Kilrush Maritime Ltd.

Maintenance Dredging Activity – Kilrush Marina

Supporting Information for Screening for Appropriate Assessment and Natura Impact Statement

Aisling Hearty

AQUAFACT Ref: P17851
October 2026
COMMERCIAL IN CONFIDENCE

Client: **Kilrush Maritime Ltd.**

Address: **Kilrush Marina, Merchants Quay, Leadmore West, Kilrush, Co. Clare, V15 AD62**

Reference no: **P17851**

Date of issue: **October 2026**

AQUAFACT contact: **Aisling Hearty**

Position: **Principal Ecologist**

E-mail: **aisling@aquafact.ie**

Telephone: **+353 (0) 91 756812**

Website: **www.aquafact.ie**

Address: **AQUAFACT International Services Ltd,**

9A Liosban Business Park,

Tuam Road,

Galway,

Ireland.

H91 K120

Registered in Ireland: **No. 493496**

Tax Reference Number: **9773384O**

Tax Clearance Number: **559674**

Approval Sheet

Client	Kilrush Maritime Ltd.
Report Title	Maintenance Dredging Activity – Kilrush Marina Supporting Information for Screening for Appropriate Assessment and Natura Impact Statement
Job Number	P17851
Report Status	Final - Updated
Issue Date	October 2026

Rev	Status	Issue Date	File Name	Author(s)	Approved By
1	Final	November 2025	P17851_Kilrush_DaS_NIS_Final	Aisling Hearty	Brendan Dickerson
2	Update	October 2026	P17851_Kilrush_DaS_NIS_Updated	Aisling Hearty	Aidan Long

AQUAFACT
APEM Group

Table of Contents

1. Introduction 1
1.1. Overview 1
1.2. Appropriate Assessment Process 3
1.3. Guidance/Legislation 4
1.4. Statement of Authority 6
2. Stage 1: Screening for Appropriate Assessment 6
2.1. Description of the Project 7
2.2. Assessment Methodology: Source-Pathway-Receptor 8
2.3. Potential Impact Mechanisms 11
2.3.1. Potential Impact Mechanism 1: Pollution of marine environment from spills/leakages 11
2.3.2. Potential Impact Mechanism 2: Noise and vibration 11
2.3.3. Potential Impact Mechanism 3: Loss of prey biomass 11
2.3.4. Potential Impact Mechanism 4: Physical Disturbance 12
2.4. European sites in the zone of influence 13
2.4.1. Special Areas of Conservation 14
2.4.2. Special Protection Areas 18
2.5. Assessment of Potential Significant Effects 26
2.5.1. Assessment of Mobile Annex II Marine Species 34
2.6. Plans or Projects That Might Act in Combination 41
2.6.1. Threats and Pressures 42
2.6.2. Plans 43
2.6.3. Projects 43
2.6.4. Aquaculture Operations 47
2.6.5. Dredging 47
2.6.6. Navigation and Marine Traffic 47
2.6.7. Diffuse and Point Source Pollution 48
2.6.8. Conclusion 48
2.7. Screening Outcome 49
3. Stage 2: Natura Impact Statement 52
3.1. Overview 52
3.2. Impact Prediction 53
3.2.1. Potential Impact Mechanism 1 - Pollution of marine environment from spills/leakages 57
3.2.1.1. Potential Receptors 57
3.2.1.2. Impact Assessment 58
3.2.1.3. Mitigation Measures 58

3.2.1.4. Conclusion 59
3.2.2. Potential Impact Mechanism 2 – Noise and vibration 60
3.2.2.1. Potential Receptors 61
3.2.2.2. Impact Assessment 62
3.2.2.3. Mitigation Measures 63
3.2.2.4. Conclusion 64
3.2.3. Potential Impact Mechanism 3 - Loss of Prey Biomass 64
3.2.3.1. Potential Receptors 65
3.2.3.2. Impact Assessment 65
3.2.3.3. Mitigation Measures 66
3.2.3.4. Conclusion 67
3.2.4. Potential Impact Mechanism 4 – Physical Disturbance 67
3.2.4.1. Potential Receptors 68
3.2.4.2. Impact Assessment 69
3.2.4.3. Mitigation Measures 71
3.2.4.4. Conclusion 72
3.3. Summary of Mitigation Measures 74
3.4. Plans or Projects that might act in-combination 76
3.5. Natura Impact Statement Conclusion 78
4. References 79

List of Figures

Figure 1-1: Proposed dredging area and site location, Kilrush Marina, Co. Clare.....2
Figure 1-2: Four stages of the Appropriate Assessment Process. 3
Figure 2-1: Suspended sediment over 24-hour period after neap tide ploughing (100m^3 per hour).....9
Figure 2-2: Suspended sediment over 24-hour period after spring tide ploughing (100m^3 per hour). 10
Figure 2-3: SACs in ZoI of Project..... 17
Figure 2-4: SPAs in ZoI of project..... 22

List of Tables

Table 2-1: Qualifying Interests (QIs) for SACs in the Zone of Influence (ZoI) of the Project. 15
Table 2-2: Special Conservation Interests (SCIs) for SPAs in the Zone of Influence (ZoI) of the Project..... 19
Table 2-3: Foraging Distances of Relevant SCIs. 23
Table 2-4: Assessment of potential significant effects from the impact mechanisms to the conservation features..... 27
Table 2-5: Hydrological distance of SACs designated for marine mammal species in Ireland..... 36
Table 2-6: Functional frequencies of various cetaceans and pinnipeds found in Irish waters (adapted from Southall *et al.* (2007 & 2019))..... 40
Table 2-7: Ranked threats and pressures to Lower River Shannon SAC relevant to Kilrush. 42
Table 2-8: threats and pressures in River Shannon and River Fergus Estuaries SPA relevant to Kilrush..... 42
Table 2-9: Assessment of potential in-combination effects with projects..... 44
Table 2-10: Summary of the Appropriate Assessment Screening outcome. 49
Table 3-1: Impact mechanisms relevant to the conservation features..... 54

1. Introduction

1.1. Overview

This report has been prepared by AQUAFACT - APEM Group (AQUAFACT) to provide relevant information to enable the competent authority (MARA) to carry out a Stage 1: Screening for Appropriate Assessment for Kilrush Marina maintenance dredging activity ('the Project') as required under Article 6(3) obligations of the Habitats Directive. MARA's functions and decision-making in this context are guided by the Maritime Area Planning Act 2021 and related statutory instruments, which establish its responsibility for assessing licence applications in line with European and national environmental law. This report considers the potential effects of the Project on European sites.

The objective of the Project is to undertake maintenance dredging of the existing access channel on the seaward approaches to Kilrush Creek, Kilrush, County Clare. The works involve the removal of accumulated sediments that have reduced the navigability of the channel leading to Kilrush Marina and the inner harbour area. The dredged material is proposed to be levelled with a plough dredge in accordance with relevant environmental legislation and permitting requirements. The Project is essential to ensure the continued safe access for vessels using the marina and to maintain the operational functionality of the harbour. The locations of the dredging works are shown in **Figure 1-1**.

The aims/benefits of the Project can be summarised as follows:

- To restore and maintain safe navigational depths within the access channel to Kilrush Marina
- To ensure continued maritime access for recreational, commercial, and emergency vessels
- To prevent sedimentation-related access constraints that could impact the local economy and harbour operations
- To manage dredged material in an environmentally responsible manner through licensing conditions from the DaS application

Following submission of the original Supporting Information for Screening for Appropriate Assessment (SISAA) and Natura Impact Statement (NIS), MARA undertook an Appropriate Assessment Screening in accordance with Regulation 42 of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. On 28 September 2026, MARA determined that Stage 2 Appropriate Assessment is required for the proposed maritime usage, as likely significant effects on European sites could not be excluded on the basis of objective scientific information. This NIS has therefore been revised to reflect the findings of MARA's Appropriate Assessment Screening and Determination Report for MUL250020, including the European sites and associated Qualifying Interests (QIs) and Special Conservation Interests (SCIs) identified by MARA as requiring further assessment at Stage 2.

