of Waterford is designated as a Port of National Significance (Tier 2) within the terms of the National Ports Policy as it is responsible for at least 2.5% of overall tonnage through Irish ports, has clear demonstrable potential to handle higher volumes of unitised traffic, and has the existing transport links to serve a wider, national marketplace beyond their immediate region. The Port of Waterford is the fifth largest of the State commercial ports in terms of total tonnage handled and the facilities are considered an infrastructure asset of national importance. The Southern Assembly Regional Spatial and Economic Strategy (RSES) supports the development of the port as a major international gateway and its achievement of Tier 1 status.

Maintenance dredging within the Waterford Estuary will ensure safe navigational depths, which in turn will ensure the continuation of operations at the Port of Waterford.

Furthermore, this report has been prepared to assess the potential environmental impacts on environmental receptors and provides suitable mitigation measures, where necessary, to ensure there are no adverse effects on environmental receptors.

In addition, an Assessment of Alternatives has been undertaken as outlined in Section 2.3.5. This assessment outlines the potential disposal options for the dredged material and concludes that the disposal at sea within the existing offshore disposal site, which has been in use for decades, is the best practicable environmental option for this material.

Therefore, it is considered that the maintenance dredging works are fully consistent with the objectives of the NMPF and contributes towards the policies and objectives of the framework.

3.2 Water Framework Directive

The Water Framework Directive (WFD) (2000/60/EC) establishes a framework for the protection, improvement and sustainable use of all water environments. According to the WFD, the purpose of the WFD is to:

> *'establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater which;*
>
> *(a) prevents further deterioration and protects and enhances the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems;*
>
> *(b) promotes sustainable water use based on a long-term protection of available water resources;*
>
> *(c) aims at enhanced protection and improvement of the aquatic environment, inter alia, through specific measures for the progressive reduction of discharges, emissions and losses of priority substances and the cessation or phasing-out of discharges, emissions and losses of the priority hazardous substances;*
>
> *(d) ensures the progressive reduction of pollution of groundwater and prevents its further pollution, and*
>
> *(e) contributes to mitigating the effects of floods and droughts.'*

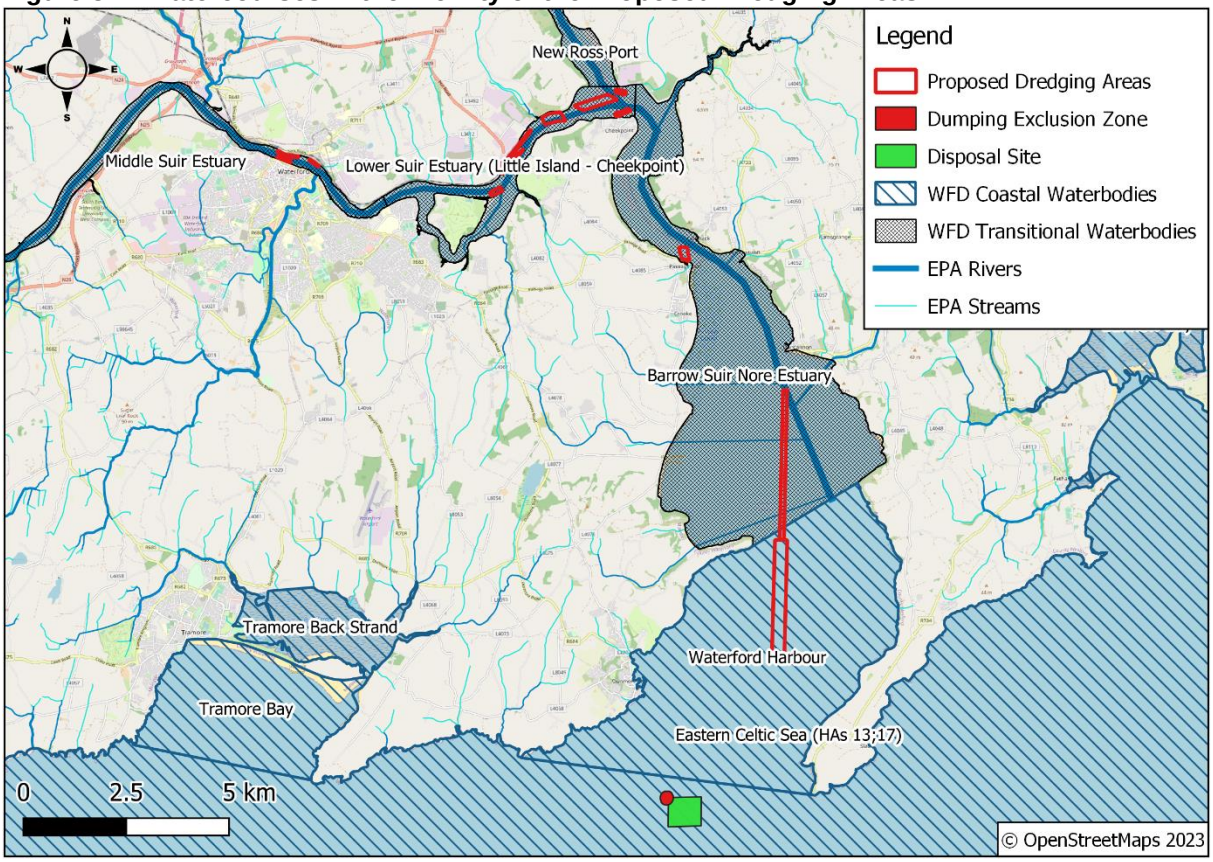
The WFD requires all EU Member States to achieve '*good*' water quality status in all surface and ground waterbodies by 2027.

To establish the current and future objectives of a waterbodies WFD status, each water body is incorporated into a river basin management plan (RBMP). The Draft River Basin Management Plan (DRBMP) 2022-2027 was published for Public Consultation on the 27th September 2021 [2]. The DRBMP outline the status of the waterbodies and measures required for the waterbodies to achieve and maintain good status. The RBMP's are implemented and reviewed in six-year cycles, the DRBMP is the third cycle currently undergoing consultation.

According to the WFD, any new development should cause '*no deterioration'* to the WFD status of a waterbody.

The dredging areas are located within 4No. watercourses the Middle Suir Estuary, Lower Suir Estuary, Barrow Suir Nore Estuary and Waterford Harbour. The disposal site is located within the Eastern Celtic Sea (see Figure 3-1).

Figure 3-1: Watercourses in the Vicinity of the Proposed Dredging Areas



Information on these watercourses/ waterbodies are provided below:

1. Middle Suir Estuary

The Proposed Dredging Areas of North Wharf, Frank Cassin Wharf and Forde Wharf and Merchants Quay Marina are located within the River Suir known as the Middle Suir Estuary by the EPA. This river flows in a northeast direction for ca. 2.2km and then transitions into the Lower Suir Estuary. The watercourse is designated as part of the Lower River Suir SAC.

This watercourse then flows south into the Waterford Harbour ca. 20.5km downstream and then the Eastern Celtic Sea a further ca. 6.5km downstream. The Proposed Dredging Areas are 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. 8km downstream.

2. Lower Suir Estuary

The dredging sites Spit Light and Queen's Channel, O'Brien's Quay, Belview to O'Brien's Quay, Belview Berths, Belview Turning Area, Cheekpoint Upper, Cheekpoint Lower, Great Island Jetty and Cheekpoint Harbour Access are located within the River Suir known as the Lower Suir Estuary by the EPA [16]. This river flows in a northeast direction for ca. 3.6km and then converges with the River Barrow and forms the Barrow Suir Nore Estuary according to the EPA. The watercourse is designated as part of the Lower River Suir SAC.

This watercourse then flows south into the Waterford Harbour ca. 15.2km downstream and then the Eastern Celtic Sea a further ca. 6.5km downstream. The Proposed Dredging Areas are located within a section of the River Suir that forms part of the Lower River Suir SAC and the River Barrow and River Nore SAC.

3. Barrow Suir Nore Estuary

The dredging sites Passage East Shoal, Passage East Boathouse Quay and Duncannon Channel are located within the Barrow Suir Nore Estuary. The watercourse flows in a south direction into the Waterford Harbour ca. 6.9km downstream and then the Eastern Celtic Sea a further ca 6.5km downstream. The Proposed Dredging Areas are located within the River Barrow and River Nore SAC.

4. Waterford Harbour

The Creadan Bank dredging area is located within the Waterford Harbour. The Waterford Harbour flows south into the Eastern Celtic Sea ca 6.5km downstream. The Proposed Dredging Area is located within the River Barrow and River Nore SAC.

5. The Eastern Celtic Sea

The disposal site is located within the Eastern Celtic Sea ca. 2.6km southwest from Hook Head.

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 [3]. 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 have '*moderate'* water quality and to be considered '*at risk'* [3]. The Eastern Celtic Sea is considered to have '*high'* water quality and is considered '*not at risk'* [3].

An assessment on water quality has been undertaken as part of this AIMU (see 5.2), and it can be concluded that the proposed works is not likely to cause a significant impact on the receiving waterbody or cause a deterioration in the WFD status of the receiving waterbody or jeopardise the waterbody from attaining '*Good'* status.

3.3 Marine Strategy Framework Directive

The Marine Strategy Framework Directive (MSFD) (2008/56/EC) was established to protect the marine ecosystem and biodiversity. The aims of the MSFD are to achieve '*good environmental status*' (GES) for all marine waters in Europe and to provide an ecosystem-based approach to human activities that enables a sustainable use of marine resources. The Irish Maritime Area that is covered by the MSFD measures to ca. 488,762km^2 [4].

GES is defined as '*the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive within their intrinsic conditions, and the use of the marine environment is at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations*.'

The MSFD is implemented in 6-year cycles. Ireland is currently on the final stage of the second cycle, and the public consultation of Ireland's MSFD – Marine Strategy Part 3: Programme of Measures was published on the 7th March 2022 [5]. The MSFD outlines the status of the marine environment, including a description of GES, develops environmental targets and associated indications (Marine Strategy Part 1), develops monitoring programmes (Marine Strategy Part 2) and put in place a programme of measures (Marine Strategy Part 3).

The determination of GES is based on 11No. qualitative descriptors that cover a range of pressures on, and the state of, the marine environment, see Table 3-1 [4].

Table 3-1: Qualitative Descriptors for Determining GES (from MSFD Annex I)

Label	Common Name	MSFD Annex I
D1	Biodiversity	Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions.
D2	Non-indigenous species	Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems.
D3	Commercial fish and shellfish	Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.
D4	Food webs	All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity.
D5	Eutrophication	Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters.
D6	Sea-floor integrity	Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.
D7	Hydrographical conditions	Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems.
D8	Contaminants	Concentrations of contaminants are at levels not giving rise to pollution effects.
D9	Contaminants in seafood	Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards.
D10	Marine Litter	Properties and quantities of marine litter do not cause harm to the coastal and marine environment.
D11	Energy, including underwater noise	Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.

The MSFD cycle 1 reported initiatives/measures to ensure Ireland's marine environment reaches the environmental targets, 2No. of which relate dredging (see Table 3-2 below).

Table 3-2: Annex I. Measures Reported by Ireland for the Marine Strategy Framework Directive in Cycle 1 [6]

Descriptor	Legislation/Initiative	Measure Number	Description
1, 4, 6, 7, 8	National Measures and Legislation	M149	Ensure dredging plans are incorporated into port master plans.

Descriptor	Legislation/Initiative	Measure Number	Description
1, 4, 6, 7, 8, 10	National Measures and Legislation (Marine Licencing, Regulation & Planning)	M068	Ensuring on-going implementation of guidelines for the assessment of dredged material for disposal in Irish waters, the application of the Foreshore Acts and the licensing, permitting and enforcement of activities under the Dumping at Sea Act.

This AIMU report has been prepared to assess the potential environmental impacts on environmental receptors and provides suitable mitigation measures, where necessary, to ensure there are no adverse effects on environmental receptors. In addition, detailed assessments have been undertaken on the benthic environment, fisheries and aquaculture (please refer to relevant reports).

Furthermore, all Proposed Dredging Activities will continue to be undertaken in accordance with recommended guidelines and the conditions outlined in the Dumping at Sea Permit from the EPA and the Licence to Carry Out Specified Maritime Usages in the Maritime Area under the Maritime Area Planning Act (2021) from MARA.

3.4 Environmental Impact Assessment (EIA) Directive

An EIA screening assessment has been undertaken in accordance with Schedule 5 and Schedule 7 of the Planning and Development Regulations 2001 (as amended) and takes cognisance of Directive 2014/52/EU, as it is currently interpreted, utilising the following guidance:

- Environmental Protection Agency (EPA), Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EIAR) 2022 [7].

3.4.1 Methodology

3.4.1.1 Desk Based Studies

In undertaking this EIA Screening Assessment, a detailed desk-based study was completed that included a review of the following information:

- Relevant legislation and guidance; and,
- Relevant published information pertaining to the Proposed Dredging Areas and surrounding area regarding all of the stipulated EIAR topics.

The first step in the assessment process was to examine whether the proposal is a project as understood by the Directive. Projects requiring environmental impact assessment are defined in Article 4, and set out in Annexes I and II, Schedule 5 of the Planning and Development Regulations, 2001 as amended. Section 5 of the Planning and Development Regulations 2001 (as amended) sets out the criteria for assessing whether a mandatory EIA is required for a development. It transposes Annex I and Annex II of the EU EIA directive (85/337/ECC as amended) into Irish law under Parts 1 and 2 of the Schedule.

3.4.1.2 Legislative and Regulatory Context

EIA screening requirements derive from the EIA Directive (Directive 2011/92/EU as amended by Directive 2014/52/EU). The amended EIA Directive came into force on 16th May 2017 and regulations transposing it into national legislation were signed into law on 19th July 2018 as the Planning and Development (Amendment) Act 2018 [8]. There are no changes to the prescribed project types or EIA thresholds under the amended EIA Directive 2014/52/EU. The project types and thresholds set out in the 2001-2010 Regulations remain in effect.

In order to determine whether it is required to undertake an EIA for the proposed works, the following legislation was consulted:

- The Planning and Development Regulations, 2001 (as amended) [9];
- EU Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment ('2014 EIA Directive') [10]; and,
- The Foreshore Act 1993 (as amended) [11]; and,
- The Maritime Area Planning Act 2021 [12].

In addition, the following guidance documents were reviewed:

- Interpretation of Definitions of project Categories of Annex I and II of the EIA Directive [13];
- European Commission (June 2017), Environmental Impact Assessment of Projects. Guidance on Screening [14];
- Department of the Environment, Heritage and Local Government (DEHLG), Environmental Impact Assessment (EIA) Guidelines for Consent Authorities regarding Sub-threshold Development [15];
- Environmental Protection Agency (EPA), Guidelines on the Information to be contained in Environmental Impact Assessment Reports Draft [16];
- Department of Housing, Planning, Community and Local Government (DHPCLG), Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive) - Circular 1/2017', 15th May 2017 [17]; and,
- Department of Housing, Planning and Local Government (DHPLG) Transposing Regulations (S.I. No. 296 of 2018) Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment [18].

3.4.2 EIA Screening

The requirement for EIA Screening under the EIA Directive 2011/92/EC, as amended, the Foreshore Acts and the Planning and Development Regulations 2001, as amended, is discussed below.

Article 2(a)(1) of the EIA Directive provides as follows:

> *'Member States shall adopt all measures necessary to ensure that, before development consent is given, projects likely to have significant effects on the environment by virtue, inter alia, of their nature, size or location are made subject to a requirement for development consent and an assessment regarding their effects on the environment. Those projects are defined in Article 4.'*

Article 4 provides as follows:

> *'1. Subject to Article 2(4), projects listed in Annex I shall be made subject to an assessment in accordance with Articles 5 to 10.*
>
> *2. Subject to Article 2(4), for projects listed in Annex II, Member States shall determine whether the project shall be made subject to an assessment in accordance with Articles 5 to 10. Member States shall make that determination through:*
>
> *(a) a case-by-case examination; or*
>
> *(b) thresholds or criteria set by the Member State.*
>
> *Member States may decide to apply both procedures referred to in points (a) and (b).'*

In summary, statutory EIA, and screening for EIA, are required only in relation to:

- Project types defined in Article 4 and listed in Annex I or Annex II of Council Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, as revised by Directive 2014/52/EU (EIA Directive); and / or
- The corresponding classes of project which are transposed by the Foreshore Acts 1933, as amended, and listed in Schedule 5, Parts 1 and 2 of the Planning and Development Regulations 2001, as amended (Planning Regulations).

3.4.2.1 Assessment under Schedule 5 (Mandatory EIA)

Part 1 of Schedule 5 of the Planning and Development Regulations 2001, as amended (Planning Regulations) lists the project types for which EIA is mandatory, transposing Annex I of the EIA Directive. Part 2 lists project types for which EIA is mandatory if a specified threshold is exceeded. For all other project types listed in Part 2, corresponding to Annex II, which do not exceed a threshold or for which no threshold is set, a screening analysis and determination are required.

The proposed works do not fall under the project types listed under Part 1 of Schedule 5. Accordingly, mandatory EIA, as classified under Annex I, is not required.

The maintenance dredging activities considered in this document do not constitute a project or development as listed in Part 1 or Part 2 of Schedule 5 of the Planning Regulations.

Furthermore, a separate Annex IV species Risk Assessment report, which addresses the Article 12 obligations of the European Community Habitats Directive 92/43/EEC, transposed into Irish law in Regulation 29 (1)(e)(i) of the European Communities (Birds and Natural Habitats) Regulations 2011.

Information is submitted to assist MARA in determining whether the proposed works (the subject of this licence application), either individually or in-combination with other activities, plans or projects, will have an adverse effect on the conservation status of animal species listed in Annex IV(a) to the Habitats Directive in their natural range.

3.4.2.2 EIA Screening Conclusions

Based on the findings of this EIA screening assessment it was concluded that the proposed works will not result in any likely and significant effects on the environment, therefore, an EIAR is not warranted.

4 METHODOLOGY

The assessment of effects has been undertaken in accordance with best practice, legislation and guidance notes. This approach and methodology have been adopted throughout the NSER, unless otherwise stated. Any differentiation has been outlined clearly in each specific chapter where relevant.