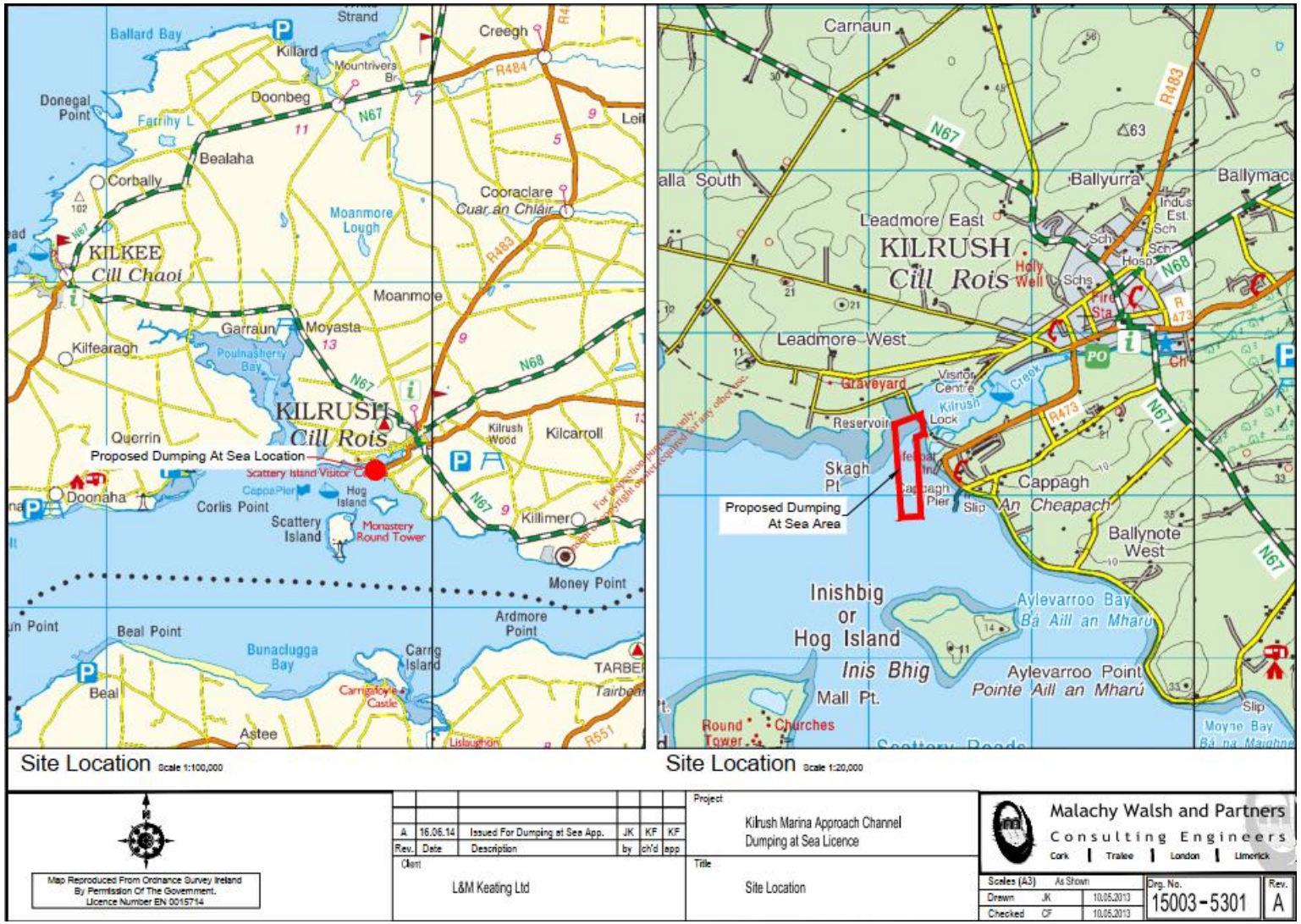


Figure 1-1: Proposed dredging area and site location, Kilrush Marina, Co. Clare.

1.2. Appropriate Assessment Process

Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (commonly known as the Habitats Directive) is the European Community legislation based on nature conservation established to ensure biodiversity is conserved through the conservation of natural habitats, wild fauna and flora in Europe. A network of sites of conservation importance hosting habitats and species as needing to be either maintained at or, where appropriate, restored to favourable conservation status have been selected as a Special Area of Conservation (SAC) and Special Protection Area (SPA), which are collectively referred to in Ireland as European sites. Together these comprise the Natura 2000 network of protected sites (OPR, 2021). The specific named habitat and/or non-bird species for which an SAC is selected are called 'Qualifying Interests' (QI) of the site while specific named bird species for which an SPA is selected are called 'Special Conservation Interest' (SCIs) of the site (OPR, 2021). In this report, QIs and SCIs are collectively referred to as 'conservation features'.

The Habitats Directive was originally transposed into Irish law by the European Communities (Natural Habitats) Regulations, 1997 (S.I. No. 94 of 1997). The 1997 Regulations were subsequently revoked and replaced by the European Communities (Birds and Natural Habitats) Regulations 2011, as amended (herein referred to as the 2011 Birds and Natural Habitats Regulations). The Habitats (92/43/EEC) and Birds (2009/147/EC) Directives were transposed into the Irish legislation by Part XAB of the 2000 Act and the Birds and Natural Habitats Regulations 2011. The legislative provisions for AA Screening for planning applications are set out in Section 177U of the 2000 Act.

Articles 6(3) and Article 6(4) of the Habitats Directive outlines the decision-making procedures for considering plans and projects that may have a significant effect on a Natura 2000 site. The Department of the Environment Heritage and Local Government guidelines (DEHLG, 2009, reviewed in 2010) promotes a four-stage process (**Figure 1-2**) to complete the AA and outlines the issues and tests at each stage. Stage 1 and Stage 2 encompass the main requirements for assessment under Article 6(3) of the Habitats Directive. Stage 3 may be part of the Article 6(3) Assessment or may be a necessary precursor to Stage 4. Stage 4 is the main derogation step of Article 6(4).

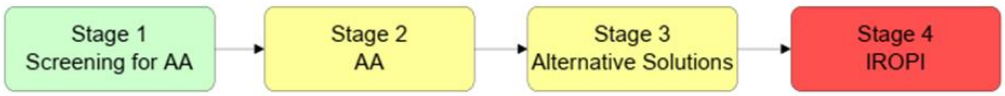


Figure 1-2: Four stages of the Appropriate Assessment Process.

An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required.

1.3. Guidance/Legislation

This report has been prepared in accordance with the following guidance:

- European Commission (2018) Managing Natura 2000 sites. The provisions of Article 6 of the Habitats Directive 92/43/EEC Commission notice.
- Office of Planning Regulator (2021) Practice Note PN01 Appropriate Assessment screening for development management.
- Department of Environment, Housing and Local Government (2009) Appropriate Assessment of plans and projects in Ireland guidance for planning authorities (Revised 2010).
- European Commission (2001) Assessment of plans and projects in relation to Natura 2000 sites – methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC Commission notice.
- Habitats Directive (Council Directive 92/43/EEC) 1992.
- Birds Directive (Directive 79/409/EEC) 1979, amended Directive 2009/147/EC.
- European Communities (Birds and Natural Habitats) Regulations 2011-2021
- Department of Arts, Heritage and the Gaeltacht – National Parks and Wildlife Service (DAHG - NPWS) (2012) Marine Natura Impact Statements in Ireland Special Areas of Conservation, a working document.
- NPWS (2014) Guidance to Manage the Risk to Marine Mammals from Man-Made Sound Sources in Irish Waters.
- EPA (2006, updated 2019) Guidelines for the Assessment of Dredged Material in Irish Waters and Addendum on Dumping at Sea Site Selection Guidance.
- Maritime Area Planning Act (2021) – provisions relating to Appropriate Assessment (AA) and Environmental Impact Assessment (EIA) for maritime projects.
- MARA (2024) Applicant Technical Guidance (V7) for Maritime Area Consents and Licensing.
- Marine Institute technical advice and data resources on sediment characterisation, dredged material assessment, and baseline marine environment datasets.

This assessment includes a desk-based review of available records of protected QIs and SCIs including the following sources:

- Conservation status assessment reports, backing documents and maps prepared to inform national reporting required under Article 17 of the Habitats Directive[1].
- Site synopsis, conservation objective reports and Natura 2000 forms available from NPWS.
- Published and unpublished NPWS reports on protected habitats and species including Irish Wildlife Manual reports, species action plans and conservation management plans.

- Existing relevant mapping and databases *e.g.* waterbody status, species and habitat distribution, *etc*. (sourced from the Environmental Protection Agency (EPA) - http://gis.epa.ie/, the National Biodiversity Data Centre (NBDC) - http://maps.biodiversityireland.ie and the NPWS - http://www.npws.ie/mapsanddata/).

1.4. Statement of Authority

This report has been prepared by Aisling Hearty (BSc, MSc & ACIEEM).

Aisling is a Principal Ecologist with 6 years of experience in consultancy and marine ecology. She is a graduate of B.Sc Science from University of Galway (UG, formerly National University of Ireland, Galway) and a First-Class Honours M.Sc in Marine Biology from UCC (University College Cork) where she completed her thesis on habitat distribution modelling of odontocetes using bioacoustic analysis. She then went on to co-author a published paper on the findings of this thesis which supported the designation of the Southeastern Rockall Slope and Canyons as an Important Marine Mammal Area (IMMA). Aisling also has a wide range of experience in ecological survey techniques and methodologies including grab sampling, freshwater kick sampling, intertidal sampling and drop-down video deployment and analysis and she is GWO and BOSIET certified. Aisling has a JNCC certification and an NPWS certification as a Marine Mammal Observer and has carried out both desk and field-based assessments regarding Marine Mammals in Ireland. Aisling has a wide range of experience in the preparation of Appropriate Assessment Screening reports, Natura Impact Statements, Ecological Impact Assessments, Environmental Impact Assessment Reports and supporting documents for an IROPI designated project. Aisling's project history includes working on aquaculture licensing, renewable energy projects (solar farms and onshore and offshore wind) and water quality projects. She is responsible for the preparation of the SISAA and NIS.

2. Stage 1: Screening for Appropriate Assessment

Stage 1 AA Screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3):

i. whether a plan or project is directly connected to or necessary for the management of European site, and
ii. whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on a European site in view of its conservation objectives.

If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2 (AA). Measures intended to avoid or reduce the harmful effects of a project on a European site cannot be taken into account at the screening stage (People Over Wind and Sweetman v Coillte Teoranta, C-323/17). Screening has therefore been undertaken without regard to any such measures, consistent with the approach taken by MARA in its screening determination (MARA, 2026a).

2.1. Description of the Project

Maintenance dredging is required to ensure that navigable water depths are maintained at previously approved levels within the existing approach channel to Kilrush Creek. The dredging of the channel seaward of the lock gates is necessary to provide adequate under-keel clearance, thereby facilitating the safe and efficient passage of vessels to and from Kilrush Marina and the inner harbour.

The proposal described in this report forms part of a long-established programme of maintenance dredging in this area, which has been carried out periodically since the completion of Cappagh Pier in the mid-19th century. Dredging activities have become more regular and essential following the development of the adjacent Kilrush Marina, which was completed circa 1990.

The proposed works will be carried out over a period of approximately five to ten working days per campaign. The equipment used to plough the marina approach channel will include a Multicat type tug towing an 8 m wide plough blade suspended from an A-frame on the stern of the vessel. SFPC's Multicat Shannon 1 has been successfully used previously and will be commissioned again for this project, if it is not available a similar model will be used. The proposed MUL area covers a total of 4.77 ha, with approximately 8000 T of material being dredged per campaign. The sides of the channel will have a gradient of 1:4. The ploughing rate is estimated to be 100 m^3 per hour depending on the length of the haul.

The channel to be ploughed is *ca*. 250 m long. Ploughing commences with a short run at the outermost end in a seaward direction. Each successive pass extends inwards until the ploughing run covers the full length of the channel. This is repeated daily for the duration of the campaign.

The licence is requested for a duration of 8 years, with 5 campaigns planned, spaced out approx. every 2 years for a total of 40,000 T dredged material over the licence duration.

2.2. Assessment Methodology: Source-Pathway-Receptor

The assessment of impact mechanisms considers all relevant aspects of the Project that have potential direct or indirect effects on conservation features. In order to establish the Zone of Influence (ZoI) of the Project, the assessment of likely significant effects will be based on the Source-Pathway-Receptor (S-P-R) Model (OPR, 2021):

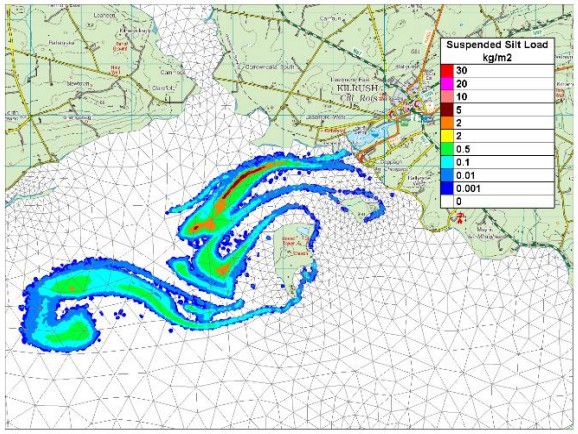
- **Source** - Identification of the characteristics of the Project based on the nature, size, location and type of impacts.
- **Pathway** – Identification of pathways that could link European sites and their conservation features to the Project.
- **Receptor** – Identification of the location, nature and sensitivities of the conservation features and the ecological conditions supporting their survival and the conservation objectives specified to maintain or restore favourable conservation condition.

In order to establish the ZoI of the Project, the assessment of connectivity between impact mechanisms and a conservation feature considers the location of the Project relative to habitats and non-mobile species, species foraging distances and migration routes, the proximity of the Project to foraging and breeding areas, potential changes in species behaviour, potential hydrological connectivity between the Project and conservation features, effects on prey species resulting in alteration of interactions and associated impacts.

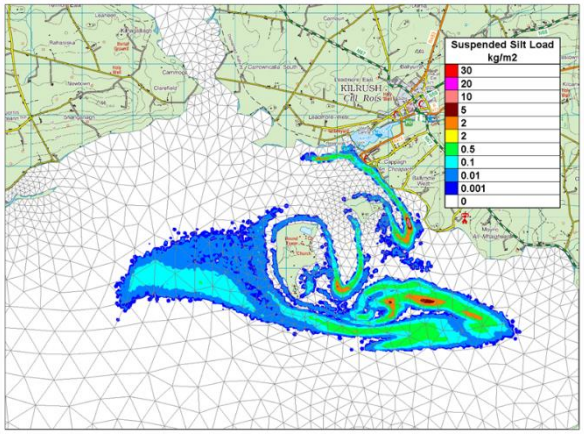
The ZoI for the proposed Project is defined as the area encompassing the dredging footprint (**Figure 2-1** and **Figure 2-2**) and the extent of predicted sediment dispersion identified in the sediment transport modelling report which is 2.5 km from the MUL area. The modelling indicates that dredged material will disperse effectively within the outer and middle Shannon Estuary. The ZoI therefore includes areas subject to temporary increases in turbidity, minor sedimentation, and vessel activity. Underwater and airborne noise from plough dredging and associated vessel operations are expected to be low intensity and short duration, attenuating rapidly with distance. Consequently, the acoustic ZoI is considered to be limited to the immediate vicinity of the dredging area, with no significant effects anticipated beyond this local area.

To inform the screening exercise, available data on protected habitats and species was mapped using a Geographic Information System (GIS) and interrogated to identify the S-P-R connectivity. The source, pathways and receptors were identified based on a review of ecological data in the area. If there is no ecological pathway or functional link between the Project and the conservation feature of the European site, there is no potential for impact and the conservation feature can be screened out.

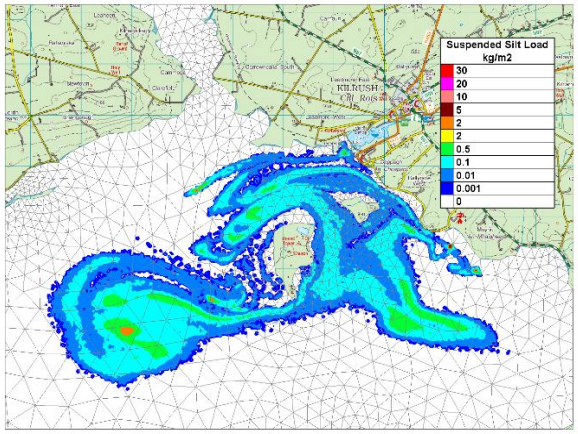
Section 2.4 and section 2.5 considers the likely significant effects from the impact mechanisms from the Project alone, while **section 2.6** considers potential in-combination effects with other plans or projects.