4.1 Assessment of the Effects – Evaluation Criteria

The evaluation of significance considers the magnitude of the change and the sensitivity of the resource or receptor. The criteria for determining the significance of impacts and the effects are set out in Figure 4-1 and Table 4-1 below, taken from EPA Guidance, *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* [7]. Definitions of impact, as outlined by the EPA, are included below and unless otherwise stated within the specific ER Chapter these definitions apply throughout this ER.

Figure 4-1: Determining Significance of Potential Effects

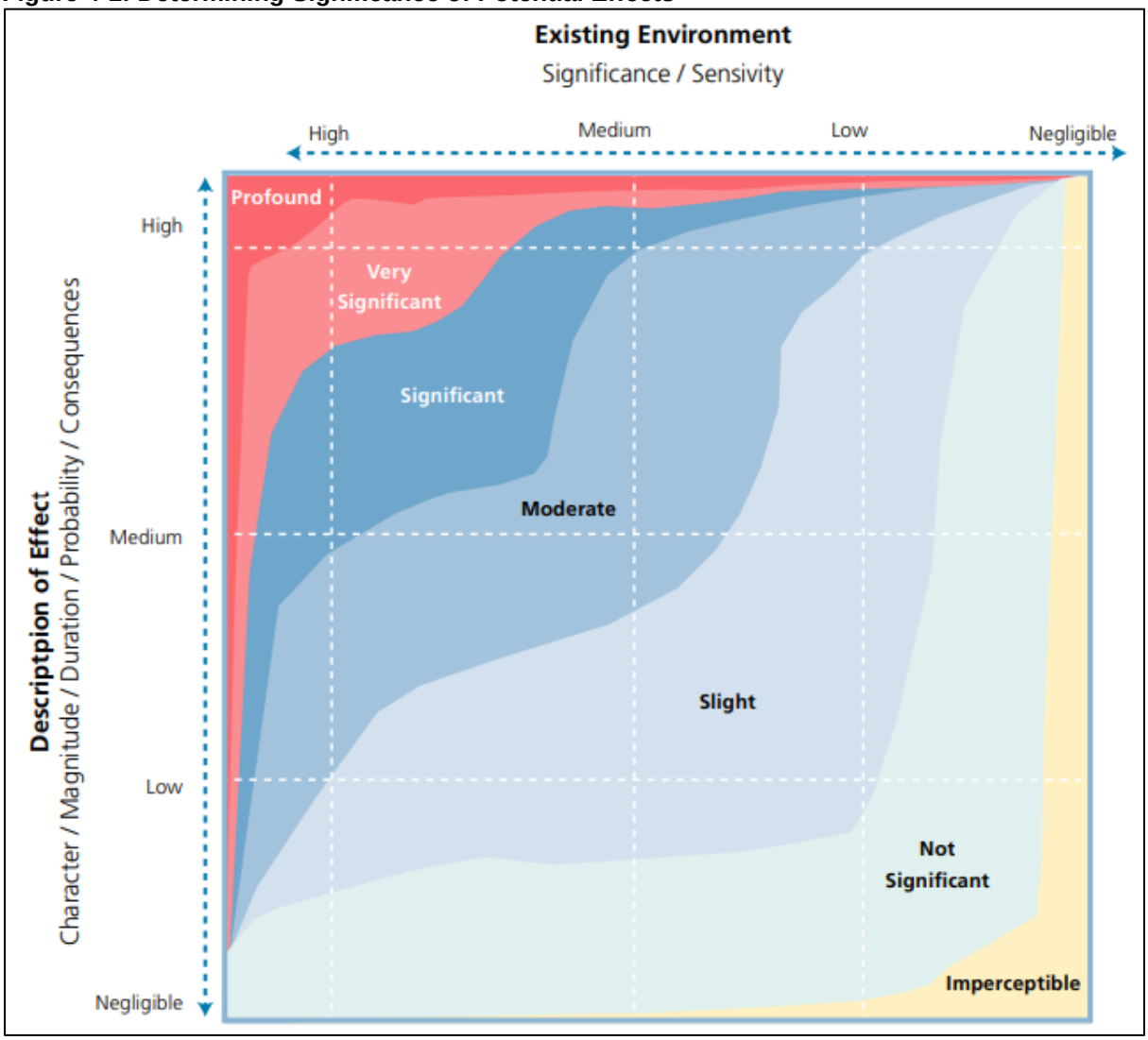


Table 4-1 defines the quality of effects from positive to negative on the environment.

Table 4-1: Quality of Effects

Type of Effect	Quality of Effect
Positive Effects	*A change which improves the quality of the environment (for example, by increasing species diversity, or improving the reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).*
Neutral Effects	*No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.*
Negative / Adverse Effects	*A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem, or damaging health or property or by causing nuisance).*

Table 4-2 outlines the definitions for significance of effect, which range from imperceptible to profound.

Table 4-2: Describing the Significance of Effects

Classification	Criteria
Imperceptible	*An effect capable of measurement but without significant consequences.*
Not Significant	*An effect which causes noticeable changes in the character of the environment but without significant consequences.*
Slight Effects	*An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.*
Moderate Effects	*An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.*
Significant Effects	*An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.*
Very Significant	*An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.*
Profound Effects	*An effect which obliterates sensitive characteristics.*

Table 4-3 describes the terminology used to discuss the extent and context of effect of a Proposed Dredging Activities on the environment.

Table 4-3: Describing the Extent and Context of Effects

Magnitude	Description
Extent	*Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.*
Context	*Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?).*

Table 4-4 shows how likely an impact is to occur.

Table 4-4: Describing Probability of Effect

Magnitude	Description
Likely Effects	*The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.*

Magnitude	Description
Unlikely Effects	*The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.*

Table 4-5 discusses the duration and frequency of effects. Momentary effects lasting from seconds to minutes will often be less concerning than a long-term and permanent effects, depending on their severity.

Table 4-5: Duration and Frequency of Effect

Magnitude	Description
Momentary Effects	*Effects lasting from seconds to minutes.*
Brief Effects	*Effects lasting less than a day.*
Temporary Effects	*Effects lasting less than a year.*
Short-term Effects	*Effects lasting one to seven years.*
Medium-term Effects	*Effects lasting seven to fifteen years.*
Long-term Effects	*Effects lasting fifteen to sixty years.*
Permanent Effects	*Effects lasting over sixty years.*
Reversible Effects	*Effects that can be undone, for example through remediation or restoration.*
Frequency of Effects	*Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually).*

Table 4-6 defines the types of effects that can potentially occur as a result of a Proposed Dredging Activities.

Table 4-6: Describing Types of Effects

Magnitude	Description
Indirect Effects (a.k.a. Secondary Effects)	*Effects on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.*
Cumulative Effects	*The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.*
'Do Nothing Effects'	*The environment as it would be in the future should the subject project not be carried out.*
`Worst case' Effects	*The effects arising from a project in the case where mitigation measures substantially fail.*
Indeterminable Effects	*When the full consequences of a change in the environment cannot be described.*
Irreversible Effects	*When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.*
Residual Effects	*The degree of environmental change that will occur after the proposed mitigation measures have taken effect.*

Magnitude	Description
Synergistic Effects	*Where the resultant effect is of greater significance than the sum of its constituents (e.g., combination of SOx and NOx to produce smog).*

The above terminology will be used throughout this report unless superseded by an environmental topic best practice in assessing NSER. Where specialist topics defer from these terms, a topic specific methodology will be provided for within the relevant chapter.

4.2 Assessment of Cumulative Impacts

Cumulative impacts refer to impacts that result from incremental changes caused by other past, present, and approved developments, and as far as practicable from reasonably foreseeable development(s), together with the Proposed Dredging Activities.

5 IMPACT ASSESSMENT

5.1 Biodiversity (Flora and Fauna)

This section of the NSER has been prepared by the MOR team to establish the baseline ecological status of the Proposed Dredging Areas and its immediate surroundings and to assess the potential impacts of the Proposed Dredging.

In addition to the NSER, a Natura Impact Statement (NIS) and Annex IV Species Risk Assessment have been prepared and will be submitted as part of this application, these reports should be read in conjunction with this AIMU.

5.1.1 Benthic Habitats

A Benthic Ecology Report has been prepared by Aquafact International Services Ltd. (APEM Group) and has been submitted as part of this licence application. This section will provide a summary of the Benthic Ecology Report; however, this report should be read in conjunction with this AIMU.

5.1.1.1 Baseline

Aquafact undertook subtidal benthic surveying at a total of 27No. sample locations ('stations') on the 23rd and 24th May 2023 within the areas around the Port of Waterford, Little Island, Cheekpoint, Passage East, and Dollar Bay, Duncannon. However, it should be noted that of the 27No. planned stations, 11No. of the sampling locations were not successfully sampled as the substrate was hard ground or cobbles. Additionally, a successful replicate faunal grab could not be collected at 6No. stations.

The subtidal and intertidal sediment samples were assessed using granulometric analysis and organic carbon analysis. The samples indicated that the sediment within the estuary is comprised of sand in the Duncannon area, gravelly muddy sand in the Passage East area, and slightly gravelly muddy sands and muddy sands in Cheekpoint.

The analysis of the faunal samples indicate that the benthic communities present at the Port of Waterford, Little Island, Cheekpoint and Passage East stations can be classified as the benthic community habitat 'muddy estuarine community complex,' which commonly occurs within the River Barrow and River Nore SAC. This community complex is present intertidally and subtidally from Cheekpoint and Great Island northward to New Ross. The substrate of this community complex is predominantly of fine material and the distinguishing species for this group are the bivalve *Scrobicularia plana* and *Macoma balthica*, the amphipod *Corophium volutator*, the polychaete *Streblospio shrubsolii* and the oligochaetes *Tubificoides pseudogaster* and *Tubificoides benedii*. These species are indicative of variable salinity community. These communities can also be classified into the JNCC biotopes SS.SMu.SMuVS.PolCvol *Polydora ciliata* and *Corophium volutator* in variable salinity infralittoral firm mud or clay (EUNIS code A5.321) and SS.SMu.SMuVS.MoMu – Infralittoral fluid mobile mud (EUNIS code: A5.324).

In addition, the faunal samples taken at in the Duncannon area were classified as belonging to another common benthic community habitat types occurring in the River Barrow and River Nore SAC namely 'fine sand with *Fabulina fabula* community.' This subtidal community is confined to the southern margin of the Estuary at the mouth of Waterford Estuary. The northern limit of this habitat is broadly delineated by a line extending from Crooke on the western side to Balinphile on the eastern side of the Waterford Estuary. The biological community is distinguished by the co-occurrence of moderately large numbers of the bivalve *Fabulina fabula* and the polychaete *Nephtys hombergii*. Also frequently present are the polychaetes *Owenia* and *Magelona filiformis* and the bivalve *Mactra stultorum*. This community can also be classified as the JNCC biotope SS.SSa.IMuSa.FfabMag – Fabulina

fabula and Magelona mirabilis with venerid bivalves and amphipods in infralittoral compacted fine muddy sand (EUNIS code A5.242).

These benthic community types have been recorded within Waterford Estuary since the characterisation of the waterbody [19] and its designation as an SAC by NPWS [20].

5.1.1.2 Impact Assessment

Potential impacts that may affect benthic communities include extraction (dredging) and siltation (both heavy siltation (30cm burial) and light siltation (5cm burial)). Therefore, sensitivity of the biotypes was reviewed for these potential impacts.

The sensitivity of SS.SMu.SMuVS.PolCvol to heavy siltation is described as 'Low.' Whereas the sensitivity to extraction (dredging) is described as 'Medium,' as dredging will remove the substrate resulting in the loss of *Polydora* tubes and *Corophium* that burrows up to 5cm deep. However, this biotope is widespread in the estuary and recolonisation will occur [21].

SS.SMu.SMuVS.MoMu and its fluid mud features are composed of high concentrations of suspended sediments in various phases of settlement, flow and resuspension. In addition, the fluid mud features of this biotope can vary in thickness from ca. 0.5m to up to 5m therefore the deposition of 5 or 30cm of fine sediment is unlikely to have a noticeable effect. This biotope is therefore classified as 'Not Sensitive' to light siltation (up to 5cm) or heavy siltation (up to 30cm) as siltation is a feature of this biotope. This biotypes sensitivity to extraction (dredging) is described as 'Low' as the fluid mud would return and be replaced within days in the neap cycle [22].

The sensitivity of SS.SSa.IMuSa.FfabMag to heavy siltation (30cm) is described as 'Medium' if siltation overburdens the sediment. However, sensitivity to lighter siltation (5cm) is 'Low' as Tellinidae bivalves can migrate through 40cm in mud or 50cm in sand. Sensitivity to extraction (dredging) is described as 'Medium' as most of the animals that occur in this biotope are shallowly buried and extraction of the sediment will remove the biological assemblage. Resilience is medium as some species may require longer than 2 years to re-establish [23].

As previously mentioned, the benthic community types identified during the 2023 survey have been recorded within Waterford Estuary since the characterisation of the waterbody [19] and its designation as an SAC by NPWS [20]. Therefore, despite the ongoing maintenance dredging and disposal activities by Port of Waterford, the biotopes have remained in a stable condition, and it can be concluded that the Proposed Dredging Activities will not negatively impact on these benthic community types within the survey areas or on the integrity of the benthic community.

5.1.1.3 Mitigation Measures

No mitigation measures are required for benthic habitats.

5.1.2 Fish

The Port of Waterford Maintenance Dredging Programme: Fish Report has been prepared by Dr [redacted] of Aztec Management Consultants and submitted as part of this application [24]. This section will provide a summary of the Fish Report; however, this report should be read in conjunction with this AIMU.

This report provides an assessment of the current status of fish in Waterford Estuary (Barrow-Nore-Suir estuary), and designated fish species in the estuary, based on best scientific knowledge and an assessment of the potential impacts of the maintenance dredging programme.

The Fish Report was prepared using information from survey work carried out by Inland Fisheries Ireland (IFI), the competent authority, as part of the National Water Framework

Directive (WFD) surveillance monitoring programme during the years 2016 and 2019 [25, 26]. The findings of these surveys formed the basis for estimating the ecological status of fish in Waterford Estuary. Other survey results used to enhance the understanding of fish species present in Waterford Estuary and their relative abundance included the results of trawl surveys throughout Waterford Estuary as part of the IFI's National Bass Conservation Programme [25, 26] and fish impingement studies carried out at Great Island thermal electricity generating station cooling water system during the years 2017, 2018, 2020, 2021, 2022 and 2023 [27, 28, 29, 30, 31].

5.1.2.1 Baseline Environment

A generalised categorisation of fish in estuaries for part or all of their lives would include:

- Marine - species that spawn at sea;
- Freshwater - species that spawn in fresh water;
- Estuarine-resident - species that complete their life cycle within the estuary; and,
- Diadromous - species that feed at sea and migrate into fresh water to spawn (anadromous*) or undergo the reverse migration (catadromous*).

  ***Note:** Anadromous species include the Atlantic salmon (*Salmo salar*) and river lamprey (*Lampetra fluviatilis*), and catadromous species include species such as the European eel (*Anguilla anguilla*).

For fish species inhabiting the Waterford Estuary for all or part of their lives, there are corresponding preferential ranges of salinity, temperature and oxygen concentrations. Varying turbidity / suspended solids levels are normal for any estuarine regime and for many species, high turbidity and high suspended solids levels facilitate their avoidance of piscivorous fish and birds.

Following a review of the WFD surveillance monitoring reports, National Bass conservation programme surveys and the fish impingement studies undertaken at Great Island CWS, a total of 49No. different fish species have been recorded in the Waterford Estuary.

It is well documented that the Waterford Estuary is designated for 5No. fish species under the River Barrow and River Nores SAC:

- Atlantic salmon (*Salmo salar*);
- Sea lamprey (*Petromyzon marinus*);
- Brook lamprey (*Lampetra planeri*);
- River lamprey (*Lampetra fluviatilis*); and,
- Twaite shad (*Alosa fallax*).

Of these species, it should be noted that brook lamprey has not been recorded within the Waterford Estuary as this species lives their entire lifecycle within freshwater habitat. A description of each species within Waterford Estuary is provided below:

Atlantic Salmon

The Atlantic salmon is an anadromous species, spawning in freshwater and migrating to sea, typically after one or more years of life in freshwater (depending on the productivity of the freshwater habitat and the temperature regime of the freshwater habitat, which can both be related to latitude) throughout its geographic range.

Atlantic salmon smolt pass seaward through Waterford Estuary rapidly, and all the available evidence on the duration of passage of Atlantic salmon through estuaries suggests that they pass through the estuary during a period lasting perhaps one to several days. Salmon smolt

passing seaward will continue feeding during their seaward migration through Waterford Estuary.

The duration of passage through the estuary of maturing adult salmon on their return migration to their natal river will depend on the flows emanating from their natal river. During droughts when there is limited freshwater flow in rivers, returning adults will have prolonged residence within the Waterford Estuary. Whereas during non-drought conditions, returning adult salmon will pass rapidly through Waterford Estuary and enter their natal river when adequate freshwater flows are available to facilitate their entry and upstream migration in their natal river.

Typically, early running multi-sea-winter (MSW) fish enter natal rivers during the spring months while one-sea-winter (1SW) and MSW summer fish will enter their natal rivers during the summer months. It should be noted that mature adults on their return migration do not feed within the estuary during their migration, therefore, it can be stated that they have very little dependency on the estuarine environment.

Sea Lamprey

The spawning adult sea lamprey migrate from the sea through Waterford Estuary and to freshwater spawning habitat during the late spring months and typically spawn in suitable shallow flowing water habitat with stony substrate during the months of May and June. The juveniles (ammocoetes) spend several years in suitable silty substrates before they transform (metamorphose), typically during the autumn months, and make their downstream migration to the sea.

These transformers have been recorded in Waterford Estuary during the November fish impingement studies at Great Island. It is believed that the transformers typically migrate through the estuary quickly and enter the open sea where they attach to suitable hosts and commence feeding on host blood and other body fluids. There is evidence that sea lamprey are disloyal to their natal river and accordingly this species can be considered to have at least regional populations from which adults ascend into suitable spawning rivers which are not necessarily their natal river to spawn and die.

River Lamprey

The spawning adult river lamprey also migrate from the sea through Waterford Estuary and to freshwater spawning during the early spring months. This species typically spawn in suitable shallow flowing water habitat with stony substrate during the months of April and May, after which they die. The juveniles (ammocoetes) spend several years before they transform (metamorphose) and make their downstream migration to the sea, typically during the spring months.

These transformers have also been recorded in Waterford Estuary during November fish impingement studies at Great Island and adults have been recorded during fish impingement studies carried out during June. However, unlike sea lamprey, river lamprey spend all their adult lives in an estuarine / coastal environment where they attach to suitable hosts and commence feeding on host blood and other body fluids. Accordingly, river lamprey are highly estuary dependent during their adult lives. There is no evidence that adults return to their natal river to spawn, and it is likely that regional populations exist which spawn in a number of local rivers which are not necessarily their natal river.

Twaite Shad

In Waterford Estuary, adult Twaite shad are known to enter the lower reaches of the River Barrow where they spawn in the vicinity of St Mullins in April and May each year. Spawning activity peaking during May and eggs will hatch in a short time afterwards. Then the young shad begin to drift into the estuary proper where conditions of relatively low salinity are experienced.

While Twaite shad is considered a diadromous species, estuarine residence time for juveniles can be prolonged. There is evidence from Waterford Estuary that fish in their first and second year of life continue to reside in the estuary. This evidence comes from WFD surveillance monitoring surveys carried out by Inland Fisheries Ireland [25, 26] and from the fish impingement studies carried out at Great Island thermal electricity generating station cooling water system [29]. The fork-length frequency distribution of Twaite shad washed off the band-screens at Great Island CWS during November 2022 confirms the presence of 0+(<13.5cm), 1+ (15.5-22.4cm) and a small number of older fish (>24.0cm) [30].

European Eel

The juveniles of this catadromous species typically arrive on Irish shores as transparent glass eels during the early winter months. Pigmentation occurs during the following spring months and a some of the survivors ascend into freshwater rivers and lakes, typically during the months of April and May. Older and larger individuals, termed bootlace eels, also migrate upstream from estuaries and the lower reaches of rivers somewhat later in the year, typically during the month of August. Those individuals which ascend into freshwater habitat typically feed and grow for a relatively long period of time depending on the productivity of the environment and the sex of the individual before maturing sexually and commencing their downstream migration to the sea and eventually to the western Atlantic Ocean where spawning occurs. Maturing males never attain total lengths exceeding about 44cm and are typically relatively young (less than about 10 years old) while maturing females typically exceed 44cm in total length and can be much older (perhaps 10-30 years in age). These maturing eels typically migrate downstream from Irish catchments during the autumn months under conditions of elevated river flow and especially during the dark of the moon. These silver eels were formally captured in commercial fisheries as they migrated downstream. Some of the rivers discharging to Waterford Estuary supported such fisheries in the past.

It is well known that a percentage of eel do not migrate upstream into freshwater habitat but remain in productive estuarine environments throughout their feeding and growing (yellow) life stage. This is the case in Waterford Estuary where significant numbers of feeding / yellow eel live throughout their lives before maturing and migrating to sea to spawn. Prior to the termination of commercial fisheries for eel in the Republic of Ireland in 2009, a number of fishermen in Waterford Estuary exploited this resource commercially using a combination of baited baskets and fyke nets. Typically, these estuary fishers used catches from flood or ebb ‘sprat weirs’ at many locations throughout Waterford Estuary is collect quantities of fish. Some of which were of marketable size but most of which were small and used as bait in the baskets. The results of the WFD surveillance monitoring surveys carried out by the IFI in 2010, 2013 and 2016 also attest to the presence of large numbers of yellow eel in Waterford Estuary [25].

The European eel is particularly abundant in Waterford Estuary and being a benthic species could be vulnerable the maintenance dredging programme. However, this species is also particularly sensitive to many environmental stimuli and would be expected to swim rapidly away from an approaching dredging operation.

Ecological Status of Fish in Waterford Estuary

These WFD surveillance monitoring survey work and other research within the Waterford Estuary have identified a wide range of fish species life stages are present in Waterford Estuary and these species represent various categories which in general relate to their level of dependency on the estuarine environment to complete their life cycles.

The WFD surveillance monitoring survey carried out during 2016 and 2019 by the IFI, the competent authority in the Republic of Ireland, concluded that the ecological status of fish in Waterford Estuary was of ‘*good’* status [25, 26]. In addition, the Barrow-Nore-Suir Complex was designated by the IFI as having ‘*good*’ status in 2022 [32].

5.1.2.2 Impact Assessment

The maintenance dredging programme in Waterford Estuary occurs in estuarine waters and has now been ongoing for many decades. Estuaries are turbid environments and frequently suspended solids levels increase from a moderate background level to higher levels depending on tidal and weather conditions.

It is considered that the potential impacts that may result from the Proposed Dredging Activities would include increased suspended solids, change / disturb the benthic habitat and benthic invertebrate food supply for fish species, alter the levels of organic matter and dissolved oxygen, increase water turbidity and potentially result in release/exposure of contaminated sediments [33]. However, the consequences of dredging on fish assemblages are often species specific and the magnitude of impacts vary among estuaries.

Teichert et al. (2016) undertook an assessment using WFD surveillance monitoring data from a total of 90No. European estuaries (including 32No. estuaries on the island of Ireland) to investigate the combined stressor impacts in estuaries on fish communities [34]. The study investigated the impact of nine stressor categories on the fish ecological status and modelled the dominant stressors and their non-linear effects, evaluated the ecological benefits expected from reducing pressure from stressors and investigated the interactions among stressors. The results of this study found that the largest restoration benefits to the ecological status of estuaries were expected when mitigating water pollution and oxygen depletion. In addition, the study found that with regards to dredging (capital dredging), their model suggested that the assessed Ecological Quality Ratio for fish in estuaries would be impacted only when very high thresholds (more than 50%) of the subtidal area of an estuary was dredged. In the case of Waterford Estuary, the Primary and Secondary dredge areas extends to 1.7km^2, which represents only 2% of the estuary at high tide.

Wenger *et al.* (2017) assessed the potential impacts of estuary dredging on fish which included the entrainment of fish with the dredged material, the removal of benthic habitat, the smothering of benthic habitat (at the dredge and disposal sites for the dredged material), the impact of temporarily high suspended solids concentration on fish and the impact of noise on fish [35]. The study assessed dredging-related stressors, including suspended sediment, contaminated sediment, hydraulic entrainment and underwater noise and how they directly influence the effect and the response elicited in fish across all aquatic ecosystems and all life-history stages. Their study found that contaminated sediment had significantly higher effect than clean sediment alone or noise effects, suggesting additive or synergistic impacts from dredging-related stressors. The early life stages such as eggs and larvae were most likely to suffer lethal impacts, while behavioural effects were more likely to occur in adult fishes. Both suspended sediment concentration and duration of exposure greatly influenced the type of fish response observed, with both higher concentrations and longer exposure durations associated with fish mortality. However, it should be noted that only clean material is dredged and disposed of as part of the ongoing maintenance dredging programme and chemistry analysis is carried out every 3No. years.

Wilber and Clarke (2001) undertook a study on the relationship between the duration of exposure of non-salmonid and estuarine fish and non-salmonid and estuarine eggs and larvae to varying concentrations of suspended solids (mg/L) and survival has shown that a wide range of suspended solids concentrations and exposure durations have no effect on fish in estuaries [36]. The study showed that increasing both the concentration and exposure time to suspended sediment increased the severity of fish response and there is a clear trend between response type, increasing concentrations and exposure to suspended sediment; however, fish have different tolerances to suspended sediment, with some species able to withstand concentrations up to 28,000 mg/L, while others experience mortality starting at 25 mg/L. Overall, the study showed that suspended solids levels under 1000 mg/L and event durations

of less than one day duration have largely no effect or only a sublethal effect on estuarine fish eggs and larvae.

In the context of the Proposed Dredging Activities and with particular reference to plough dredging, which results in higher suspended solids levels in the water column than TSHD and backhoe dredging, the 2021 turbidity assessment has shown that low mean levels of suspended solids (ca. 30-40 mg/L) occur in the vicinity of operations during periods of active dredging and during periods when dredging is not taking place [37]. Also, the duration of individual dredging events in Waterford Estuary (particularly TSHD dredging) average less than one hour. This short duration coupled with relatively low suspended solids levels indicate that the Proposed Dredging Activities are very unlikely to cause problems for fish, either in the vicinity of operations or in the greater Waterford Estuary area.

The TSHD involves the deployment of a suction head into the sediment and suction occurs only when the suction head is immersed in the sediment at the commencement and termination of individual dredging events which are less than one hour in duration. Fish are mobile animals which, depending on species, can rest on the bottom or occupy the water column at varying distances from the bottom or surface. Either way, it can be expected that fish species can swim at normal or burst speeds (typically up to seven body lengths per second) away from any sudden disturbance in their immediate vicinity. Therefore, the entrainment of fish during the TSH dredging or the backhoe dredging is therefore unlikely to be significant. In addition, with regard to the plough dredging, soil is moved but not removed and it is likely that fish on or close to the bottom will be disturbed and flee to adjacent areas to avoid the disturbance.

Any potential disturbances to fish are likely to be very localised and restricted to the immediate vicinity of operations. Noise levels associated with the maintenance dredging are considered to be insignificant compared with the noise emanating from normal ship traffic in the estuary.

The soil being moved / removed as part of the maintenance dredging programme is of recent origin, and therefore it is considered unlikely to contain material which would be detrimental to fish during the removal / resuspension process. Some temporary habitat loss will occur for fish, particularly benthic fish, but in the context of the overall dimensions of Waterford Estuary, this temporary loss of habitat is not significant.

In addition, there is indirect evidence that the ongoing maintenance dredging operations in Waterford Estuary within the vicinity of Cheekpoint Lower Bar do not affect the behaviour of fish in that general area. This evidence was noted during the Great Island CWS fish impingement studies carried in November 2022 and June 2023, there were several days during the study periods when dredging operations were also carried out [30, 31]. However, the numbers and fish species range washed off bandscreens at the Great Island CWS (approximately 400m from the dredge area) did not vary between days when dredging occurred and when no dredging was carried out. It can thus be deduced that the maintenance dredging operation did not have any measurable local effect on fish [30, 31].

Based on best available scientific research and information that has been established throughout several years of sampling fish as part of the Water Framework Directive surveillance monitoring programme in Waterford Estuary, it can be concluded that the Waterford Estuary has good ecological status with regard to fish [25, 26], and that the ecological status of fish has not previously been significantly affected. In addition, based on the assessment of potential impacts on fish in Waterford Estuary, the ecological status of fish in Waterford Estuary will not be significantly affected by the maintenance dredging programme in Waterford Estuary.

5.1.2.3 Mitigation Measures

No mitigation measures are required for fish.

5.1.3 Avifauna

5.1.3.1 Baseline

Desk-based Assessment

The Proposed Dredging Areas are not located within or immediately adjacent to areas known as sites of importance to any bird species and designated as Special Protect Areas ('SPA'), Ramsar sites, or Nature Reserves [38, 39, 40]. The nearest SPA is located ca. 5.7km east of the Proposed Dredging Areas and ca. 7.9km NW of the proposed offshore disposal area. However, the offshore disposal site is located within the boundary of the Seas off Wexford candidate SPA (cSPA). It should be noted that the period of observations for the Seas off Wexford cSPA is still open at the time of writing this report and will remain open until the 9th April 2024. Following the closure of the observation period it is possible that the boundary and / or conservation objectives of the SPA may be amended. Therefore, at the time of writing this report, the boundary and conservation objectives for this SPA used reflects the information issued by the NPWS on the 9th January 2024 [41].

Therefore, a data request was submitted on the 25th April 2023 to the Irish Wetland Bird Survey (I-WeBS), which is coordinated by BirdWatch Ireland and under contract to the National Parks and Wildlife Service (NPWS). The data request was for all available data from the I-WeBS sites within close proximity to the Proposed Dredging Areas. This included a number of subsites within the River Suir Lower site and the Waterford Harbour site:

- Belview – Little Island – Faithlegg subsite (subsite code: 0M390);
- Barrow Bridge - Passage East subsite (subsite code: 0M496); and,
- Barrow Bridge - Creadan Strand subsite (subsite code: 0M498).

The records were reviewed in order to gain an understanding into the potential assemblage of bird populations that may utilise the areas within and within the vicinity of the Proposed Dredging Areas.

The data received from BirdWatch Ireland covers a period from 2012/2013 winter season to 2021/2022 winter season. A total of 35No. species have been recorded during the 10-year period.

However, during the 2021/2022 winter season, a total of 14No. species were recorded, which included bean goose, black-headed gull, common gull, cormorant, curlew, greenshank, grey heron, greylag goose, little egret, mallard, mute swan, pink-footed goose, teal and whooper swan.

None of the species recorded in the last 10-years were recorded in numbers that would be considered of international importance. However, several species were recorded in numbers that would be considered to be of national importance, including:

- Bar-tailed godwit were recorded at numbers of national importance during the 2013/2014 season in the Waterford Harbour at Passage East - Creadan Head;
- Great crested grebe were recorded at numbers of national importance during the 2013/2014 season in the Waterford Harbour at Passage East - Creadan Head;
- Greylag geese were recorded at numbers of national importance at River Suir - Coolfinn during the 2012/2013 season;
- Greylag geese were recorded at numbers of national importance at River Suir - Derrigal – Portnascully during the 2012/2013, 2013/2014, 2014/2015, 2015/2016, 2017/2018, 2018/2019 and 2019/2020 seasons;

- Greylag geese were recorded at numbers of national importance at River Suir - Fiddown - Tibberaghny during the 2012/2013, 2015/2016, 2016/2017, 2018/2019, 2019/2020 and 2021/2022 seasons; and,
- Teal were recorded at numbers of national importance during the 2013/2014 & 2014/2015 seasons in the River Suir at Fiddown – Tibberaghny.

However, it should be noted that none of these species identified are considered to exclusively occur within this area.

Field-based Assessment

During the 2022 TSHD campaign, 2No. suitably qualified and experienced MOR ecologists undertook 2No. surveys from the dredger to assess potential disturbance responses from birds within the estuary on the 15th May 2022 and the 4th November 2022.

During these surveys, the dredging activity was taking place at the Cheekpoint Lower area and the surveys were completed during a full dredging cycle, which involved the dredger going up the estuary to the Cheekpoint Lower area, dredging and going to the offshore disposal site. The vessel was ca. 71.5m in length, had a width of 14m and had a top speed of ca. 10-11 knots.

The MOR ecologists undertook vantage point surveys from the top deck of the vessel, ca. 5-7m above the waterline. Each surveyor was located on either side of the bridge using binoculars to identify and record the responses of species. For each survey, the following characteristics were collected: date, time of day, wind (knots), sea state (Douglas sea state), sea swell (m) and visibility. The surveys were undertaken in good weather conditions and good visibility, see Table 5-1 below.

Table 5-1: Dredger Survey Metadata

Date	Timing	Wind (knots)	Sea State	Sea Swell	Visibility
15/05/2022	9:30 – 13:00	18kt	4	1-2m	Good
04/11/2022	9:00 - 11:00	6kt	1	<1m	Very Good

The methodology utilised for the surveys was an adapted methodology based on the methods developed by Jarrett *et al* (2021) [42].

The surveyors recorded all bird species viewable from the dredger. The distance at which the bird was first observed was recorded and the distance at which the bird showed any observable response to the dredger were recorded (distance was recorded as the perpendicular distance of the bird to the route of the vessel: 0–50m, 50–100m, 100–200m, 200–300m), the behaviour response (categorised as: flight, swim away, evasive dive, or no response), and the duration that the behaviour response occurred.

Overall, a total of 12No. species were recorded during the surveys. The species recorded included:

- 2No. were Green BoCCI listed non-annex species – great black-backed gull and heron;
- 5No. were Amber BoCCI listed non-annex species – black-headed gull, cormorant, gannet, herring gull and lesser black-backed gull;
- 3No. was a Red BoCCI listed non-annex species – black-tailed godwit, kittiwake and oystercatcher;
- 1No. was a Green BoCCI listed Annex I species – little egret; and,

- 1No. was a Red BoCCI listed Annex II(II) species – curlew.

The survey results of the survey are shown in Table 5-2 and Table 5-3. As described in the tables, the majority of the species did not show a response to the dredger. Numerous species (black-headed gull, cormorant, gannet, great black-backed gull, herring gull and kittiwake) were observed foraging within the areas that had recently been dredged.

Some seabirds have been known to be initially attracted to areas where increased food sources are available as a result of bottom sediments being stirred up, which include dredging operations [43]. In addition, some bird species, specifically scavenging species like gulls, have been known to be attracted to areas with low vessel speeds, similar to those associated with dredging [43, 44].