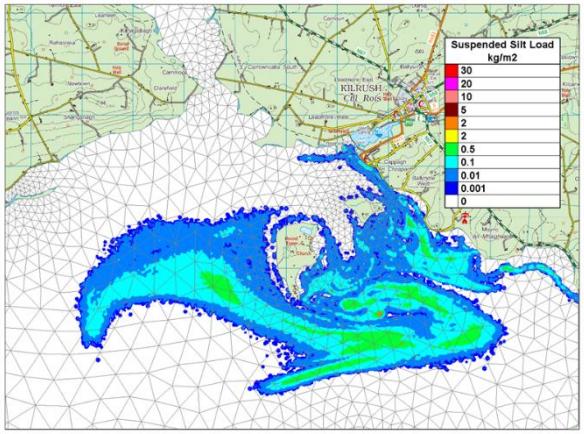
a) After 6 hours



b) After 12 hours

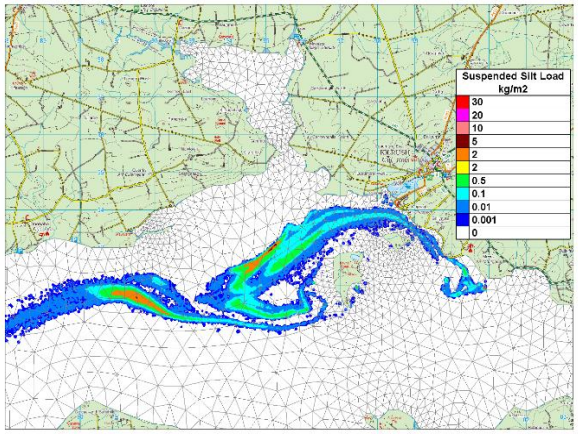


c) After 18 hours

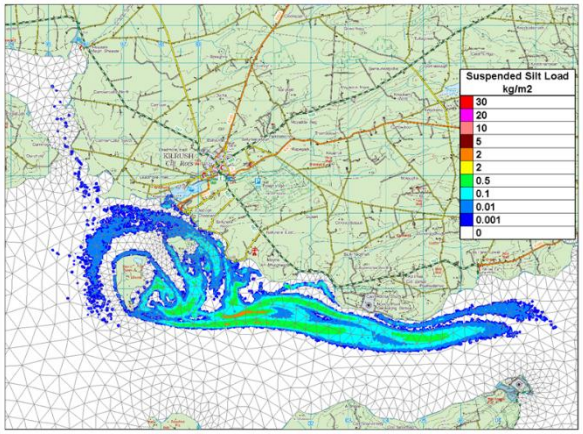


d) After 24 hours

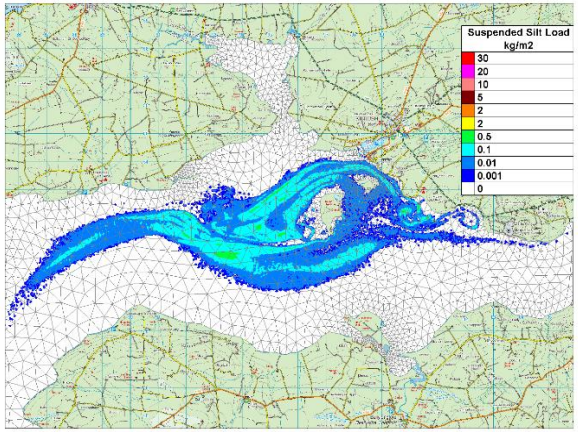
Figure 2-1: Suspended sediment over 24-hour period after neap tide ploughing (100m^3 per hour).



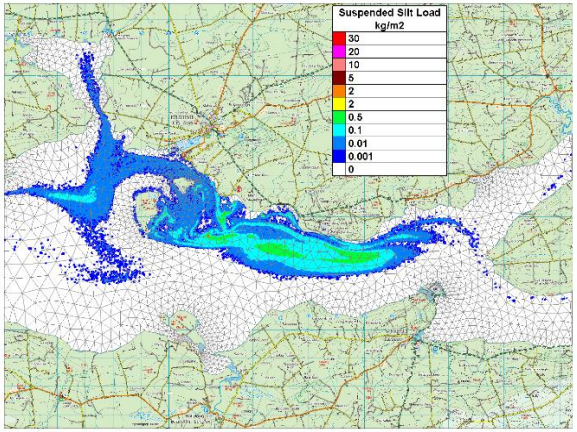
a) After 6 hours



b) After 12 hours



c) After 18 hours



d) After 24 hours

Figure 2-2: Suspended sediment over 24-hour period after spring tide ploughing (100m^3 per hour).

2.3. Potential Impact Mechanisms

A detailed description of the Project is provided above; given the nature of the proposed activities associated with the Project, the potential impact mechanisms (or sources of impact) are:

2.3.1. Potential Impact Mechanism 1: Pollution of marine environment from spills/leakages

Accidental spills or leakages from machinery poses a potential risk to the marine environment during the dredging operations. Such incidents could result in the release of polluting substances, including hydrocarbons (*e.g*. diesel, lubricants, hydraulic fluids), into the surrounding water column or sediment. These substances can be toxic to aquatic organisms, particularly filter feeders, benthic invertebrates, bird species and fish species, and may contribute to the degradation of water quality within the zone of influence. Furthermore, any accidental release of contaminants may lead to indirect impacts on qualifying interests of nearby Natura 2000 sites, including designated bird species reliant on intertidal or subtidal foraging habitats. While the risk of such events is typically low if best practice measures are in place, it remains a relevant potential impact pathway and must be considered in the overall assessment of likely significant effects.

2.3.2. Potential Impact Mechanism 2: Noise and vibration

The dredging operations and associated vessel movements have the potential to generate underwater noise and vibration, which may cause temporary disturbance to sensitive marine fauna, particularly marine mammals and fish species. Mechanical dredging equipment and support vessels activities can produce low to moderate levels of underwater acoustic emissions that may disrupt normal behaviour, including foraging, communication, or navigation. Species listed under Annex II of the Habitats Directive, such as the Harbour Porpoise (*Phocoena phocoena*), are known to be particularly sensitive to anthropogenic noise. While the anticipated noise levels are not expected to result in permanent hearing damage or physical harm, there remains the potential for temporary behavioural disturbance within the zone of acoustic influence. The significance of such impacts depends on the presence, abundance, and sensitivity of qualifying species within nearby European Sites, and must therefore be assessed in the context of the conservation objectives of those sites.

2.3.3. Potential Impact Mechanism 3: Loss of prey biomass

The proposed dredging activities have the potential to result in a temporary loss or reduction of benthic and epibenthic prey biomass within the affected areas, which may impact species that rely on these resources for foraging. Physical disturbance of the seabed during dredging can displace, injure, or remove infaunal and epifaunal organisms, including polychaetes, molluscs, and small crustaceans, which form important

components of the diet for a range of protected species. In particular, fish, marine mammals such as bottlenose dolphins (*Tursiops truncatus*), and diving waterbirds designated as qualifying interests of nearby European Sites (*e.g*. the River Shannon and River Fergus Estuaries SPA) may be affected if their foraging grounds are temporarily degraded or their prey availability is significantly reduced. While recolonisation of disturbed areas typically occurs over time, the scale, timing, and frequency of the proposed works must be considered in assessing the potential for short-term prey depletion and whether this could lead to significant ecological impacts on designated species within Natura 2000 sites.

2.3.4. Potential Impact Mechanism 4: Physical Disturbance

The proposed dredging operations have the potential to cause physical disturbance to the marine environment within the dredging footprint. This disturbance may result from the direct removal of seabed sediments, which can lead to temporary habitat loss or alteration, and from increased turbidity caused by sediment resuspension during dredging. Such physical impacts may affect benthic communities, particularly in areas supporting sensitive or slow-recovering species. While these effects are generally localised and temporary in nature, their potential to impact the conservation objectives of nearby European Sites must be carefully assessed, particularly where qualifying habitats or species are located within or adjacent to the zone of influence of the proposed works.

In addition to the direct disturbance caused by dredging activities, the operation of project vessels has the potential to cause additional physical disturbance to marine fauna. Increased vessel traffic in and around the dredge area may lead to displacement of sensitive species, such as marine mammals and waterbirds, from important foraging or resting areas. Vessel movements can also increase the risk of collision with large marine fauna, including basking sharks, seals, and cetaceans. For species reliant on undisturbed intertidal or nearshore habitats, such as otters, increased vessel activity could cause temporary avoidance behaviour, thereby reducing habitat use in the vicinity of the works. While such disturbance is typically short-term and reversible once activity ceases, it remains an important impact pathway to consider, particularly where vessels operate in close proximity to known areas of ecological importance.

2.4. European sites in the zone of influence

The zone of influence (ZoI) for the proposed dredging at Kilrush Marina was established through a review of the hydrodynamic and sediment dispersion modelling previously carried out, alongside consideration of the proposed dredging methodology and associated equipment. The modelling report provided spatial predictions of the extent, duration, and concentration of suspended sediment plumes during dredging operations, thereby identifying the likely spatial footprint of potential water quality impacts. In addition, the type of dredging equipment to be employed and the operational methodology were reviewed to determine the potential for physical disturbance and resuspension of sediments. The assessment also incorporated the potential for sound propagation from dredging equipment and vessel activity, recognising that underwater noise can act as a disturbance mechanism for sensitive marine fauna. Together, these factors informed a precautionary delineation of the ZoI, ensuring that all relevant Natura 2000 sites and receptors with a reasonable likelihood of interaction were included in the screening and subsequent impact assessment. The SACs and SPAs within the Zone of Influence of the proposed Kilrush Creek site are shown in **Figure 2-3** and **Figure 2-4**, respectively.

Table 2-1 and **Table 2-2** show the conservation features for which the European sites are designated, their conservation objectives and the distance of the SACs and SPAs to the Project. Bird foraging ranges can be seen in **Table 2-3**. All site synopsis and conservation objectives for the European sites can be accessed through the NPWS website[2].

2.4.1. Special Areas of Conservation

In accordance with Article 6(3) of the Habitats Directive, this assessment considers the potential for the proposed dredging and activitiy to significantly affect any Special Areas of Conservation (SACs) located within the project's identified zone of influence. The zone of influence encompasses the spatial extent within which direct, indirect, or cumulative impacts arising from the proposed works could reasonably occur, including those related to sediment disturbance, water quality changes, noise, and habitat alteration. All SACs hydrologically or ecologically connected to the project area have been screened in. The Qualifying Interests (QIs) and conservation objectives of each relevant SAC have been reviewed to determine whether the proposed activities could undermine the integrity of these sites, either alone or in combination with other plans or projects.

Table 2-1: Qualifying Interests (QIs) for SACs in the Zone of Influence (ZoI) of the Project.

SAC (site code)	Distance from Project (km)	Qualifying Interest	Ecological Group	Conservation objective
Lower River Shannon SAC [002165]	<0 km	Freshwater Pearl Mussel (*Margaritifera margaritifera*) [1029]	Annex II freshwater mollusc	Restore favourable conservation condition
		Sea Lamprey (*Petromyzon marinus*) [1095]	Annex II fish species	Restore favourable conservation condition
		Brook Lamprey (*Lampetra planeri*) [1096]	Annex II fish species	Maintain favourable conservation condition
		River Lamprey (*Lampetra fluviatilis*) [1099]	Annex II fish species	Maintain favourable conservation condition
		Atlantic Salmon (*Salmo salar*) [1106]	Annex II fish species	Restore favourable conservation condition
		Bottlenose Dolphin (*Tursiops truncatus*) [1349]	Annex II marine mammal	Maintain favourable conservation condition
		Otter (*Lutra lutra*) [1355]	Annex II mammal species	Restore favourable conservation condition
		Sandbanks slightly covered by sea water all the time [1110]	Annex I marine habitat	Maintain favourable conservation condition
		Estuaries [1130]	Annex I marine habitat	Maintain favourable conservation condition
		Mudflats and sandflats not covered at low tide [1140]	Annex I marine habitat	Maintain favourable conservation condition
		Coastal Lagoons [1150]	Annex I marine habitat	Restore favourable conservation condition
		Large shallow inlets and bays [1160]	Annex I marine habitat	Maintain favourable conservation condition
		Reefs [1170]	Annex I marine habitat	Maintain favourable conservation condition
		Perennial vegetation of stony banks [1220]	Annex I coastal habitat	Maintain favourable conservation condition
		Vegetated sea cliffs of the Atlantic & Baltic coasts [1230]	Annex I coastal habitat	Maintain favourable conservation condition
		Salicornia and other annual colonisers [1310]	Annex I saltmarsh habitat	Maintain favourable conservation condition
		Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	Annex I saltmarsh habitat	Restore favourable conservation condition
		Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	Annex I saltmarsh habitat	Restore favourable conservation condition
		Water courses of plain to montane levels with Ranunculion fluitantis/Callitricho-Batrachion [3260]	Annex I freshwater habitat	Maintain favourable conservation condition
		Molinia meadows on calcareous/peaty soils [6410]	Annex I grassland habitat	Maintain favourable conservation condition
		Alluvial forests (*Alnus glutinosa* & *Fraxinus excelsior*) [91E0]	Annex I woodland (priority)	Restore favourable conservation condition

SAC (site code)	Distance from Project (km)	Qualifying Interest	Ecological Group	Conservation objective
Kerry Head Shoal SAC [002263]	35 km	Reefs [1170]	Annex I marine habitat	Maintain favourable conservation condition

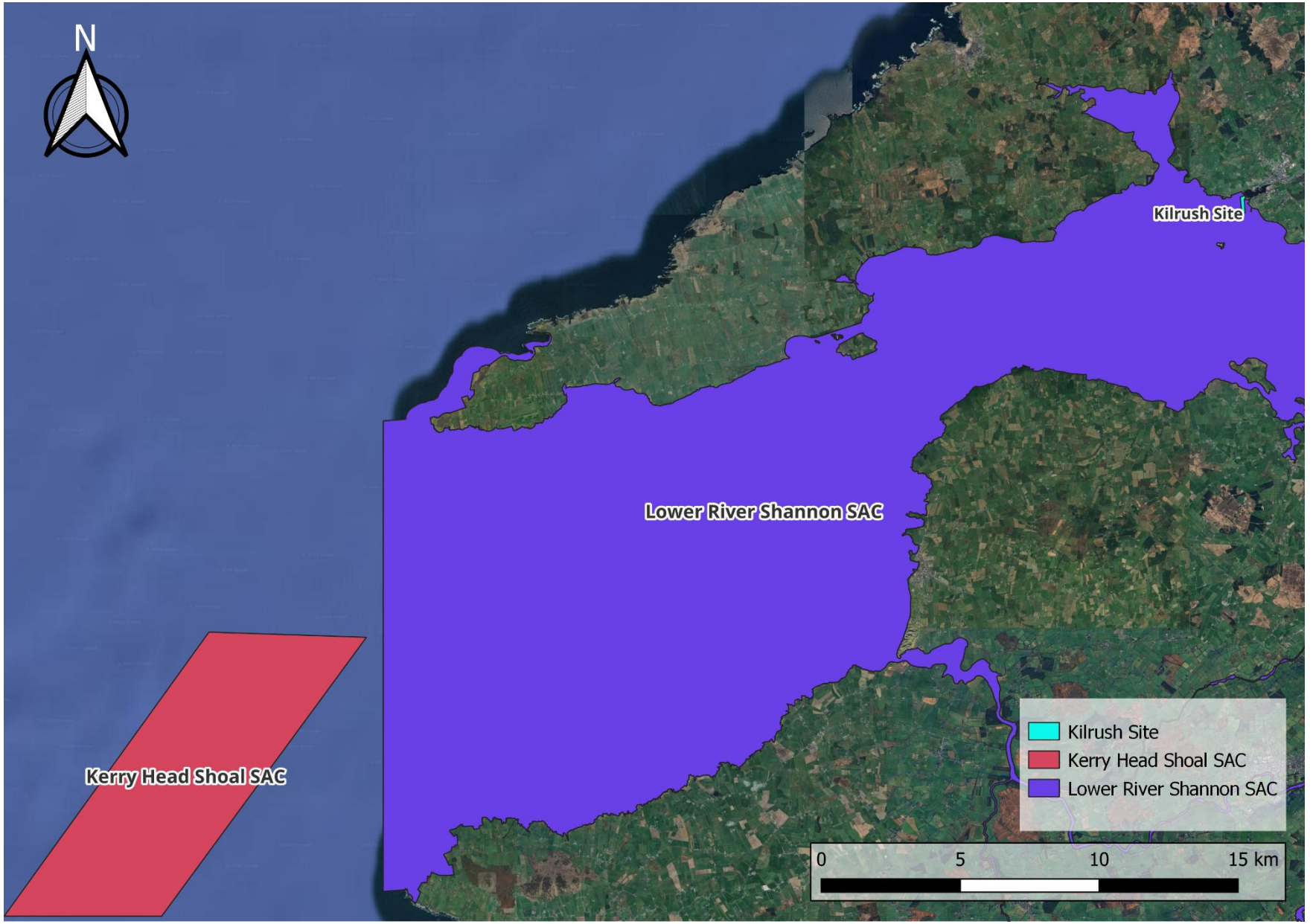


Figure 2-3: SACs in ZoI of Project.