Table 5-2: Dredging Survey Results from Survey 1

BoCCI Conservation Status [45]	**Species**	***Latin Name***	**Total Number Recorded**	**Number of Individuals (No Response)**	**Number of Individuals (Response)**	**Closest Distance of Individual Recorded (m)**	**Closest Individual Recorded - Behaviour**	**Closest Individual Recorded - Response to Dredger**	**Closest Individual Recorded - Duration of Response (seconds)**
Green	Greater Black-backed Gull	*Larus marinus*	1	1	0	200-300	Roosting on water	No response	N/A
Amber	Black-headed Gull	*Larus ridibundus*	6	6	0	200-300	Foraging on intertidal mudflats	No response	N/A
	Cormorant	*Phalacrocorax carbo*	30	28	2	0-50	Foraging in areas where dredger has passed	N/A	N/A
						0-50	Roosting on old fishing pier	Flight	25 seconds
	Gannet	*Morus bassana*	1	0	1	0-50	Flying behind boat and foraging in water	N/A	N/A
	Herring Gull	*Larus argentatus*	13	0	13	0-50	Foraging in areas where dredger has passed	N/A	N/A
Red	Black-tailed Godwit	*Limosa limosa*	23	23	0	200-300	Foraging on intertidal mudflats	No response	N/A
	Kittiwake	*Rissa tridactyla*	4	4	0	0-50	Foraging in areas where dredger has passed	N/A	N/A

Figure 5-1: Dredging Survey Results from Survey 2

BoCCI Conservation Status [45]	**Species**	***Latin Name***	**Total Number Recorded**	**Number of Individuals (No Response)**	**Number of Individuals (Response)**	**Closest Distance of Individual Recorded (m)**	**Closest Individual Recorded - Behaviour**	**Closest Individual Recorded - Response to Dredger**	**Closest Individual Recorded - Duration of Response (seconds)**
Green	Great Black-backed Gull	*Larus marinus*	13	13	0	0-50	Foraging in areas where dredger has passed	N/A	N/A
	Grey Heron	*Ardea cinerea*	1	1	0	200-300	Perched on intertidal mudflat	No response	N/A
	Little Egret	*Egretta garzetta*	15	15	0	200-300	Foraging on intertidal mudflats	No response	N/A
Amber	Black-headed Gull	*Larus ridibundus*	211	176	35	0-50	A group of individuals flying behind boat and foraging in water	N/A	N/A
	Cormorant	*Phalacrocorax carbo*	36	36	0	200-300	Perching on old fishing pier	No response	N/A
	Herring Gull	*Larus argentatus*	39	36	3	0-50	A group of individuals foraging in areas where dredger has passed	N/A	N/A
	Lesser Black-backed Gull	*Larus fuscus*	8	8	0	0-50	Foraging in water	No response	N/A
Red	Black-tailed Godwit	*Limosa limosa*	2	2	0	300	Foraging on intertidal mudflats	No response	N/A
	Curlew	*Numenius arquata*	1	1	0	150	Foraging on intertidal mudflats	No response	N/A
	Oystercatcher	*Haematopus ostralegus*	28	28	0	150	Foraging on intertidal mudflats	No response	N/A

5.1.3.2 Impact Assessment

Direct Impacts

Impacts from Disturbance

Disturbances as a result of dredging can result in the flushing of bird species from an area or avoidance of an area by bird species. Flushing distance for bird species can vary by both species and flock size [43]. Species such as cormorant, divers, grebes, and seaduck (eiders, scoters and long-tailed ducks) are considered to be highly sensitive species to direct disturbances that may occur from dredging works [43, 46]. Disturbance / displacement from an area is considered to effectively be habitat loss as the species. However, it has been shown that boats can approach within 100m to sensitive species before a response ('flight') is triggered [43, 46, 47]. Whereas, generally, it is considered that gulls, terns, gannets and storm petrels are to be of low sensitivity to disturbance effects that may occur as a result of dredging works [43].

It should be noted that the Proposed Dredging Areas are located within the Waterford Estuary, and the offshore disposal site is located ca. 2.6km southwest of Hook Head. There are no areas of intertidal mudflats, saltmarshes or habitats of a similar nature located within the dredge areas or disposal site, therefore, the Proposed Dredging Activities will not result in a loss of potential foraging habitat for birds utilising the coastal habitat given the distance separating the Proposed Dredging Areas and the coastal habitats.

Furthermore, it should be noted that the licensed offshore disposal site has been receiving dredged materials since 1996 and the total area of the site is ca. 0.52km^2, which is ca. 0.02% of the area covered by the SPA. Furthermore, the disposal site is only infrequently utilised during the dredging campaigns. In addition, it can be concluded that bird species that regularly utilise the Waterford Estuary and Celtic Sea are considered habituated to shipping traffic to and from the Belview Port. Therefore, it is considered that the dredger vessel will not differ significantly from the existing vessel movements and therefore it is concluded that the Proposed Dredging Activities will not result in any significant disturbances to bird species within the Waterford Estuary or Celtic Sea.

Impacts from Aerial Noise

The Proposed Dredging Activities will require dredging vessels, which will emit aerial noise emissions. However, the Port of Waterford is an active port that regularly has vessel movements entering and exiting the Waterford Estuary. Therefore, it is concluded that bird species utilising the Waterford Estuary experience regular anthropogenic noise sources (vessel movements, port related activities, etc.) and are likely habituated to such anthropogenic noise sources. As such, it is considered unlikely that the presence of the dredging vessel will result in any noise impacts to bird species within the Waterford Estuary.

Impacts from Turbidity / Suspended Sediments

Dredging activities have the potential to increase turbidity within the water column and reduce water clarity. This could impact bird species that forage using sight (including terns, guillemot, gannet, etc.) and birds that forage underwater (including divers, grebes, mergansers, etc) as they may not be able to see through the water column [43]. However, it should be noted that the Waterford Estuary is estuarine and subject to naturally occurring tidally generated suspended solid concentrations that vary between 50 and 500mg/l at both Belview Point in the River Suir and at Garraunbaun Rock near Ferry Point in the White Horse Reach of the River Barrow to exceeding 1,000mg/l downstream in the River Suir, between Passage East and Buttermilk Point.

In 2017 ABP Marine Environmental Research Ltd. (ABPmer) modelled the impact of plough dredging at Cheek Point Lower [48]. The modelling showed that the dispersed sediment would

move throughout the estuary, with the vast majority moving up-estuary, but would generally be confined to the area between Buttermilk Point and Little Island. A majority of the material would be transported and eroded on the flood tide and during spring tides whereas neap tides would predominantly be accretional. The modelling identified locations of temporary sediment storage (later eroded) as well as sediment 'sinks,' where accretion would be more permanent, notably the southern edge of the Cheekpoint section, adjacent to the maintained channel. Maximum suspended sediment concentrations (SSC) (above background) at the point of disturbance were around 2,500mg/l near-bed at the time of peak flows and 1,500mg/l during slack flows [48].

One day following completion of plough disturbance, peak SSC would reduce by over an order of magnitude at the disturbance site. Maximum concentrations away from the disturbance location, for the most part, would occur on peak flood flows as 'pulses' that rarely last for longer than 30 minutes per tide. Individual spikes can reach 1,000mg/l at some locations. Elevated SSC that lasts for several hours are generally in the range 150-250mg/l, depending on location, on spring flood tides, and lower on ebb tides. Average elevated concentrations are rarely above 50mg/l. These values compare against the measured background SSC level, which were recorded between 350 and 600mg/l between Carters Patch and the River Barrow, on a typical spring tide, increasing to up to 1,000mg/l during an observed storm event. Therefore, sedimentation as a result of the plough disturbance is for the most part temporary, accumulating during periods of slack water, or in areas of eddy circulation [48].

Therefore, it is considered that the dredging works will not result in significant impacts to foraging bird species.

Impacts to Water Quality

In addition to potential turbidity / suspended sediments resulting from the proposed works, should pollutants be discharged from the dredging vessel, this could result in impacts to the water quality within the Waterford Estuary and direct impacts to avifauna.

Potential pollutants would include discharges from dredging vessels including ballast water, wastewater, oil or fuel. Pollution events that result in the release of oil, hydrocarbons or chemicals could result in damage to bird plumage, impairment of waterproofing and temperature regulation, sickness or death of birds. Therefore, in order to ensure no pollution events occur during the proposed works, all works will comply with all relevant legislation and best practice to reduce potential environmental impacts of the works, and mitigation measures will be implemented to protect water quality (see Section 5.2 below).

Loss of Prey Species

As discussed in Section 4.1.1 and Section 4.1.2, it is not anticipated that there will be any effects to benthic species or fish species as a result of the proposed works. Therefore, it can be concluded that there will be no impacts to foraging bird species. Furthermore, it should be noted that the measures that will be implemented to protect water quality will also ensure that no impacts occur to prey species as a result of water quality impairment (pollution).

5.1.3.3 Mitigation Measures

Overall, it is considered that the dredging works will not result in significant impacts to avifauna. Nonetheless, mitigation measures to protect water quality will be implemented in order to ensure no adverse effects occur to avifauna within Waterford Estuary, see Section 5.2.3 below.

5.1.4 Annex IV Species Risk Assessment

An Annex IV Species Risk Assessment has been prepared and submitted as part of this licence application. This section will provide a summary of the Annex IV Species Risk Assessment; however, this report should be read in conjunction with this AIMU.

5.1.4.1 Baseline Environment

All species listed under Annex IV of the Habitats Directive with the potential to be impacted by the Proposed Dredging Activities will be fully assessed. The Annex IV species that occur in Ireland [49] that will have been identified as relevant to this risk assessment include:

- All Irish cetaceans (whales, dolphins, and porpoise);
- Otter; and,
- All marine turtles.

Other non-Annex IV species have also been included in this risk assessment to ensure no adverse effects occur to any protected species, which include phocids (seals) and basking sharks.

It should be noted that the following Annex IV species that occur in Ireland have not been considered for the risk assessment due to their terrestrial nature:

- *Microchirptera* – all species (all bat species present in Ireland);
- *Bufo calamita* - Natterjack Toad; and,
- *Geomalacus maculosus* – the Kerry Slug.

The Annex IV Risk Assessment examined the following Annex IV species and non-Annex IV species due to their common occurrence within the Waterford Estuary:

- Common Dolphin (*Delphinus delphis)* – This species were the most commonly recorded species during the examined time period (2012 to 2023), accounting for ca. 66.64% of all marine mammals reported in the Waterford Estuary. While there was no records of this species within the disposal site, this species was recorded within close proximity to a number of the dredging locations; however, there were only 2No. sightings of common species reported within the Proposed Dredging Areas at Duncannon Channel and Creadan Bank.
- Fin Whale (*Balaenotera physallus)* – This species accounted for ca. 6.8% of all records of marine mammals reported in the Waterford Estuary. There were no records of this species within the disposal site; however, there was 1No. record of this species occurring within the Proposed Dredging Areas, within the Creadan Bank dredging area, and no other records of this species were noted further up the estuary or within the vicinity of the other Proposed Dredging Areas.
- Harbour Porpoise (*Phocoena phocoena*) – This species accounts for ca. 5% of all reported marine mammals within the Waterford Estuary. There was only 1No. record this species within the disposal site while there are 3No. records of this species within the Proposed Dredging Areas at Creadan Bank and Passage East Shoal, this species most frequently occurred between Passage East and Ballyhack.
- European Otter (*Lutra lutra)* – European otter are known to commonly occur within the Waterford Estuary [50]. Otter tend to utilise the areas within 80m of the shoreline (high water mark) [51]. Therefore, given the fact that the Creadan Bank and Duncannon Channel dredging areas are located over 500m from the shoreline and the disposal site is ca. 2.3km from the shoreline, these areas are not considered suitable for otter. However, a number of the Proposed Dredging Areas are located

within areas considered suitable for commuting and foraging otters. In addition, MOR were commissioned by the Port to undertake ongoing surveys within the accessible areas around the Belview Port and its environs since April 2021 in support of the Port of Waterford Masterplan Projects. These surveys recorded otter activity in the form of footprints, spraints, foraging remains, couching areas and live sightings in the Belview-Faithlegg-Cheekpoint area; however, no holts have been identified in this area.

- Basking Shark (*Cetorhinus maximus)* – Although basking sharks are not an Annex IV species, they were given further consideration as ca. 4% of all IWDG records within the Waterford Estuary were basking sharks. There were no records of this species within the Proposed Dredging Areas nor the disposal site.
- Phocids – There are 2No. Phocids species native to Irish water, the grey seal and common seal. There are no records of common seals within the Waterford Estuary or within the disposal site, however, this species is known to occur at Hook Head – southeast of the Proposed Dredging Areas. Grey seals are known to occur within the Waterford Estuary and have been recorded within and upstream of the Proposed Dredging Areas. There are no haul-out sites for either of these species within the Waterford Estuary or upstream of the estuary, however, both species are known to have colonies around the southeast coast of Ireland.

5.1.4.2 Impact Assessment

Based on the nature of the Proposed Dredging Activities, the following potential impacts were identified:

Proposed Dredging Activities

The primary potential impact associated with the Proposed Dredging Activities is the noise associated with the Proposed Dredging Activities and the transport to / from the disposal site. The primary method of dredging will be the proposed used of TSHD which will be used to maintain the depth of the navigation channels and other parts of the Waterford Estuary. TSHD will be supported by other dredging methods including a bed leveller, mechanical dredging and plough dredging.

The noise associated with the dredging and transport to and from the disposal site can potentially affect marine based species' ability to detect important acoustic cues over ambient noise and potentially effecting the behaviour of individuals. Dredging operations have been recorded to produce omnidirectional sounds during TSHD, with source levels between 186dB – 188dB re 1 µPa rms. Based on the estimated maximum sound pressure levels of the dredging activities and sound exposure levels of marine mammals, these levels are only within the Permanent Threshold Shift (PTS) for harbour porpoise within the immediate vicinity of the vessel. However, these levels would be expected to drop below the PTS over 1km away from the vessel. Although levels may be within the Temporary Threshold Shift (TTS) for some cetacean species, these levels are estimated within the immediate vicinity of the vessel. It is considered that the disturbance of individuals would not be significant as these are highly mobile species and can move away from the works during the short duration of the Proposed Dredging Activities.

Disposal at Disposal Site

During the disposal process, the disposal is carried out through the vessel's hull whilst moving at slow speed and the disposal site is divided into subsections with each used that ensures there is a uniform spread of the dredged sediments and ensures against accumulation of material within an isolated area (i.e., the centre of the disposal site). This process is repeated for each disposal operation with the master of the vessel referring to the previous disposal locations used, within the on-board tracking system, and selecting a new disposal location

within the licensed area. By using as much of the disposal site as possible any impacts of excessive accumulation in one location from the disposal activity are minimised.

Increased levels of Turbidity

Levels of turbidity are expected to increase during both the dredging phase and dispersal phase of the Proposed Dredging Activities. Increased levels of sediment in the water column may result in the indirect impact on the abundance and disturbance to favoured prey species of the species mentioned in Section 5.1.4.1. However, as discussed in Section 5.1.2, it is concluded that the Proposed Dredging Activities will result in impacts to fish and as discussed in Section 5.1.1, it is concluded that the Proposed Dredging Activities will not result in impacts to benthic flora and fauna.

Ship-strike with Individuals

The Proposed Dredging Activities presents an added risk of ship-strike / collision of vessels with species due to the shipping activity associated with the Proposed Dredging Activities (i.e., dredging vessels). Due to the slow speed of the dredgers, it is unlikely that ship-strike would occur as marine mammals would have sufficient time to move away from the dredging vessels. Additionally, shipping traffic in the Waterford Estuary is not uncommon given the presence of a Tier 2 National Port and the additional traffic associated with the Proposed Dredging Activities in the Waterford Estuary is unlikely result in ship-strike of individuals.

The effects of the above species and the potential impacts are considered to be limited based on the infrequent short-term nature of the Proposed Dredging Activities at each of the areas, the highly localised nature of the works and the expected sound levels of the activities.

5.1.4.3 Mitigation Measures

The Annex IV Risk Assessment concluded that the mitigation measures under the current permit (Permit Reg. No. S0012-03) and Foreshore Licence (Licence Reg. No. FS006684) remain valid for the Proposed Dredging Activities. These mitigation measures include:

- **Condition 4.10.1** – The permit holder shall implement clear ‘soft-start’ or ‘ramp up’ procedures during loading and plough dredging activities, whereby sound energy input to the marine environment is gradually or incrementally increased from levels unlikely to cause significant behavioural impact on marine mammals to the full output necessary for completion of the activities; and,
- **Condition 4.10.2** – The implementation of the risk control measure for marine mammals specified in Condition 4.10.1 shall be to the satisfaction of the Agency.

Full details of the conditions are outlined in the EPA Permit Reg. No. S0012-03 and Foreshore Licence Reg. No. FS006684.

5.1.5 European Sites

5.1.5.1 Baseline Environment

In accordance with the European Commission Methodological Guidance [52] a list of European sites that can be potentially affected by the Proposed Dredging Activities has been compiled. Guidance for Planning Authorities prepared by the Department of Environment Heritage and Local Government [53] 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 [54], 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 12No. European sites located within 15km of the Proposed Dredging Areas and the disposal site - these are identified in Figure 5-3. However, please note the Saltee Island SAC has also been included in the screening due to the mobility of the species designated as a qualifying interest.

It should also be noted that the Seas off Wexford cSPA has been included in this assessment. It should be noted that the period of observations for this SPA is open until the 9th April 2024, at which time the boundary and conservation objectives of the SPA could possibly be amended. Therefore, at the time of writing this report, the boundary and conservation objectives for this SPA used reflects the information issued by the NPWS on the 9th January 2024 [41].

Table 5-3 outlines the proximity of the European sites in relation to the disposal site and Table 5-4 outlines the proximity of the European sites in relation to the Proposed Dredging Areas.