2.4.2. Special Protection Areas

In accordance with Article 6(3) of the Habitats Directive, this assessment evaluates the potential for the proposed dredging activity to result in significant effects on any Special Protection Areas (SPAs) located within the identified zone of influence of the project. This zone encompasses the area within which direct, indirect, or cumulative impacts could plausibly arise, including those associated with disturbance to bird species, changes in water quality, sediment dispersion, and alteration of foraging or roosting habitats. All SPAs that are ecologically connected to the project site, either through hydrological linkage or functional habitat use by listed bird species, have been included in the screening process. The Special Conservation Interests (SCIs) and site-specific conservation objectives of each SPA have been examined to determine whether the proposed works could cause likely significant effects on these sites, either individually or in combination with other relevant plans or projects.

Table 2-2: Special Conservation Interests (SCIs) for SPAs in the Zone of Influence (ZoI) of the Project.

SPA (site code)	Distance from Project (km)	Special Conservation Interest	Ecological Group	Conservation objective
River Shannon and River Fergus Estuaries SPA [004077]	<0 km	Whooper Swan (*Cygnus cygnus*) [A038]	Wintering wildfowl (Annex I)	Maintain the favourable conservation condition.
		Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]	Wintering wildfowl (Annex I)	Maintain the favourable conservation condition.
		Shelduck (*Tadorna tadorna*) [A048]	Wader species	Maintain the favourable conservation condition.
		Wigeon (*Mareca penelope*) [A855]	Wintering wildfowl	Maintain the favourable conservation condition.
		Teal (*Anas crecca*) [A052]	Wintering wildfowl	Maintain the favourable conservation condition.
		Pintail (*Anas acuta*) [A054]	Wintering wildfowl	Maintain the favourable conservation condition.
		Shoveler (*Spatula clypeata*) [A857]	Wintering wildfowl	Maintain the favourable conservation condition.
		Scaup (*Aythya marila*) [A062]	Wintering wilfowl	Maintain the favourable conservation condition.
		Cormorant (*Phalacrocorax carbo*) [A017]	Seabird species	Maintain the favourable conservation condition.
		Ringed Plover (*Charadrius hiaticula*) [A137]	Wintering wader (Annex I) (Year round population also present)	Maintain the favourable conservation condition.
		Golden Plover (*Pluvialis apricaria*) [A140]	Wintering wader (Annex I)	Maintain the favourable conservation condition.
		Grey Plover (*Pluvialis squatarola*) [A141]	Wintering wader (Annex I)	Maintain the favourable conservation condition.
		Lapwing (*Vanellus vanellus*) [A142]	Wintering wader (Year-round population also present)	Maintain the favourable conservation condition.

SPA (site code)	Distance from Project (km)	Special Conservation Interest	Ecological Group	Conservation objective
		Knot (*Calidris canutus*) [A143]	Wintering wader (Annex I)	Maintain the favourable conservation condition.
		Dunlin (*Calidris alpina alpina*) [A149]	Wintering wader (Annex I)	Maintain the favourable conservation condition.
		Black-tailed Godwit (*Limosa limosa*) [A156]	Wintering wader (Annex I)	Maintain the favourable conservation condition.
		Bar-tailed Godwit (*Limosa lapponica*) [A157]	Wintering wader (Annex I)	Maintain the favourable conservation condition.
		Curlew (*Numenius arquata*) [A160]	Wintering wader (Annex I)	Maintain the favourable conservation condition.
		Redshank (*Tringa totanus*) [A162]	Wintering wader	Maintain the favourable conservation condition.
		Greenshank (*Tringa nebularia*) [A164]	Wintering wader (Annex I)	Maintain the favourable conservation condition.
		Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	Gull species	Maintain the favourable conservation condition.
		Wetlands and Waterbirds [A999]	Supporting habitat	Maintain the favourable conservation condition of the wetland habitat.
Mid-Clare Coast SPA [004182]	12	Cormorant (*Phalacrocorax carbo*) [A017]	Breeding seabird	Maintain the favourable conservation condition.
		Barnacle goose (*Branta leucopsis*) [A045]	Wintering wildfowl (Annex I)	Maintain the favourable conservation condition.
		Ringed plover (*Charadrius hiaticula*) [A137]	Wintering wader	Maintain the favourable conservation condition.
		Sanderling (*Calidris alba*) [A144]	Wintering wader	Maintain the favourable conservation condition.
		Purple Sandpiper (*Calidris maritima*) [A148]	Wintering wader	Maintain the favourable conservation condition.

SPA (site code)	Distance from Project (km)	Special Conservation Interest	Ecological Group	Conservation objective
		Dunlin (*Calidris alpina*) [A149]	Wintering wader	Maintain the favourable conservation condition.
		Turnstone (*Arenaria interpres*) [A169]	Wintering wader	Maintain the favourable conservation condition.
		Wetland and Waterbirds [A999]	Supporting habitat	Maintain the favourable conservation condition of the wetland habitat.
Illaunonearaun SPA [004114]	15.3	Barnacle Goose (*Branta leucopsis*) [A045]	Wintering wildfowl (Annex I)	To restore the favourable conservation condition.
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA [004161]	16.7	Hen Harrier (*Circus cyaneus*) [A082]	Grassland bird (Annex I)	To restore the favourable conservation condition.
Kerry Head SPA [004189]	22.3	Fulmar (*Fulmarus glacialis*) [A009]	Seabird species	Maintain favourable conservation condition.
		Chough (*Pyrrhocorax pyrrhocorax*) [A346]	Annex I bird species	Restore favourable conservation condition.
Loop Head SPA [004119]	27	Kittiwake (*Rissa tridactyla*) [A188]	Seabird species	Maintain favourable conservation condition.
		Guillemot (*Uria aalge*) [A199]	Seabird species	Maintain favourable conservation condition.