Figure 5-2: Proposed Dredging Areas & Disposal Site and European Designated Sites within 15km

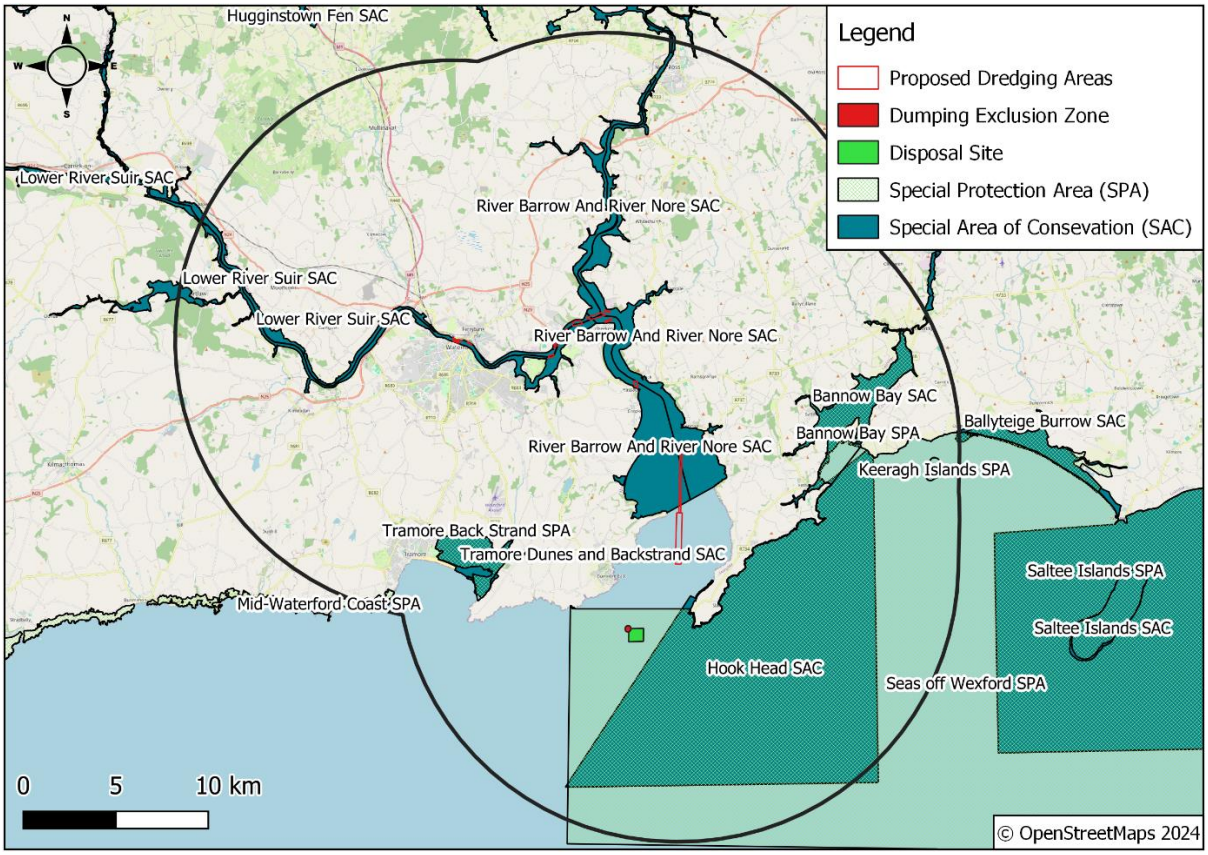


Table 5-3: European Designated Sites within 15km of the Disposal Site

Site Name	Code	Distance (km)	Direction from the Disposal Site
Special Areas of Conservation (SAC)			
Hook Head SAC	000764	0.8km	E
River Barrow and River Nore SAC	002162	6.5km	N
Tramore Dunes and Backstrand SAC	000671	7.9km	NW
Bannow Bay SAC	000697	10.0km	NE
Lower River Suir SAC	002137	13.2km	NW
Saltee Islands SAC	000707	19.1km	E
Ballyteige Burrow SAC	000696	19.6km	NE
Special Protection Area (SPA)			
Seas off Wexford cSPA	004237	Within	Within
Tramore Back Strand SPA	004027	7.9km	NW
Bannow Bay SPA	004033	11.6km	NE
Mid Waterford Coast SPA	004193	12.9km	NW
Keeragh Islands SPA	004118	18.1km	NE

Table 5-4: Distance of the Proposed Dredging Areas from European Designated Sites

Dredging Area	Distance (Km)											
	Lower River Suir SAC	River Barrow & River Nore SAC	Tramore Dunes & Backstrand SAC	Bannow Bay SAC	Hook Head SAC	Ballyteige Burrow SAC	Saltee Islands SAC	Tramore Back Strand SPA	Bannow Bay SPA	Mid Waterford Coast SPA	Keeragh Islands SPA	Seas off Wexford cSPA
	002137	002162	000671	000697	000764	000696	000707	004027	004033	004193	004118	004237
Duncannon Channel	8.0km NW	**Within**	8.5km SW	5.5km E	4.0km SE	15.2km E	17km SE	8.7km SW	5.7km E	16.0km SW	13.4km E	5.4km S
Cheekpoint Lower	**Within**	**Within**	12.1km SW	11.3km SE	15.5km SE	20.0km SE	24.1km SE	12.1km SW	11.8km SE	18.2km SW	19.2km SE	16km SE
Belview Berths	**Within**	1.4km E	10.5km SW	12.9km SE	15.7km SE	21.7km SE	25.6km SE	10.5km SW	13.5km SE	16.1km SW	20.9km SE	15.2km SE
Belview Turning Area	**Within**	1.8km E	10.3km SW	13.0km SE	15.4km SE	21.8km SE	25.6km SE	10.3km SW	13.6km SE	16.0km SW	21.0km SE	14.7km SE
Belview to O'Brien's Quay	**Within**	2.3km E	10.2km SW	13.4km SE	15.3kmSE	22.2km SE	25.8km SE	10.2km SW	14.0km SE	16.0km SW	21.2km SE	14.5km SE
Cheekpoint Harbour Access	0.5km W	**Within**	12.3km SE	10.8km SW	15.0km SE	19.6km SE	23.6km SE	12.3km SE	11.8km SW	18.6km SW	18.8km SE	16.9km SE
Cheekpoint Upper	**Within**	0.7km E	11.5km SE	12.2km SE	15.5km SE	21.0km SE	25km SE	11.5km SE	12.8km SE	17.3km SW	20.3km SE	15.6km SE
Creadan Bank	11.0km NW	0.2km N	8.4km SW	5.4km E	1.8km SE	15.3km NE	16.9km SE	8.3km SW	6.3km NE	15.3km SW	13.3km NE	2.9km S

Dredging Area	Distance (Km)											
	Lower River Suir SAC	River Barrow & River Nore SAC	Tramore Dunes & Backstrand SAC	Bannow Bay SAC	Hook Head SAC	Ballyteige Burrow SAC	Saltee Islands SAC	Tramore Back Strand SPA	Bannow Bay SPA	Mid Waterford Coast SPA	Keeragh Islands SPA	Seas off Wexford cSPA
	002137	002162	000671	000697	000764	000696	000707	004027	004033	004193	004118	004237
Frank Cassin Wharf	**Within**	6.6km E	9.9km S	17.8km SE	18.0km SE	26.7km SE	30.1km SE	10.0km S	17.9km SE	14.0km SW	25.6km SE	15km SE
Forde Wharf & Merchants Quay Marina	**Within**	7.2km E	10.0km SW	18.5km SE	18.8km SE	27.3km SE	30.7km SE	10.1km SW	19.1km SE	13.8km SW	26.2km SE	15.4km SE
Great Island Jetty	0.7km W	**Within**	12.8km SW	11.1km SE	15.5km SE	18.8km SE	23.9km SE	12.8km SW	11.6km SE	19.2km SW	19.1km SE	16.1km S
North Wharf	**Within**	6.9km E	10.1km SW	18.3km SE	18.7km SE	27.1km SE	30.6km SE	10.2km SW	19.0km SE	14.0km SW	26.0km SE	15.4km SE
O'Brien's Quay	**Within**	2.4km E	10.0km SW	13.3km SE	15.2km SE	22.0km SE	25.8km SE	10.0km SW	14.0km SE	15.7km SW	21.3km SE	14.1km SE
Passage East Boathouse Quay	4.1km NW	**Within**	10.2km SW	8.5km SE	11.1km SE	17.4km SE	20.8km SE	10.2km SW	9.2km SE	17.2km SW	16.3km SE	11.9km SE
Passage East Shoal	3.8km NW	**Within**	10.1km SW	8.5km SE	11.1km SE	17.4km SE	20.9km SE	10.1km SW	9.2km SE	17.1km SW	16.3km SE	12km SE

Dredging Area	Distance (Km)											
	Lower River Suir SAC	**River Barrow & River Nore SAC**	**Tramore Dunes & Backstrand SAC**	**Bannow Bay SAC**	**Hook Head SAC**	**Ballyteige Burrow SAC**	**Saltee Islands SAC**	**Tramore Back Strand SPA**	**Bannow Bay SPA**	**Mid Waterford Coast SPA**	**Keeragh Islands SPA**	**Seas off Wexford cSPA**
	002137	002162	000671	000697	000764	000696	000707	004027	004033	004193	004118	004237
Spit Light and Queen's Channel	**Within**	2.8km E	9.4km SW	13.2km SE	14.8km SE	22.2km SE	25.7km	9.4km SW	13.9km SE	15.2km SW	21.2km SE	13.5km S

5.1.5.2 Impact Assessment

An NIS has been prepared that documented the findings of the Appropriate Assessment screening assessment. Following an assessment of the European designated sites located within the Zone of Influence, the Lower River Suir SAC, the River Barrow and River Nore SAC, Hook Head SAC and the Saltee Islands SAC were taken forward for further consideration based on the potential for water quality impairment and potential ambient and underwater noise disturbance in the absence of appropriate mitigation measures.

Following further assessment of the potential sources of impacts on the screened in European designated sites, the NIS concluded:

> *'It has been objectively concluded, following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the Proposed Development and all associated works, and with implementation of the proposed mitigation measures, that the Proposed Development will not, either alone or in combination with other plans or projects, adversely affect the integrity of Lower River Suir SAC, the River Barrow and River Nore SAC, Hook Head SAC, the Saltee Islands 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.'*

Refer to the NIS for full details of the assessment.

5.1.5.3 Mitigation Measures

Taking a precautionary principle, several mitigation measures were proposed to protect water quality (see Section 5.2.3) and to ensure no disturbance to designated species, specifically otter and grey seal (refer to Section 5.1.4.3).

Refer to the NIS for full details of the assessment.

5.2 Water Quality

A Turbidity Report based on 2023 data has been prepared by [redacted] on behalf of the Port of Waterford and has been submitted as part of this licence application. This report should be read in conjunction with this AIMU report.in support of this application.

5.2.1 Baseline Environment

As discussed in Section 3.2, the Proposed Dredging Areas are located within 4No. EPA watercourses, the Middle Suir Estuary, Lower Suir Estuary, Barrow Suir Nore Estuary and Waterford Estuary, and the disposal site is located with the Eastern Celtic Sea.

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 [3]. 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 Estuary are all considered to have '*moderate'* water quality and to be considered '*at risk'* [3]. The Eastern Celtic Sea is considered to have '*high'* water quality and is considered '*not at risk'* [3].

5.2.2 Impact Assessment

In order to assess any potential impacts from dredging on the water quality within the Waterford Estuary, LCF Marine undertook a review and analysis of water monitoring and turbidity data within the Waterford Estuary before and during the early 2023 plough dredging campaign was carried out. This analysis utilised data gathered by 2No. water quality monitoring buoys within the Waterford Estuary. These buoys monitored water quality

conditions during the plough dredging campaigns that occurred between January to June 2023.

The analysis concluded that the rise in suspended solids/turbidity, due to ploughing, was of no practical significance as it was hidden within the natural variability of the turbidity within the estuarine system. In addition, the strategy of dredging during spring tides appears to be robust as it occurred when levels of suspended sediments are already naturally elevated, and during the daytime, when more sediment will be mobilised and when mid tide flow rates are higher than at night.

A previous water quality assessment undertaken by IDS Monitoring in 2017 during plough dredging campaigns and a TSHD campaign at Cheekpoint using data collected from 2No. monitoring buoys concluded that there was no significant change in the turbidity levels at the upstream and downstream monitoring stations during any of the dredging campaigns at Cheekpoint, turbidity variance between plough dredging campaigns and TSHD dredging was not discernible and any differences observed during dredging were not greater than what was seen when comparing data from different periods without dredging and are accounted for as natural temporal variation and are caused by the strong tidal and fluvial flows [55].

Following a review of the historic WFD water quality from 2013-2018 for the waterbodies in which the Proposed Dredging Activities are located, it should be noted that only the River Suir (Lower Suir Estuary) status decreased from '*good*' to '*moderate*' due to increased phosphate concentrations, primarily associated with pasture and urban wastewater discharges in the Suir and driven by benthic invertebrates [56]. However, the Barrow Suir Nore Estuary and the Waterford Estuary other waterbodies remained at the same status, and the Eastern Celtic Sea increased in status from '*good*' to '*high*' [3].

The majority of the Proposed Dredging Areas have been dredged for many years and although there will be a minor extension at 3 locations, which will result in an increase of the total Proposed Dredging Areas of ca. 9.97ha or 6.1%, this is not considered to be a significant change. The disposal site has been receiving dredged material since 1996, and the material to be dredged is regularly tested every three years to ensure there is no change to water quality or flood risk resulting from the continued dredging and disposal operation. Therefore, it is concluded that dredging will not result in any significant impacts on the receiving waterbodies.

5.2.3 Mitigation Measures

Although it is considered that the dredging will not result in impacts to the receiving waterbodies, mitigation measures will be implemented in order to ensure no adverse impacts occur to water quality within the Waterford Estuary. These measures include:

- Best practice measures to minimise the release of suspended solids into the receiving environment shall be implemented;
- Overflow of dredged sediment will only be permitted when it can be demonstrated that the majority of material dredged is being retained onboard;
- A documented Accident Prevention Procedure will be put in place prior to commencement;
- A documented Emergency Response Procedure will be put in place prior to commencement;
- A full record of loading and disposal tracks and a record of the material being deposited will be maintained for each trip;
- Disposal at the disposal site will be carried out through the vessel's hull whilst moving at slow speed;

- Plough dredging will be limited to spring tide periods only for Cheekpoint locations;
- Disposal will be limited to a maximum rate per day of 69,079 wet tonnes for the offshore disposal site and 3,356 wet tonnes per day for the plough dredging sites;
- The disposal site will be divided into subsections with each used sequentially to ensure there is a uniform spread of the dredged sediments;
- All loading operations will be managed to be as efficient as possible and minimise the duration of the dredging activities;
- Water jets and automatic light mixture overboard shall only be utilised when necessary to ensure adequate production;
- To ensure that only suitably clean material shall be dumped at sea, the Port shall carry out sediment chemistry analysis in 2026, 2029 and 2032; and,
- The dredging works will be carried out in full accordance with the conditions stipulated in the Dumping at Sea permit.

5.3 Aquaculture

An Aquaculture Assessment Report has been prepared by Aquafact International Services Ltd. (APEM Group) and has been submitted as part of this licence application. This section will provide a summary of the Aquaculture Assessment Report; however, this report should be read in conjunction with this AIMU.

5.3.1 Baseline Environment

Waterford Estuary is the location of one of 63No. shellfish areas in Ireland. The shellfish area at Waterford Estuary is located at the confluence of the River Suir and the River Barrow that flow through the Waterford Estuary to the Celtic Sea. The shellfish waters in Waterford Estuary that are designated for the protection of shellfish growth and production cover an area of ca. 30km^2.

In addition, Waterford Estuary is also the location of a 'Bivalve Classified Production Area' from which live bivalve molluscs may be harvested, in the outer harbour area 3No. sites are sampled including Arthurstown, Woodstown and Harrylock Bay. The Waterford Estuary is also licensed for the production of mussels and Pacific oysters with mussels occupying an area of ca. 176.9ha across the harbour and oysters occupying ca. 140.1ha located near Woodstown.

The water depths throughout Waterford Estuary varies from a maximum depths of 20m recorded at the mouth of the harbour to 2m and shallower at Woodstown within the Barrow Suir Nore estuary. This estuarine area is characterised by a deep ca. 100m wide sinusoidal channel running north-south (max. depth of ca. 7m) that has formed as a result of river flow augmented by dredging. This channel is flanked by relatively shallow waters typically 2 – 4m in depth.

Therefore, given the fact that there is strong tidal action in Waterford Estuary and due to the density of sea water on both flooding tide and ebbing tides, water will follow the deepest parts of the channel thereby avoiding the shallower waters where aquaculture in carried out, particularly in the shallow section at Woodstown Strand where *Crassostrea* is cultured. Additionally, as this area dries out ca. 2No. hours after Highwater and remains dry for ca. 7No. hours, it cannot be impact by sediments in suspension in the water column when dry.

5.3.2 Impact Assessment

The potential impacts that may occur to aquaculture species as a result of the Proposed Dredging Activities would include extraction (dredging) and siltation (both heavy siltation

(30cm burial) and light siltation (5cm burial)). However, as extraction does not occur in aquaculture sites, it can have no impact on either cultured species.

Based on the sedimentation models, sedimentation as a result of the plough disturbance is for the most part temporary, accumulating during periods of slack water, or in areas of eddy circulation [48]. With the exception of identified 'sink' areas, accumulations are small at a few millimetres to 1cm to 2cm. Most accumulations are re-eroded on the following peak flows, predominantly on the ebb. In the areas around Carter's Patch, sedimentation of up to 1.5cm was present for a maximum period of 6No. hours before being re-eroded and in all cases, sedimentation rates and SSC levels increase after ca. 2No. days of ploughing. This would be considered light siltation (5cm burial).

Oysters and mussels have evolved over geologically long periods of time (many hundreds of millions of years) to live in areas where suspended sediment levels can be either highly variable (as in estuaries) or stable [57, 58, 59, 60].

A reviewed water quality data collected by 2No. sensors in Waterford Estuary during dredging campaigns during July 2020 through February 2021 concluded that the effect of dredging / ploughing has not caused any significant departure from the natural background pattern of turbidity [37]. In addition, a review of water quality data collected by 2No. sensors in Waterford Estuary during dredging campaigns during January and June 2023 concluded that the rise in suspended solids / turbidity, due to ploughing, was of no practical significance as it was hidden within the natural variability of the turbidity within the estuarine system [61].

With regard to fluctuations in salinity, it has been noted that oysters (including both *Ostrea* and *Magellana* (*Crassostrea*) are very tolerant of variable salinities [62], while many bivalves are euryhaline, that is they can tolerate an extremely wide range of salinities in their natural environment [63]. It has been recorded that Blue Mussels (*Mytilus edulis*) can tolerate salinities ranging from 4 – 5psu to fully marine conditions while Rock Oysters (*Magellana / Crassostrea*) occur in salinities from 5 – 35psu [63].

Therefore, given the physical oceanographic conditions in Waterford Estuary, the already turbid character of its waters, the fact that both oysters and mussels have evolved to live in such conditions and that the predicted levels of suspended sediments generated by the dredging and disposal activities are low, the level of impact of such activities on aquaculture species is extremely low.

5.3.3 Mitigation Measures

No mitigation measures are required for aquaculture.

5.4 Soils, Geology and Hydrogeology

5.4.1 Baseline

The Waterford Estuary is a large semi-enclosed coastal water body open to sea through an entrance ca. 4.25km wide between Hook Head, Co. Wexford and Dunmore East, Co. Kilkenny. The water surface area covers approximately 80km², comprising for the most part of relatively shallow riverine sections; however, a series of deep pockets occur within Waterford Estuary.

As discussed in Section 2.2, the physical composition of the sediments sampled within the Proposed Dredging Areas was consistent throughout Waterford Estuary (51% sand, 33% mud, and 16% gravel). In addition, according to INFOMAR data, the Proposed Dredging Areas are identified as having sediments classified as mud to muddy sand, coarse sediment, and sand [64].

Benthic surveys undertaken at the area in which the dumpsite is located in 2020 found that the site is dominated by fine sand that was formed into small waves and troughs by the action

of bottom currents. In addition, the sediment profile showed that silt-clay has been incorporated into the bottom although it has not dispersed evenly as small clumps of silt-clay were still evident. Evidence from the survey suggests the methods used during the disposal of dredged materials has ensure that there is an even dispersion of material with no mounds or accumulations at any one spot.

Previous benthic surveys of the area have documented coarse gravelly sands occurring within the area, and given its use as a disposal site, the nature of the seafloor in the spoil ground varies from coarse gravels to fine sand and silt, which were confirmed by drop-down photographic and video surveys have been conducted at the disposal site in August 1996, November 1996, January 1999, April 2013 by Aquafact. However, the benthic surveys undertaken in 2017 recorded that the gravel that was previously recorded is now completely covered by a blanket of fine sand from the disposal events throughout the site.

The survey reports for the Aquafact benthic surveys undertaken at the offshore disposal site in August 1996, November 1996, January 1999, April 2013, November 2017 and September 2020 can be found in Appendix F.

5.4.2 Impact Assessment

The majority of the Proposed Dredging Areas have been dredged in their current form for many years and although there will be a minor extension at 3 locations, which will result in an increase of the total Proposed Dredging Areas of ca. 9.97ha or 6.1%, this is not considered to be a significant change. Furthermore, these extension areas are considered to be of the same morphology area the previously dredged areas. Furthermore, the disposal site has been receiving dredged material for over 20No. years. Overall, it can be concluded there are no changes to the existing morphology or hydrogeology resulting from the continued dredging and disposal operation.

5.4.3 Mitigation Measures

No mitigation measures are required for soils, geology and hydrogeology.

5.5 Coastal Processes

5.5.1 Baseline

Extensive modelling has been undertaken at the Waterford Estuary to assess the dredging and disposal activities undertaken by the Port of Waterford during the maintenance dredging operations (see Appendix G).

ABPmer have undertaken an updated 2023 assessment that focusses on the characterisation of the dispersion of deposited dredged sediment at the licensed disposal site by considering a series of full-dredge disposal operations, investigating the potential impacts on short-term suspended sediment concentrations and associated settling/ deposition (see Appendix G-1). The modelling tools applied include the driving hydrodynamics and wave conditions associated with a defined storm event. The modelled sediment disposal includes the range of sediment components from the dredge sites (ranging from silts to sands), with disposal operations over both spring and neap tidal periods. See Appendix G-1 for further details.

It should be noted that ABPmer have previously undertaken an assessment on plough dredging within Waterford Estuary using detailed estuary wide numerical hydrodynamic and sediment transport models that are capable of replicating the present environmental conditions, in order to assess the physical effects of on-going port operations, including maintenance dredging and disposal (see Appendix G-2). In addition, previous models of the dredging and disposal operations within the Waterford Estuary have been undertaken by Deltares that assessed the impacts of increased suspended sediments during dredging and

disposal operations and the longer-term evolution of a disposal mound under a range of wave conditions (calm, moderate and rough) (see Appendix G-3 and G-4).

5.5.2 Impact Assessment

Naturally occurring, tidally generated suspended solid concentrations (SSC) were modelled by Delft Hydraulics (see Appendix G-3 and G-4):

- Tidally generated SSC range from 50 and 500mg/l at both Belview Point in the River Suir and at Garraunbaun Rock near Ferry Point in the White Horse Reach of the River Barrow;
- Tidally generated SSC at Cheekpoint, the confluence of the River Barrow and the River Suir, were typically less than 150mg/l;
- Tidally generated SSC downstream in the River Suir, between Passage East and Buttermilk Point, exceeded 1,000mg/l; and,
- Tidally generated SSC at Duncannon Bar within the Suir Estuary were above 100mg/l at bed and mid-water on spring tides.

The 2017 modelling undertaken by ABPmer on the potential impacts of plough dredging at Cheekpoint showed that the dispersed sediment would move throughout the estuary, with the vast majority moving up-estuary, but would generally be confined to the area between Buttermilk Point and Little Island. The greatest effects were seen throughout the estuary at the end of the plough disturbance scenario (8 days with ploughing ceasing on Day 4). These effects fall back to background levels within ca. 4No. days following cessation of ploughing on falling spring tides. Most material would be moved (transported and eroded) on the flood tide and during spring tides whereas neap tides would predominantly be accretional. The modelling identified locations of temporary sediment storage (later eroded) as well as sediment 'sinks,' where accretion would be more permanent, notably the southern edge of the Cheekpoint section, adjacent to the maintained channel. Maximum SSC (above background) at the point of disturbance were around 2,500mg/l near-bed at the time of peak flows and 1,500mg/l during slack flows. One day following completion of plough disturbance, peak SSC would reduce by over an order of magnitude at the disturbance site. Maximum concentrations away from the disturbance location, for the most part, would occur on peak flood flows as 'pulses' that rarely last for longer than 30 minutes per tide. Individual spikes can reach 1,000mg/l at some locations. Elevated SSC that last for several hours are generally in the range 150-250mg/l, depending on location, on spring flood tides, and lower on ebb tides. Average elevated concentrations are rarely above 50mg/l. See Appendix G-2 for further information.

The 2023 modelling undertaken by ABPmer assessed dredging campaigns from Belview Quay, Cheekpoint Lower Bar and Duncannon Bar, interacting with difference tidal conditions (mean neap or spring tides) in storm wave conditions (worst-case scenarios).

It was noted that the relatively low volume of disposal material from Belview and the relatively higher fine sediment content of material dredged from Cheekpoint Lower Bar result in generally limited siltation from these campaigns. Where material does settle to the bed (under slack water conditions around high and low tide), the subsequent peak flows are sufficient to remobilise the material and put it back into suspension for further dispersion. The influence of the storm event is also a contributing factor, providing added energy to the system and resulting in wave-induced bed shear stress, which further limits the sedimentation potential for the material in suspension.

The 2023 modelling also included selected timestep to provide the instantaneous predicted increased SSC and bed sedimentation at a range of time periods after the end of the Duncannon disposal campaign (only the plume development from Duncannon is shown as the smaller disposal volume from Belview and the larger dispersion of the finer material from

Cheekpoint Lower Bar results in overall lower instantaneous concentrations from these campaigns). The results of the instantaneous plume development indicate a peak concentrations of around 60 to 70mg/l in and around the disposal site. Across the wider region, plume concentrations above 10mg/l are predicted to extend west to Rinnashark Harbour and east to Hook Head. In addition, a sediment plume with concentrations of up to 30 to 40mg/l (above baseline) extends into the outer estuary, past Dunmore East and, for disposal campaigns from Duncannon, this plume extends further north, past Creadan Head and on towards Duncannon Strand.

With a greater volume of deposited material, the results of the timestep modelling for the Duncannon campaign indicate some settling of material to the bed. Initially (around 2No. hours after the end of the disposal campaign), as the storm event builds towards its peak, bed accretion is generally limited. With greater time passing from the end of the campaign, and as the peak of the storm event passes and calmer conditions return (from both lower wave heights and with the tide moving away from the peak of the spring towards neap conditions), more settling of material is predicted. By 36No. hours after the end of disposal, accretion of up to around 1cm is predicted to the southwest of the disposal site and of around 0.7cm further west towards Brazen Head. However, the peak flows associated with spring tidal conditions are sufficient to remobilise this material, indicating that the settling sediment will only be temporary until the next spring tide or until further storm conditions return. The peaks in excess suspended solid concentrations (SSC) values, which 'spike' for a short period of time as the plume passes the location, before dropping off as the plume moves away. This cycle continues as the disposal events are underway (and as the flood and ebb tides move material back and forth across the site). Once the disposals cease, the material in suspension becomes continuously more dispersed and concentrations drop back to existing (baseline) levels. At all locations, the levels of peak siltation are predicted to be very small (typically <0.5mm).

5.5.3 Mitigation Measures

No mitigation measures are required for coastal processes.

5.6 Air Quality

5.6.1 Baseline Environment

The Port of Waterford and Proposed Dredging Areas are located within and adjacent to the 'Rural East' Air Quality Index Region [3]. The nearest air monitoring station to the Site is Station 87 (Merchants Quay, Waterford City, Co. Waterford). The air quality recorded at this air monitoring station on 30th August 2023 is reported as being of '*good*' status [65].

5.6.2 Impact Assessment

Due to the fact that the works will require a vessel, emissions to air from the vessel exhausts will be unavoidable. Fuel emissions will be limited to the temporary undertaking of the dredging works as per the operating regime detailed in section 2 above. The fuel used will generally be Marine Gas Oil and the main emissions to air will be NO_x, SO_x, CO and TPM/PM_{10} [66].

However, due to the fact that only one dredging vessel will be operating at any one time and dredging will only occur as required, as per Section 2.3.2, these emissions will be negligible. As such they will not likely result in any significant impacts on background levels in this area and will not have the potential to lead to air quality standards being exceeded. The impact of the dredging on the local air quality as a direct result of the Proposed Dredging Activities has been considered not significant in this respect.

In addition, it was noted that although there will be potential for odour generation and nuisance to occur where decayed organic material will be encountered during the proposed dredging, which can then release sulphurous compounds. However, due to the locations of the Proposed

Dredging Areas, it has been considered that there will be no significant odour impacts as a result of the Proposed Dredging.

5.6.3 Mitigation Measures

Dredging vessels will not be left idle when not in operation, and engines switched off to avoid any unnecessary emissions to air.

5.7 Climate

5.7.1 Baseline Environment

The Port of Waterford provides important national trade infrastructure. The Port of Waterford is designated as a Port of National Significance (Tier 2) within the terms of the National Ports Policy as it is responsible for at least 2.5% of overall tonnage through Irish ports, has clear demonstrable potential to handle higher volumes of unitised traffic, and has the existing transport links to serve a wider, national marketplace beyond their immediate region. As a result, trade vessels are regularly entering and departing the harbour. In line with the current national GHG emissions reduction targets, the importance of accelerating renewable energy projects, including offshore renewable energy, is at the forefront of the Government's Climate Action Plan 2023 [67]. Therefore, the importance of developing and maintaining port infrastructure and access is imperative to facilitate renewable energy projects.

5.7.2 Impact Assessment

Fuel emissions are limited to the temporary undertaking of the dredging works as per the operating regime detailed in section 2 above. The fuel used will generally be Marine Gas Oil which will have associated GHG emissions. The Port of Waterford shall record the fuel used during the dredging works and monitor the carbon emissions using published conversion factors where available.

The impact of the dredging on climate resulting from the use of vessel fuel during the Proposed Dredging Activities will be short-term and is considered not significant in this respect. Therefore, it is concluded that the Proposed Dredging Activities will not have the potential to impact climate change trends.

5.7.3 Mitigation Measures

Dredging vessels will not be left idle when not in operation, and engines switched off to avoid any unnecessary GHG emissions.

5.8 Noise

5.8.1 Baseline Environment

The ambient acoustic environment contains a mixture of sounds existing in a given environment, these include natural sources such as wind induced noise through trees and foliage, bird calls, flowing water and anthropogenic sources, such as road traffic, sirens, commercial and industrial emissions. Noise is generally an undesired sound and can exhibit a broad spectrum.

The Port of Waterford is an established Tier 2 port and is located within a zoned port and industrial setting. Due to the setting the local ambient sound are expected to be typical of those for industrial/infrastructural development.

5.8.2 Impact Assessment

The Proposed Dredging Activities involves the use of various plant and equipment which will give rise to noise emission identified in Section 2.3. Dredging will occur at several locations as outlined in Figure 2-1.

Noise emissions are predominantly anticipated to be similar in nature to those arising from existing shipping. Currently on-going dredging is subject to sound monitoring programmes, which are submitted to the EPA. The results show the dredging works are compliant with prescribed limits for noise nuisance at sensitive receptors. The Proposed Dredging Activities will be similar in terms of the plant to be used and the locations to be dredged, with minor extension at 3 locations, which will result in an increase of the total Proposed Dredging Areas of ca. 9.97ha or 6.1% (refer to Table 2-1 above).

Regarding noise complaints, there has only ever one complaint during dredging operations and that was submitted back in October 2013. The absence of any further complaints over the past 10 years is testament to the fact that POW have been able to maintain dredging operations within the noise limit, as specified under their dumping at sea permit S0012-03, with noise limits outlined in Schedule B1.

Localised noise emissions may arise from dredging operations. Specifically on exceptionally calm days or when the ambient sea is calm, there might be some discernible noise levels in the immediate vicinity of the dredger. However, the distances from the disposal location to the mainland areas are great enough that any airborne noise levels associated with the disposal at sea process will not significantly impact on potential receptors on land.

Underwater noise assessment related to marine mammals is discussed in Section 5.1.4.

5.8.3 Mitigation Measures

This policy currently in place under the dumping at sea permit, Condition 2.2.2 will be maintained that will ensure dredger loading in the Cheekpoint Lower, refer to Figure 2-1 above, will only occur during night-time hours (11pm to 7am) should a noise assessment of the dredger demonstrate that the operation falls within the required noise limits set forth. This condition will only be revisited if such improvements in equipment can be made to ensure, to the satisfaction of the Agency, that noise limits can be met.

5.9 Cultural Heritage

An Underwater Archaeological Impact Assessment (UAIA) was carried out by the Archaeological Diving Company Ltd (ADCO) and submitted as part of this application [68]. This section will provide a summary of the UAIA; however, this report should be read in conjunction with this AIMU.

5.9.1 Baseline Environment

A series of 16No. locations are regularly dredged by the Port of Waterford to maintain the ruling depth of the approach channel and quaysides, between Waterford city upstream and Creadan Bank in Waterford Harbour. The proposed marine disposal area is also considered.

The UAIA is based on a desktop assessment of the dredge areas and the marine disposal area, informed by known archaeological sites and existing archaeological intervention reports.

The estuarine areas of the River Suir and Waterford Harbour retain a series of known archaeological sites and a series of unregistered sites that are recorded on the historic Ordnance Survey maps. The sites for the most part include shipwrecks, historic quaysides and historic fish traps.

There are 28No. known wreck sites in the sea area extending from Waterford City south through Waterford Harbour to the existing licensed marine disposal area ca. 4km south of Dunmore East. The majority of the known sites are not close to any of the maintenance dredging locations, and none of the sites lie within any dredge area.

The wreck site of principal interest lies on Duncannon Bar, next to the Duncannon Channel dredging area. The Duncannon Wreck (W18543) was identified during archaeological monitoring of dredging in 2002. It remains on the seabed on the edge of the navigation channel. It is a significant timber vessel armed with a line of iron cannon and it remains largely intact below decks if buried. It is considered to date to the seventeenth century. The National Monuments Service believes there is the remains of a second wreck (W11617, Duncannon 2) to the north of the Duncannon Wreck and suggests Duncannon 2 may be somewhat earlier in date. Both sites are protected from dredging impacts by the existence of an Archaeological Exclusion Zone, within which it is not permitted to conduct any dredging without the express permission of the National Monuments Service, and subject to the requirements of the National Monuments Service.

There are 3No. other known wreck sites lie immediately adjacent to the Proposed Dredging Areas:

- W10645 – Waterford City - This is an unknown vessel that is located at Ferrybank just upstream of Frank Cassin Wharf;
- W11329 - Little Island – This is also an unknown vessel that is located within the main channel downstream; and,
- W11328 – Cheekpoint – This is an unknown wreck that is located at the confluence of the Barrow and the Suir.

There is 1No. known shipwreck site located close to but outside the offshore disposal site, the *George Milburn* (W04931) was a mine sweeper that was lost on 12/07/1917. However, this wreck site lies outside the offshore disposal area.

5.9.2 Impact Assessment

The archaeological risk was assessed in the UAIA for each of the Proposed Dredging Areas and the offshore disposal site.

While the dredging may encounter flotsam and wash-in of material from upstream, there are no known archaeological assets within the Proposed Dredging Areas. Furthermore, there are no known archaeological assets within the offshore disposal site.

Therefore, it can be concluded that as the Proposed Dredging Activities will remain within the boundaries identified in Section 2.1, there will be no impacts on any known archaeological monuments or features.

5.9.3 Mitigation Measures

As part of the UAIA, a number of mitigation measures have been outlined, which will be implemented as part of the maintenance dredging programme. These measures include the following:

- It is recommended that annual high resolution multibeam survey data acquired on DA-15, Duncannon Channel is reviewed archaeologically by a marine archaeologist experienced in marine dredging projects, to monitor the effectiveness of the Archaeological Exclusion Zones established at both the Duncannon Wreck (W18543) and Duncannon 2 (W11617) in maintaining the protective covering sands over both sites, and to advise ameliorative measures where necessary.

- Where the existing dredge footprints are to be maintained, the need for archaeological monitoring onsite is not required. An exception to this is at DA-15, Duncannon Channel in the vicinity of W18543 and W11617 if the bathymetry surveys reveal exposure of elements of the buried sites.
- A protocol should be prepared and in place to report any discoveries that might occur in the course of maintenance dredging. The protocol would be prepared by a marine archaeologist experienced in marine dredging projects and would conform to the guidelines and requirements of the National Monuments Service and the National Museum of Ireland for the recording of and reporting of archaeological finds found in the course of construction works.
- Where the dredge footprint is to be enlarged at O'Brien's Quay and Cheekpoint Lower Bar, it is recommended that archaeological monitoring licensed by the Department of Housing, Local Government and Heritage is carried out where the use of TSHD and/or mechanical dredging is to be conducted. The archaeological monitoring will take place during Year 1 of the maintenance dredging programme or when the enlargement works will take place. The archaeological monitoring will establish a baseline information. The requirement for further archaeological monitoring in future dredging seasons will be reviewed on foot of the observations and findings from Year 1 activity.
- The maintenance dredge footprint at Cheekpoint Harbour Access includes the pier head. Impacts and undermining of the pier head should be avoided during dredging operations.
- It is recommended that the requirement for archaeological monitoring on Duncannon Channel is kept under constant review and will be activated if it is believed that additional monitoring is needed in the vicinity of Duncannon Wreck (W18543) and Duncannon 2 (W11617).
- Care should be taken to ensure that the disposal of silts are retained within the boundary of the marine disposal area and should not be permitted to migrate towards the site of W04931.
- Recommendations are subject to the approval of the National Monuments Service at the Department of Housing, Local Government and Heritage.