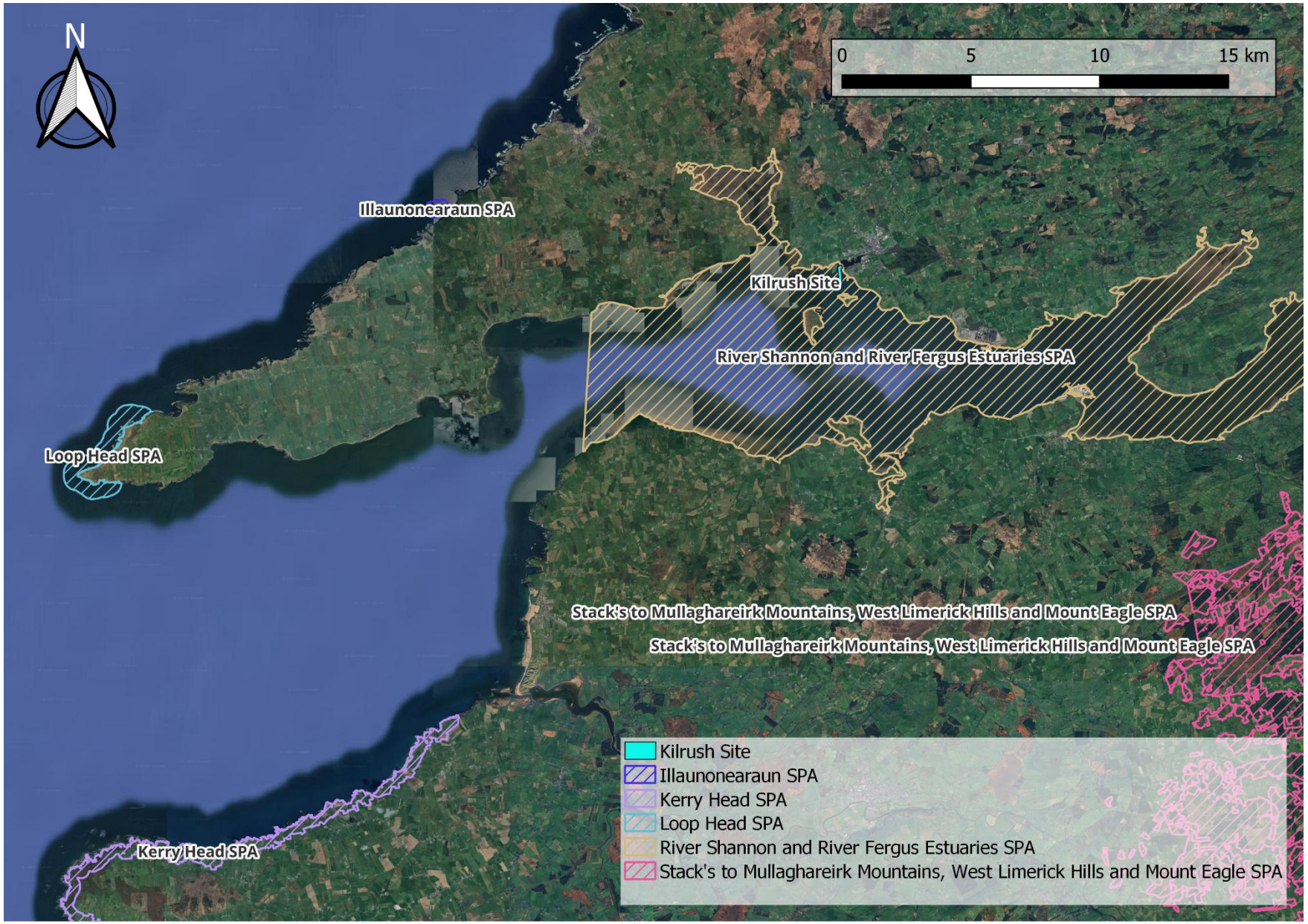


Figure 2-4: SPAs in ZoI of project.

Table 2-3: Foraging Distances of Relevant SCIs.

Species (SCI code)	Typical foraging/commuting distance used for screening	Notes	Key sources
Whooper Swan (A038)	Core ~5 km; up to ~20 km	Regular roost–field commutes; 5 km "core" widely used in SPA connectivity.	NatureScot SPA Connectivity guidance[3]
Light-bellied Brent Goose (A046)	Typically 3–10 km (often ≤5 km)	Coastal/estuarine feeders commuting between high-tide roosts and shores/fields.	BSG Ecology collation of literature[4]
Shelduck (A048)	Usually within estuary; ~1–10 km	Crepuscular/nocturnal feeding; commuting within and between estuary sectors.	Johnson *et al*. 2014 (review of duck FFDs).
Wigeon (A050)	~1–10 km (mean dabblers ≈5 km)	Grazing on eelgrass/saltmarsh and fields near roosts.	Johnson *et al*. 2014 (mean dabblers 5.1 ± 4.4 km).
Teal (A052)	~1–10 km (often ≤5 km)	Shorter flights where food abundant; site dependent.	Johnson *et al*. 2014 & Guillemain *et al*., 2008
Pintail (A054)	~1–15 km (commonly ≤10 km)	Longer flights recorded in some systems.	Johnson *et al*. 2014
Shoveler (A855)	~1–10 km (often ≤5 km)	Filtering in shallow wetlands; usually close to roost.	Johnson *et al*. 2014 & Gray *et al*., 1996
Scaup (A857)	Typically within 5–15 km of core mussel beds/roosts (site-specific)	Wintering in bays/estuaries near benthic prey; movements between bays possible.	Natural England, 2012[5] & Marchowski *et al*., 2020
Cormorant (A017)	Commonly ≤10–20 km; up to 25–30 km recorded	Wide variability; central-place forager from roost/colony.	BirdLife factsheet[6]; Paillisson *et al*., 2004, Veneranta et al., 2020
Ringed Plover (A137)	Typically within estuary/shoreline; ~1–5 km from roosts	Small coastal home ranges; strong roost–flat linkage.	Clausen & Bregnballe 2022, Goodship & Furness 2022
Golden Plover (A140)	Core ~3 km; up to ~10 km	Regular high-tide roost ↔ inland pasture commutes.	NatureScot SPA Connectivity guidance [3]; Whittingham *et al*., 2000.
Grey Plover (A141)	Typically within 5–10 km of roosts	Estuarine commuting between roosts and outer flats.	Clausen & Bregnballe 2022
Lapwing (A142)	Usually ≤.5 of breeding/nesting locations	Inland field foraging from coastal roosts.	Cevenini *et al*., 2025
Knot (A143)	10–16 km (typically)	Strong site fidelity shown, with major aggregation within ≲10 km; weekly foraging area ~800 km² (radius ~16 km)	Oudman *et al*., 2018 & Peng *et al*., 2024
Dunlin (A149)	Majority ≤5 km from roost	Densities fall steeply beyond ~5 km from roost.	Dias *et al*., 2006
Black-tailed Godwit (A156)	0.5 km–31 km	Commutes between estuarine roosts and flooded grasslands.	Wadertales – Inland feeding by coastal godwits[7]

Species (SCI code)	Typical foraging/commuting distance used for screening	Notes	Key sources
Bar-tailed Godwit (A157)	Typically ≤5–10 km	Largely intertidal forager near coastal roosts.	Clausen & Bregnballe 2022
Curlew (A160)	Often ≤5–10 km	Movements between mudflat foraging and inland fields.	Clausen & Bregnballe 2022, Goodship & Furness 2022
Redshank (A162)	Typically ≤5 km	High site fidelity within estuary sectors.	Clausen & Bregnballe 2022
Greenshank (A164)	Typically ≤2–3 km during breeding season (no information on general foraging dist.)	Scattered individuals; commute between creeks and roosts.	NatureScot SPA Connectivity guidance[3]
Black-headed Gull (A179)	Commonly 5–17 km (with longer distances for rural colonies	Generalist; wide ranging to farmland, tips, intertidal.	Jakubas *et al*., 2020
Barnacle Goose (A045)	Commonly 10–15 km; occasionally longer	Primarily forage on terrestrial grasslands; limited use of intertidal.	NatureScot SPA Connectivity guidance[3]
Hen Harrier (A082)	Core ~1 km (breeding); up to ~9 km recorded	In forested areas Hen Harriers forage in young plantations, closed canopy forests are generally not used by this species.	Arroyo *et al*., 2014
Fulmar (A009)	Mean range of 69 Km, max of 664 km	Offshore forager; large colony-centred ranges.	Natural England Technical Information Note TIN126[8] - Fulmar
Chough (A346)	Typically 0–2 km from nest/roost (often ≤1–1.5 km)	Coastal pasture/strandline specialist; short commute.	Robertson *et al*., 1995 & Colhoun *et al*., 2024
Kittiwake (A188)	Commonly 30-50 km, Mean max ~60 km (breeding)	Pelagic forager; wide colony radius.	Natural England Technical Information Note TIN128[9] - Black Legged Kittiwake
Guillemot (A199)	Commonly 24 km, Mean max ~50–100 km (breeding)	Central-place forager at sea; large ranges.	Natural England Technical Information Note TIN123[10] - Common Guillemot

I-WeBS Data Request

An I-WeBS (Irish Wetland Bird Survey) data request was submitted in September 2025 for subsites in proximity to the proposed Project area. The purpose of this request was to establish recent patterns of waterbird usage within and adjacent to the Zone of Influence (ZoI). The closest sub-site to the Kilrush site with available information was Poulnasherry bay. The datasets included peak counts for relevant species over the 2019/20 and 2020/21 seasons, allowing assessment against all-Ireland and flyway 1% population thresholds, as well as evaluation of species of conservation concern *(e.g*. BoCCI (Birds of Conservation Concern in Ireland) Red and Amber listed species).

The information supplied forms the basis for determining the relative importance of the site to wintering and migratory waterbirds, identifying species regularly present in notable numbers, and highlighting those that meet or exceed national or international thresholds. These data are summarised below.

Across the 2019/20 and 2020/21 I-WeBS seasons, Poulnasherry Bay supported moderate numbers of wintering waterbirds, with peaks recorded for Light-bellied Brent Goose (93), Shelduck (175), Teal (321), Dunlin (646), Pintail (35) and Curlew (276). None exceeded the 1% flyway population thresholds, but Shelduck, Curlew, Pintail and Teal approached or exceeded the all-Ireland 1% thresholds in at least one year, highlighting their local conservation significance. Several Red List species (Curlew, Lapwing, Dunlin) were also regularly present.