5.10 Population and Human Health

5.10.1 Baseline

The Waterford Estuary is regularly used for commercial shipping traffic, and by local recreational, fishing and ferry vessels. Given the fact that the dredging operations occur within the marine environment, the Proposed Dredging Activities will not cause any disturbance to the general public.

5.10.2 Impact Assessment

The Proposed Dredging Activities will not result in any negative impact on the local population or on human health as no environmental pathways have been identified.

5.10.3 Mitigation Measures

All relevant Health and Safety regulations will be adhered to, which will ensure the health and safety of all staff members working onboard the vessels and the general public. Therefore, there no mitigation measures are deemed to be required for population and human health.

5.11 Landscape and Visual

5.11.1 Baseline

The Waterford Estuary is regularly used for commercial shipping traffic, and by local recreational, fishing and ferry vessels.

The lands in the surrounding area that have views of the Proposed Dredging Areas are located within County Kilkenny, County Waterford and County Wexford. It should be noted that there are no specific landscape character types or sensitivities that include the Proposed Dredging Areas or the disposal site, as these are all marine-based locations.

However, the terrestrial lands adjacent to the Waterford Estuary have been assessed for specific landscape character types or sensitivities:

- According to the Kilkenny County Development Plan 2021-2027 (KCDP), the lands bordering the Waterford Estuary and River Suir fall under the landscape character type of '*Upland Areas'* [69]. The sensitivity of the Uplands Area landscape character type ranges from '*sensitive'* to '*robust-normal'* [70].
- According to the Waterford City & County Development Plan 2022 – 2028 (WCCDP), the lands bordering the Waterford Estuary and River Suir fall under the landscape character types of '*Coastal'*, '*Rivers'* and '*Estuaries'*, and these lands fall under the sensitivity classification of '*most sensitive'* [71].
- According to the Wexford County Development Plan 2022-2028 (WCDP), the lands bordering the Waterford Estuary fall under the '*Barrow/Suir River Valley'* and *'Hook Peninsula'* [72]. The Barrow/Suir River Valley falls under the '*River Valley'* landscape character unit, which is classified as having '*moderate to high*' landscape sensitivity [72]. The Hook Peninsula falls under the '*Coastal'* landscape character unit, classified as having '*high'* landscape sensitivity [72].

5.11.2 Impact Assessment

Due to the fact that the Port of Waterford is designated as a Port of National Significance (Tier 2) and is responsible for at least 2.5% of overall tonnage through Irish ports, there are regular vessel movements entering and departing the Waterford Estuary.

The Proposed Dredging Activities will be marine-based and temporary in duration, as they will only occur when required. Furthermore, given the fact that the Proposed Dredging Activities does not constitute a new development infrastructure, and the presence of dredging vessels within the Waterford Estuary will be infrequent, it can be concluded that from a visual perspective, the Proposed Dredging Activities will not result in any landscape or visual impacts.

5.11.3 Mitigation Measures

No mitigation measures are required for landscape and visual.

5.12 Material Assets - Waste

5.12.1 Baseline & Impact Assessment

Dredged material is classified as a waste material and thus requires to be managed appropriately. Additionally, the operation of the dredger by a crew will result in the production of waste (e.g., wastewater, domestic waste).

5.12.2 Mitigation Measures

The Port of Waterford have applied to the EPA for a Dumping at Sea (DaS) permit concurrently with the Maritime Licence application to MARA. Therefore, the Port of Waterford will comply with all of the conditions specified in the DaS permit to ensure that all dredged material will be handled and disposed of correctly.

Additionally, any man-made debris recovered during the dredging works will be segregated, stored and disposed of ashore in strict accordance with the relevant regulations. The waste produced by the dredger and its crew (e.g., wastewater, domestic waste) will also be landed ashore and managed responsibly.

6 ANALYSIS OF 'IN-COMBINATION' EFFECTS

An assessment of potential in-combination effects has been undertaken. As part of this, a review of the available information sources was undertaken to identify any plans or projects that have potential to result in-combination effects with the Proposed Dredging Activities. The sources of information reviewed included:

- Maritime Area Consent (MAC) Information Notice – Phase One Projects [73];
- Dumping at Sea (DaS) Register [74];
- Foreshore Notices [75];
- An Bord Pleanála (ABP) Mapping Search [76];
- Department of Housing, Local Government and Heritage (DHLGH) - EIA Portal [77];
- Waterford City and County Council – Online Planning Enquiries [78];
- Wexford County Council – Planning Applications Search [79]; and,
- Kilkenny County Council – Search Planning Application Viewer [80].

The permitted or submitted plans or projects identified using these information sources are outlined in Table 6-1 below.

It is noted that there are numerous permissions have been identified along the coastline of Waterford, Wexford and Kilkenny [76, 78, 79, 80, 77]. However, it is not considered that these plans or projects will have any potential in-combination effects with the Proposed Dredging Activities given the fact that these applications are all terrestrial in nature and the Proposed Dredging Activities are solely marine-based.

Table 6-1: Assessment of Potential In-Combination Effects

Project Ref	Applicant	Project Description	Status of Project	Location	Potential for In-combination Effects
Phase One Projects with Maritime Area Consents					
MAC Ref: 2022-MAC-001	Oriel Windfarm Ltd.	Oriel Wind Park	MAC Granted: 23/12/2022	Ca. 6km off the north Louth Coast	No – This project is located ca. 200km from the Site.
MAC Ref: 2022-MAC-002	Sure Partners Ltd.	Arklow Bank II	MAC Granted: 23/12/2022	Ca. 6-15km off the coast of Arklow, Co. Wicklow	No – This project is located ca. 100km from the Site.
MAC Ref: 2022-MAC-003 and 004	Bray Offshore Wind Ltd. & Kish Offshore Wind Ltd.	Bray Bank & Kish Bank	MAC Granted: 23/12/2022	Ca. 10km off the coast of Dublin	No – This project is located ca. 133km from the Site.
MAC Ref: 2022-MAC-005	North Irish Sea Array Windfarm Ltd.	North Irish Sea Array	MAC Granted: 23/12/2022	Ca. 13.5km off the coast of Dublin, Meath and Louth	No – This project is located ca. 170km from the Site.
MAC Ref: 2022-MAC-006	Codling Wind Park Ltd.	Codling Wind Park (Codling I and Codling II	MAC Granted: 23/12/2022	Ca. 13-22km off the coast of Greystones and Wicklow Town, Co. Wicklow	No – This project is located ca. 125km from the Site.
MAC Ref: 2022-MAC-007	Fuinneamh Sceirde Teoranta	Skerd Rocks	MAC Granted: 23/12/2022	Ca. 5km off Connemara, Co. Galway	No – This project is located ca. 237km from the Site.
Dumping at Sea (DaS) Register					
S0012-03	Port of Waterford Company	Maintenance Dredging within navigation channels.	Granted: 14/01/2020	Dredging areas are located within the River Suit and Waterford Estuary, and the disposal site is located ca. 2.5km southwest of Hook Head.	No – The permitted maintenance dredging will expire on the 31st December 2025, at which time this application will replace the previous permit.

Project Ref	Applicant	Project Description	Status of Project	Location	Potential for In-combination Effects
S0025-01	L&M Keating Ltd	Dredging of accumulated sediments to reinstate navigational and berthing depths.	Granted: 29/09/2015	Dredging areas are located within Dunmore East Harbour and the disposal site is located ca. 2.5km southwest of Hook Head.	No – This application was for dredging works that would be completed in 2 weeks during 2015 and has since then expired.
S0030-01	Wexford County Council	Dredged material from the mouth and approach channel to Kilmore Quay harbour and dumping at sea.	Granted: 02/08/2019	At mouth and approach channel to Kilmore Quay harbour and disposal site is ca. 11km west of the harbour.	No – The disposal site is located ca. 16.2km from the Proposed Dredging Activities. Given the distance separating these activities it is not considered that in-combination effects will occur.
Foreshore Notices					
FS006684	Port of Waterford Company	Maintenance Dredging within navigation channels.	Granted: 14/01/2020	Dredging areas are located within the River Suir and Waterford Estuary, and the disposal site is located ca. 2.5km southwest of Hook Head.	No – The permitted maintenance dredging will expire on the 31st December 2025, at which time this application will replace the previous permit.
FS006983	SSE Renewables	Geophysical, Geotechnical and Environmental Site Investigation works	Current Status: Consultation Stage	Proposed site investigation works will be located off the coast of Bunmahon Bay, Co. Waterford and Bannow Bay, Co. Wexford	No – The proposed site investigation works will be located ca. 11.5km from the Proposed Dredging Activities at its nearest point. Given the distance separating these activities it is not considered that in-combination effects will occur. It should also be noted that the proposed site investigation works have not been granted.
FS007136	ESB Wind Development Limited	Site Investigations works to inform the engineering and design of a potential offshore wind farm and associated export cable route at a site named "Helvick Head Offshore Wind."	Current Status: Consultation Stage	Proposed site investigation works will be located to the ca. 10km offshore to the south of County Waterford and to the southeast of County Cork.	No – The proposed site investigation works will be ca. 9km from the Proposed Dredging Activities at its nearest point. Given the distance separating these activities it is not considered that in-combination effects will occur. It should also be noted that the proposed site investigation works have not been granted.

Project Ref	Applicant	Project Description	Status of Project	Location	Potential for In-combination Effects
FS007138	ESB Wind Development Limited	Site investigation works for the proposed Celtic Offshore Wind project comprising of two projects, one fixed and one floating.	Current Status: Consultation Stage	The fixed project (Celtic One) will be ca. 7.5km from shore and the export cable corridor for the floating project (Celtic 2) is the only aspect of the floating project that lies within the 12nm limit.	No - The proposed site investigation works will be located ca. 42.3km from the Proposed Dredging Activities at its nearest point. Given the distance separating these activities it is not considered that in-combination effects will occur. It should also be noted that the proposed site investigation works have not been granted.
FS007384	Celtic Horizon Offshore Wind Farm Limited	Site investigations work including a combination of invasive and non-invasive survey activities, consisting geophysical, geotechnical, archaeological, ecological, metocean and benthic surveys.	Current Status: Applied	The foreshore licence area will be located off the coast of Co. Wexford and Co. Waterford, the area at its closest point, is 9.01km from the Saltee Islands and 13.49km from mainland Wexford.	No – Although the proposed site investigation areas is located ca. 1.1km from the Proposed Dredging Activities, it is considered that these works will not result in in-combination effects with the Proposed Dredging Activities. This conclusion is based on the fact that the proposed site investigations will take place on a phased basis over a 5-year period, the site investigation area does not overlap with the disposal site or the Proposed Dredging Areas, and the mitigation measures in this AIMU and in the documentation provided for the site investigations will ensure no impacts occur to the receiving environment. It should also be noted that the proposed site investigation works have not been granted.

Project Ref	Applicant	Project Description	Status of Project	Location	Potential for In-combination Effects
FS007436	Voyage Offshore Array Limited	Surveys and site investigations which will include geophysical, geotechnical, and environmental surveys.	Current Status: Applied	The foreshore licence area will be located off the coast of Co. Wexford and Co. Waterford.	No – Although the site investigation area overlaps partially with the disposal site and the Creadan Bank dredging area, it is not considered that these investigations will result in cumulative impacts with the Proposed Dredging Activities due to the fact that the site investigations will not involve any dredging or disposal of dredged materials and the Proposed Dredging Activities will implement mitigation measures in order to ensure no impacts occur to any environmental receptors. It should also be noted that the proposed site investigation works have not been granted.
FS007488	Celtic Offshore Renewable Energy Limited	Surveys and site investigations will include geotechnical, environmental and metocean surveys.	Current Status: Applied	The foreshore licence area will be located off the coast of Co. Wexford and Co. Waterford.	No – Although the site investigation area partially overlaps with the disposal site and the Creadan Bank dredging area, it is not considered that these investigations will result in cumulative impacts with the Proposed Dredging Activities due to the fact that the site investigations will not involve any dredging or disposal of dredged materials and the Proposed Dredging Activities will implement mitigation measures in order to ensure no impacts occur to any environmental receptors. It should also be noted that the proposed site investigation works have not been granted.
FS007318	RWE Renewables Ireland East Celtic Limited	Surveys and site investigations will include hydrographical, geophysical, geotechnical, metocean, ecological and archaeological surveys.	Current Status: Applied	The foreshore licence area will be ca. 9km from the shore off the coast of Co. Waterford and Co. Wexford	No - The proposed site investigation works will be located ca. 8.3km from the Proposed Dredging Activities at its nearest point. Given the distance separating these activities it is not considered that in-combination effects will occur. It should also be noted that the proposed site investigation works have not been granted.

Project Ref	Applicant	Project Description	Status of Project	Location	Potential for In-combination Effects
FS007621	Péarla Offshore Wind Limited	Surveys and site investigations will include geophysical, archaeological, subtidal, marine benthic, geotechnical and intertidal surveys.	Current Status: Applied	The foreshore licence area will be located off the coast of Co. Wexford and Co. Waterford.	No – Although the site investigation area overlaps with the disposal site and the Creadan Bank dredging area, it is not considered that these investigations will result in cumulative impacts with the Proposed Dredging Activities due to the fact that the site investigations will not involve any dredging or disposal of dredged materials and the Proposed Dredging Activities will implement mitigation measures in order to ensure no impacts occur to any environmental receptors. It should also be noted that the proposed site investigation works have not been granted.
FS007661	EirGrid Public Limited Company	Surveys and site investigations will include geophysical, geotechnical and environmental surveys.	Current Status: Applied	The foreshore licence area will be located off the coast of Co. Wexford and Co. Waterford.	No – Although the site investigation area overlaps with the disposal site, it is not considered that these investigations will result in cumulative impacts with the Proposed Dredging Activities due to the fact that the site investigations will not involve any dredging or disposal of dredged materials and the Proposed Dredging Activities will implement mitigation measures in order to ensure no impacts occur to any environmental receptors. It should also be noted that the proposed site investigation works have not been granted.

7 MITIGATION MEASURES

Mitigation measures to ensure no impacts occur to any environmental receptors have been put forward in this AIMU. A summary of the mitigation measures is outlined below.

7.1 Annex IV Risk Assessment

The Annex IV Risk Assessment concluded that the mitigation measures under the current permit (Permit Reg. No. S0012-03) and Foreshore Licence (Licence Reg. No. FS006684) remain valid for the Proposed Dredging Activities. These mitigation measures include:

- **Condition 4.10.1** – The permit holder shall implement clear 'soft-start' or 'ramp up' procedures during loading and plough dredging activities, whereby sound energy input to the marine environment is gradually or incrementally increased from levels unlikely to cause significant behavioural impact on marine mammals to the full output necessary for completion of the activities; and,
- **Condition 4.10.2** – The implementation of the risk control measure for marine mammals specified in Condition 4.10.1 shall be to the satisfaction of the Agency.

Full details of the conditions are outlined in the EPA Permit Reg. No. S0012-03 and Foreshore Licence Reg. No. FS006684.

7.2 Water Quality

Although it is considered that the dredging will not result in impacts to the receiving waterbodies, mitigation measures will be implemented in order to ensure no adverse impacts occur to water quality within the Waterford Estuary. These measures include:

- Best practice measures to minimise the release of suspended solids into the receiving environment shall be implemented;
- Overflow of dredged sediment will only be permitted when it can be demonstrated that the majority of material dredged is being retained onboard;
- A documented Accident Prevention Procedure will be put in place prior to commencement;
- A documented Emergency Response Procedure will be put in place prior to commencement;
- A full record of loading and disposal tracks and a record of the material being deposited will be maintained for each trip;
- Disposal at the disposal site will be carried out through the vessel's hull whilst moving at slow speed;
- Plough dredging will be limited to spring tide periods only for Cheekpoint locations;
- Disposal will be limited to a maximum rate per day of 69,079 wet tonnes for the offshore disposal site;
- The disposal site will be divided into subsections with each used sequentially to ensure there is a uniform spread of the dredged sediments;
- All loading operations will be managed to be as efficient as possible and minimise the duration of the dredging activities;
- Water jets and automatic light mixture overboard shall only be utilised when necessary to ensure adequate production;

- To ensure that only suitably clean material shall be dumped at sea, the Port shall carry out sediment chemistry analysis in 2026, 2029 and 2032; and,
- The dredging works will be carried out in full accordance with the conditions stipulated in the Dumping at Sea permit.

7.3 Ambient Noise

This policy currently in place under the dumping at sea permit, Condition 2.2.2 will be maintained that will ensure dredger loading in the Cheekpoint Lower, refer to Figure 2-1 above, will only occur during night-time hours (11pm to 7am) should a noise assessment of the dredger demonstrate that the operation falls within the required noise limits set forth. This condition will only be revisited if such improvements in equipment can be made to ensure, to the satisfaction of the Agency, that noise limits can be met.

7.4 Cultural Heritage

As part of the UAIA, a number of mitigation measures have been outlined, which will be implemented as part of the maintenance dredging programme. These measures include the following:

- It is recommended that annual high resolution multibeam survey data acquired on DA-15, Duncannon Channel is reviewed archaeologically by a marine archaeologist experienced in marine dredging projects, to monitor the effectiveness of the Archaeological Exclusion Zones established at both the Duncannon Wreck (W18543) and Duncannon 2 (W11617) in maintaining the protective covering sands over both sites, and to advise ameliorative measures where necessary.
- Where the existing dredge footprints are to be maintained, the need for archaeological monitoring onsite is not required. An exception to this is at DA-15, Duncannon Channel in the vicinity of W18543 and W11617 if the bathymetry surveys reveal exposure of elements of the buried sites.
- A protocol should be prepared and in place to report any discoveries that might occur in the course of maintenance dredging. The protocol would be prepared by a marine archaeologist experienced in marine dredging projects and would conform to the guidelines and requirements of the National Monuments Service and the National Museum of Ireland for the recording of and reporting of archaeological finds found in the course of construction works.
- Where the dredge footprint is to be enlarged at O'Brien's Quay and Cheekpoint Lower Bar, it is recommended that archaeological monitoring licensed by the Department of Housing, Local Government and Heritage is carried out where the use of TSHD and/or mechanical dredging is to be conducted. The archaeological monitoring will take place during Year 1 of the maintenance dredging programme or when the enlargement works will take place. The archaeological monitoring will establish a baseline information. The requirement for further archaeological monitoring in future dredging seasons will be reviewed on foot of the observations and findings from Year 1 activity.
- The maintenance dredge footprint at Cheekpoint Harbour Access includes the pier head. Impacts and undermining of the pier head should be avoided during dredging operations.
- It is recommended that the requirement for archaeological monitoring on Duncannon Channel is kept under constant review and will be activated if it is believed that additional monitoring is needed in the vicinity of Duncannon Wreck (W18543) and Duncannon 2 (W11617).

- Care should be taken to ensure that the disposal of silts are retained within the boundary of the marine disposal area and should not be permitted to migrate towards the site of W04931.
- Recommendations are subject to the approval of the National Monuments Service at the Department of Housing, Local Government and Heritage.

7.5 Population and Human Health

All relevant Health and Safety regulations will be adhered to, which will ensure the health and safety of all staff members working onboard the vessels and the general public. Therefore, there no mitigation measures are deemed to be required for population and human health.

7.6 Material Assets - Waste

The Port of Waterford have applied to the EPA for a Dumping at Sea (DaS) permit concurrently with the Maritime Licence application to MARA. Therefore, the Port of Waterford will comply with all of the conditions specified in the DaS permit to ensure that all dredged material will be handled and disposed of correctly.

Additionally, any man-made debris recovered during the dredging works will be segregated, stored and disposed of ashore in strict accordance with the relevant regulations. The waste produced by the dredger and its crew (e.g., wastewater, domestic waste) will also be landed ashore and managed responsibly.

8 CONCLUSIONS

This Assessment of the Impact on the Maritime Usage Report (AIMU) has assessed the implications of the ongoing maintenance dredging and disposal activities and for slightly extended areas of dredging at Cheekpoint Lower Bar, Cheekpoint Harbour and O'Brien's Quay ('the Proposed Dredging Activities'), alone and in-combination with other projects on the receiving environment. It is considered that the full implementation of the proposed mitigation measures will ensure that no negative impacts on the receiving environment will occur.

- The Applicant intends to apply for an 8No. year DaS permit from the EPA and a Maritime Licence from MARA to dredge and dump at sea (2026-2033 inclusive).
- The Proposed Dredging Activities will involve:
    - Dredging of approximately 823,513 wet tonnes of spoil annually to maintain the Navigation Channel;
    - Disposal of the dredged material at the existing licenced offsite disposal site; and,
    - 3No. areas of extended dredging and/or ploughing at Cheekpoint Lower Bar, Cheekpoint Harbour, and O'Brien's Quay.
- The Benthic Survey Report concluded the existing benthic biotopes have remained in a stable condition despite the ongoing maintenance dredging and disposal activities by Port of Waterford, and it can be concluded that the Proposed Dredging Activities will not negatively impact on these benthic community types or on the integrity of the benthic community.
- The Aquaculture Assessment Report has concluded that given the physical oceanographic conditions in Waterford Estuary, the already turbid character of the waters, the fact that both oysters and mussels have evolved to live in such conditions and that the predicted levels of suspended sediments generated by the dredging and disposal activities was low, the level of impact of such activities on aquaculture species will be extremely low.
- The Fish Report concluded that the Waterford Estuary has good ecological status with regard to fish, and that the ecological status of fish in Waterford Estuary will not be significantly affected by the maintenance dredging programme in Waterford Estuary.
- The UAIA concluded that there are no known archaeological assets within the Proposed Dredging Areas nor are there any known archaeological assets within the offshore disposal site. Therefore, the Proposed Dredging Activities will not result in any impacts on any known archaeological monuments or features following the implementation of appropriate mitigation measures.
- Although the Proposed Dredging Areas will be located within the Lower River Suir SAC and the River Barrow and River Nore SAC, the NIS concluded that the Proposed Dredging Activities will not have any direct or indirect adverse impacts on the conservation objectives of any European Designated sites or on any notable / protected flora and fauna following the implementation of appropriate mitigation measures.
- The assessment concluded that the proposed works will not result in any adverse impacts to the hydrological or hydrogeological regime of the receiving environment following the implementation of the appropriate mitigation measures.

- The assessment concluded that the proposed works will not result in any significant ambient noise, air quality, climate, population and human health, landscape and visual or material assets (waste) impacts.
- The Annex IV Risk Assessment concluded that the Proposed Dredging Activities will not result in any impacts to marine mammals following the implementation of the appropriate mitigation measures.
- Although the navigation channel into Port of Waterford has, for the most part, good water depths, the sediment input from storm events, the Duncannon and Cheekpoint sand bars, and the ongoing maintenance of the berths at Belview all require maintenance through regular dredging to ensure of the navigation channel remains fit for purpose and safe to use.

9 REFERENCES

[1] Government of Ireland, “Project Ireland 2040 - National Marine Planning Framework,” 2021.

[2] Department of Housing, Local Government and Heritage, “Draft River Basin Management Plan for Ireland 2022-2027,” Government of Ireland, 2021.

[3] EPA, “EPA Map Viewer,” 2024. [Online]. Available: http://gis.epa.ie/Envision.

[4] Government of Ireland, “Marine Strategy Framework Directive 2008/56/EC - Article 17 update to Ireland’s Marine Strategy Part 1: Assessment (Article 8), Determination of Good Environmental Status (Article 9) and Environmental Targets (Article 10),” 2020.

[5] Department of Housing, Local Government and Heritage, “Public Consultation on Ireland’s Marine Strategy Part 2: Programme of Measures,” Government of Ireland, 2022.

[6] Government of Ireland , “Public Consultation on Ireland’s Marine Strategy Part 2: Programme of Measures,” 2022.

[7] EPA, “Guidelines on the Information to be Contained in Environmental Impact Assessment Reports,” Environmental Protection Agency, Dublin, 2022.

[8] Statutory Instrument, “The Planning and Development (Amendment) Act,” office of the General, Dublin, 2018.

[9] Statutory Instrument, “the Planning and Development Regulations (as amended),” 2001.

[10] European Parliament, “Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment Text with EEA relevance,” 2014.

[11] Statutory Instrument, “Foreshore Act 1993 (as amended),” Statutory Instrument, 2023.

[12] Government of Ireland, “Maritime Area Planning Act 2021,” 2021.

[13] European Commission, “Interpretation of Definitions of project Categories of Annex I and II of the EIA Directive”.

[14] EU, “Environmental Impact Assessment of Projects. Guidance on Screening,” 2017.

[15] DEHLG, “Guidance for Consent Authorities regarding Sub-Threshold Development,” 2003.

[16] EPA, “Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Draft),” EPA, 2017.

[17] DHPLG, “Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive) - Circular 1/2017’, 15th May 2017,” 2017.

[18] DHPLG, “Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment,” 2018.

[19] R. Kennedy, “Benthic Biotope classification of subtidal sedimentary habitats in the Lower River Suir candidate Special Area of Conservation and the River Nore and River Barrow candidate Special Area of Conservation (July 2008),” 2008.

[20] NPWS, “Conservation Objectives Report - River Barrow and River Nore SAC,” National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht., 2011.

[21] E. De-Bastos and J. Hill, “[Polydora ciliata] and [Corophium volutator] in variable salinity infralittoral firm mud or clay,” Plymouth: Marine Biological Association of the United Kingdom, 2016.

[22] H. Tyler-Walters, “Infralittoral fluid mobile mud,” In Tyler-Walters H. and Hiscock K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews, [on-line].

[23] H. Tillin and W. Rayment, “[Fabulina fabula] and [Magelona mirabilis] with venerid bivalves and amphipods in infralittoral compacted fine muddy sand,” In Tyler-Walters H. and Hiscock K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews, [on-line], 2016.

[24] D. M. O'Farrell, “Port Of Waterford Maintenance Dredging Programme: Fish Report,” AMC, 2023.

[25] D. Ryan, J. Coyne, D. Putharee and W. Roche, “Fish Stock Survey of Transitional Waters in the Southern River Basin District – Barrow, Nore, Suir Estuary 2016,” Inland Fisheries Ireland, 2017.

[26] D. Ryan, J. Cooney, E. Leonard, K. Nolan and W. Roche, “Fish Stock Survey of Transitional Waters in the Southern River Basin District – Barrow, Nore, Suir Estuary 2019,” Inland Fisheries Ireland, 2020.

[27] N. Teague, A. Sutcliffe, L. Fullbrook, R. Phillips and A. Scorey, “Great Island Power Station - Fish Impingement Study for SSE,” APEM, 2018.

[28] Anon., “Great Island CWS Fish Impingement Study (November 2020),” Aztec Management Consultants, Dublin and Aquafact International Services Ltd., 2021.

[29] Anon., “Great Island CWS Fish Impingement Study (June 2021),” Aztec Management Consultants, Dublin and Aquafact International Services Ltd., 2021.

[30] Anon., “Great Island CWS Fish Impingement Study (November 2022),” Aztec Management Consultants, Dublin and Triturus Environmental Ltd., 2023.

[31] Anon., “Great Island CWS Fish Impingement Study (June 2023),” Aztec Management Consultants, Dublin and Triturus Environmental Ltd., 2023.

[32] W. Corcoran, R. Matson, P. McLoone, A. Bateman, D. Cierpial, A. Gavin, P. Gordon, E. McCarthy, K. Kelly, S. Robson, G. Wightman, W. Roche and F. Kelly, “Sampling Fish for the Water Framework Directive - Summary Report 2022,” Inland Fisheries Ireland, 2023.

[33] H. Cabral, A. Borja, V. Fonseca, T. Harrison, N. Teichert, M. Lepage and M. Leal, “Fishes and Estuarine Environmental Health,” in *Fish and Fisheries in Estuaries: A Global Perspective*, vol. 1, John Wiley & Sons Ltd., 2022.

[34] N. Teichert, A. Borja, G. Chust, A. Uriarte and L. M., “Restoring fish ecological quality in estuaries: implication of interactive and cumulative effects among anthropogenic stressors,” *Science of the Total Environment,* vol. 542, no. A, pp. 383-393, 2016.

[35] A. Wenger, E. Harvey, S. Wilson, C. Rawson, S. Newman, D. Clarke, B. Saunders, N. Browne, M. Travers, J. Mcilwain, P. Erftemeijer, J. Hobbs, D. Mclean, D. M. and R. Evans, “A critical analysis of the direct effects of dredging on fish,” *Fish and Fisheries,* vol. 18, pp. 967-985, 2017.

[36] D. Wilber and D. Clarke, “Biological Effects of Suspended Sediments: A Review of Suspended Sediment Impacts on Fish and Shellfish with Relation to Dredging Activities in Estuaries,” *North American Journal of Fisheries Management,* vol. 21, pp. 855-875, 2001.

[37] M. Cunningham, “A review and analysis of water quality monitoring data from the Port of Waterford before, during and after the plough dredging campaigns of July 2020 to Feb 2021,” 2021.

[38] NPWS, “National Parks and Wildlife Service,” 2024. [Online]. Available: https://www.npws.ie.

[39] Irish Ramsar Wetland Committee, “Ramsar Sites in Ireland,” 2024. [Online]. Available: https://www.irishwetlands.ie/irish-sites/.

[40] NPWS, “Nature Reserves in Ireland,” Department of Housing, Local Government and Heritage, 2024. [Online]. Available: https://www.npws.ie/nature-reserves.

[41] NPWS, “Seas off Wexford cSPA,” National Parks & Wildlife Service, 2024. [Online]. Available: https://www.npws.ie/protected-sites/spa/004237. [Accessed 01 2024].

[42] D. Jarrett, J. Calladine, A. Cook, A. Upton, J. Williams, S. Williams, J. Wilson, M. Wilson, I. Woodward and E. Humphreys, “Behavioural responses of non-breeding waterbirds to marine traffic in the near-shore environment,” *Bird Study,* vol. 68, no. 4, pp. 443-454, 2021.

[43] A. Cook and N. Burton, "A Review of the Potential Impacts on Marine Aggregate Extraction on Seabirds," Marine Aggregate Levy Sustainability Fund (MALSF), 2010.

[44] S. Garthe and O. Huppop, "Effect of Ship Speed on Seabird Counts in Areas Supporting Commercial Fisheries," *Journal of Field Ornithology,* vol. 70, no. 1, pp. 28-32, 1999.

[45] G. Gilbert, A. Stanbury and L. Lesley Lewis, "Birds of Conservation Concern in Ireland 4: 2020-2026," 2020.

[46] Marine Management Organisation, "Displacement and habituation of seabirds in response to marine activities. A report produced for the Marine Management Organisation," MMO Project No: 1139, 2018.

[47] M. Ruddock and D. Whitefield, "A review of disturbance distances in selected bird species," A report for Natural Research (Projects) Ltd. to Scottish Natural Heritage, 2007.

[48] ABPmer, "Waterford Estuary, Plough Assessment, ABPmer Report No. R.2899TN," A report produced by ABPmer for Port of Waterford, 2017.

[49] NPWS, "Legislation," 2021. [Online]. Available: https://www.npws.ie/legislation.

[50] NBDC, "National Biodiveristy Live Maps," 2024. [Online]. Available: http://maps.biodiversityireland.ie/.

[51] H. Kruuk, Otters: Ecology, behaviour and conservation, Oxford University Press, 2006.

[52] EC, "Managing Natura 2000 Sites: The Provision of Article 6 of the Habitats Directive 92/43/EEC," European Commission, 2018.

[53] DoEHLG, "Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities," Department of the Environment, Heritage and Local Government, 2010.

[54] OPR, "Appropriate Assessment Screening for Development Management," 2021.

[55] IDS Monitoring Environmental Data Acquisition and Telemetry, "A review of dredge related monitoring data at Cheek Point, Waterford for a period covering three campaigns between January and March 2017," 2017.

[56] EPA, "Water Quality in Ireland," 2016-2021.

[57] A. Hawkins, R. Smith, B. Bayne and M. Heral, "Novel observations underlying the fast growth of suspension feeding shellfish in turbid environments: Mytilus edulis," *Marine Ecology Progress Series,* vol. 131, pp. 179-190, 1996.

[58] M. Dutertre, L. Barille, P. Beninger, P. Rosa and Y. Gruet, "Variations in the pallial organ sizes of the invasive oyster, Crassostrea gigas, along an extreme turbidity gradient," *Estuarine, Coastal and Shelf Science,* vol. 85, pp. 431-436, 2009.

[59] L. Barillé, A. Lerouxel, M. Dutertre, J. Haure, A. Barillé, S. Pouvreau and M. Alunno-Bruscia, "Growth of the Pacific oyster (Crassostrea gigas) in a high-turbidity environment: Comparison of model simulations based on scope for growth and," *Journal of Sea Research,* Vols. 392-402, p. 66, 2021.

[60] J. Lunt and D. Smee, "Turbidity alters estuarine biodiversity and species composition," *Journal of Marine Science,* vol. 77, pp. 379-387, 2020.

[61] M. Cunningham, "Review and analysis of the turbidity data before & during the plough dredging campaign of early 2023," 2023.

[62] A. Giese and J. Pearse, "Chapter 6: Ostreidea," in *Reproduction of Marine Molluscs*, London, Academic Press, 1979, p. 368.

[63] E. Gosling, Marine Bivalve Molluscs, Wiley Blackwell, 2015.

[64] INFOMAR, "Seabed and Sediment," GSI, Marine Institute, & Department of Environment, Climate and Communications, 2024. [Online]. Available: https://www.infomar.ie/maps/interactive-maps/seabed-and-sediment.

[65] EPA, "AirQuality.ie," Environmental Protection Agency (EPA), 2024. [Online]. Available: https://airquality.ie/. [Accessed 2024].

[66] European Environment Agency, "International maritime navigation, international inland navigation, national navigation (shipping), national fishing, military (shipping), and recreational boats," EMEP/EEA air pollutant emission inventory guidebook 2019, 2021.

[67] Government of Ireland, "Climate Action Plan 2023," Government of Ireland, Dublin, 2023.

[68] ADCO, "Port of Waterford - Navigation Maintenance Dredging Programme 2026-2033: Underwater Archaeological Impact Assessment," 2024.

[69] Kilkenny City and County Council, "Kilkenny City and County Development Plan 2021-2027," 2021.

[70] Kilkenny County Council, "Appendix C: Landscape Character Assessment," 2003.

[71] Waterford City and County Council, "Waterford City & County Development Plan 2022 – 2028," 2022.

[72] Wexford County Council, "Wexford County Development Plan 2022-2028," 2022.

[73] Department of the Environment, Climate and Communications, "Maritime Area Consent (MAC) Information Notice – Phase One Projects," Government of Ireland, 2022.

[74] EPA, "Search for Dumping at Sea (DaS) application, permit or Environment Information," 2024. [Online]. Available: https://epawebapp.epa.ie/terminalfour/DaS/index.jsp.

[75] Department of Housing, Local Government and Heritage, “Foreshore Notices,” 2024. [Online]. Available: https://www.gov.ie/en/foreshore-notices/.

[76] An Bord Pleanála, “Map Seach,” 2024. [Online]. Available: https://www.pleanala.ie/en-ie/map-search. [Accessed 2024].

[77] Department of Housing, Local Government and Heritage, “EIA Portal,” [Online]. Available: https://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=d7d5a3d48f104ecbb206e7e5f84b71f1. [Accessed 2024].

[78] Waterford City and County Council, “Online Planning Enquiries,” 2024. [Online]. Available: https://www.waterfordcouncil.ie/departments/planning/planning-enquiries/online-planning-enquiries.htm.

[79] Wexford County Council, “Search Planning Applications,” 2024. [Online]. Available: https://www.wexfordcoco.ie/planning/search-planning-applications.

[80] Kilkenny County Council, “Kilkenny County Council Planning Portal,” 2024. [Online]. Available: https://kilkennycoco.maps.arcgis.com/apps/webappviewer/index.html?id=05af4c18c54e498091dc8c7d33c4b4aa.