These results indicate that Poulnasherry Bay functions as an important supporting site for a range of wintering and migratory waterbirds within the lower Shannon Estuary complex. While no species were recorded in numbers exceeding international (flyway) thresholds, the consistent presence of several species meeting or approaching the national (all-Ireland) 1% threshold underscores the site's local ecological value. The assemblage reflects the wider estuarine character of the area, supporting both intertidal foragers and surface-feeding waterfowl. Given the distance of Poulnasherry Bay from the proposed works and the limited spatial extent of predicted disturbance, no likely significant effects are predicted.

2.5. Assessment of Potential Significant Effects

A detailed description of the proposed Project has been provided in the preceding sections. Based on the nature, scale, and location of the proposed works, specifically the maintenance dredging of the existing navigation channel, there are several potential impact mechanisms that could give rise to effects on nearby European sites. These impact mechanisms (or sources of impact) arise primarily from the physical and operational characteristics of the dredging activities and include both direct and indirect pressures on the receiving environment. The key potential impact mechanisms identified for assessment are as follows:

1. Pollution of marine environment from spills/leakages
2. Noise and vibration
3. Loss of prey biomass
4. Physical disturbance

Table 2-4: Assessment of potential significant effects from the impact mechanisms to the conservation features.

Site	QIs or SCIs	Impact Mechanisms	S-P-R Assessment	Brought to Stage 2 (Y/N)
Lower River Shannon SAC [002165]	Freshwater Pearl Mussel (*Margaritifera margaritifera*) [1029]	**1.** Pollution of marine environment from spills/leakages **2.** Noise and vibration **3.** Loss of prey biomass **4.** Physical disturbance	No clear hydrological pathway between marine dredging area and known populations of FPM (limited to upstream, freshwater rivers). No functional link. No connectivity.	No connectivity exists, therefore this QI has been screened out and will not be considered for Stage 2 Assessment.
	Sea Lamprey (*Petromyzon marinus*) [1095]		**Adults and juveniles may occur in estuarine areas seasonally during migration. Potential exposure to sediment disturbance, underwater noise and contaminants. Connectivity identified.**	**Connectivity established, will be brought forward for Stage 2 assessment.**
	Brook Lamprey (*Lampetra planeri*) [1096]		Species restricted to freshwater; unlikely to be present near marine works. No exposure pathway. No connectivity.	No connectivity exists, therefore this QI has been screened out and will not be considered for Stage 2 assessment.
	River Lamprey (*Lampetra fluviatilis*) [1099]		**Species uses estuarine areas during migration. Potential exposure to dredging-related impacts. Connectivity identified.**	**Connectivity established, will be brought forward for Stage 2 assessment.**
	Atlantic Salmon (*Salmo salar*) [1106]		**Migratory species passing through estuarine/marine areas; potential exposure to water quality, noise, suspended sediment. Connectivity identified.**	**Connectivity established, will be brought forward for Stage 2 assessment.**
	Bottlenose Dolphin (*Tursiops truncatus*) [1349]		**Mobile marine species; may be sensitive to underwater noise, vessel traffic, and pollution. Although it is noted that the works will be carried out outside of the areas of Critical Habitat identified in the Conservation Objectives document. Connectivity identified.**	**Connectivity established, will be brought forward for Stage 2 assessment.**
	Otter (*Lutra lutra*) [1355]		**Otters may forage in coastal areas; limited but potential exposure to disturbance, due to territorial nature the number of individuals within the marina is expected to be low. However they may be susceptible to contamination from pollutants.**	**Connectivity established, will be brought forward for Stage 2 assessment.**
	Sandbanks slightly covered by sea water all the time [1110]		No meaningful hydrological pathway between the Project and this QI has been identified within the modelled sediment dispersion area. No connectivity.	No connectivity exists, therefore this QI has been screened out and will not be considered for Stage 2 assessment.
	Estuaries [1130]		**Directly within receiving environment; potential for physical alteration, turbidity, or contamination. Connectivity identified.**	**Connectivity established, will be brought forward for Stage 2 assessment.**
	Mudflats and sandflats not covered at low tide [1140]		**Vulnerable to smothering and turbidity during dredging operations. Connectivity identified.**	**Connectivity established, will be brought forward for Stage 2 assessment.**

Site	QIs or SCIs	Impact Mechanisms	S-P-R Assessment	Brought to Stage 2 (Y/N)
	Coastal Lagoons [1150]		Sediment dispersion model does not show any deposition in this habitat.	No connectivity exists, therefore this QI has been screened out and will not be considered for Stage 2 assessment.
	Large shallow inlets and bays [1160]		**Broad habitat type; may experience temporary disturbance or water quality changes. Connectivity identified.**	**Connectivity established, will be brought forward for Stage 2 assessment.**
	Reefs [1170]		**Sensitive benthic habitat; may be affected by dredge plume, smothering or spills. Connectivity identified.**	**Connectivity established, will be brought forward for Stage 2 assessment.**
	Perennial vegetation of stony banks [1220]		Typically supratidal; unlikely exposure. No connectivity.	No connectivity exists, therefore this QI has been screened out and will not be considered for Stage 2 Assessment.
	Vegetated sea cliffs of the Atlantic & Baltic coasts [1230]		No plausible pathway from marine dredging to sea cliff vegetation. No connectivity.	No connectivity exists, therefore this QI has been screened out and will not be considered for Stage 2 Assessment.
	Salicornia and other annual colonisers [1310]		Habitat not within ZoI on review of sediment dispersion modelling.	No connectivity exists, therefore this QI has been screened out and will not be considered for Stage 2 Assessment.
	Atlantic salt meadows (*Glauco Puccinellietalia maritimae*) [1330]		**Although outside the direct dredging footprint, potential indirect effects through sediment/water-quality changes within the hydrologically connected estuarine environment cannot be excluded at screening. Connectivity identified.**	**Connectivity established, will be brought forward for Stage 2 assessment.**
	Mediterranean salt meadows (*Juncetalia maritimi*) [1410]		Habitat not within ZoI on review of sediment dispersion modelling.	No connectivity exists, therefore this QI has been screened out and will not be considered for Stage 2 Assessment.
	Water courses of plain to montane levels with *Ranunculion fluitantis/Callitricho Batrachion* [3260]		Freshwater habitat; located upstream to the proposed works. No connectivity.	No connectivity exists, therefore this QI has been screened out and will not be considered for Stage 2 Assessment.
	Molinia meadows on calcareous/peaty soils [6410]		Terrestrial habitat, no connection to marine works. No connectivity.	No connectivity exists, therefore this QI has been screened out and will not be considered for Stage 2 Assessment.
	Alluvial forests (*Alnus glutinosa* & *Fraxinus excelsior*) [91E0]		Riparian/floodplain woodland; no pathway from marine works. No connectivity.	No connectivity exists, therefore this QI has been screened out and will not be considered for Stage 2 Assessment.

Site	QIs or SCIs	Impact Mechanisms	S-P-R Assessment	Brought to Stage 2 (Y/N)
Kerry Head Shoal SAC [002263]	Reefs [1170]	**1.** Pollution of marine environment from spills/leakages **2.** Noise and vibration **3.** Loss of prey biomass **4.** Physical disturbance	The SAC is located approximately 35 km from the proposed project area. Given this distance, there is no hydrodynamic or acoustic pathway linking the project to the reef habitats. No connectivity.	No connectivity exists, therefore this QI has been screened out and will not be considered for Stage 2 Assessment.
Inishmore Island SAC [000213]	**Harbour Porpoise (*Phocoena phocoena*) [1351]**	**1.** Pollution of marine environment from spills/leakages **2.** Noise and vibration **3.** Loss of prey biomass **4.** Physical disturbance	**Highly mobile marine mammal capable of ranging beyond the SAC and potentially occurring within the Project ZoI. Potential exposure to underwater noise, vessel activity/collision risk and changes to supporting habitat/prey. Functional connectivity identified.**	**Connectivity established, will be brought forward for Stage 2 assessment.**
Galway Bay Complex SAC [000268]	**Harbour Seal (*Phoca vitulina*) [1365]**	**1.** Pollution of marine environment from spills/leakages **2.** Noise and vibration **3.** Loss of prey biomass **4.** Physical disturbance	**Mobile marine mammal capable of foraging beyond the SAC boundary and potentially occurring within the Project ZoI. Potential exposure to underwater noise, vessel activity/collision risk and changes to supporting habitat/prey. Functional connectivity identified.**	**Connectivity established, will be brought forward for Stage 2 assessment.**
Blasket Islands SAC [002172]	**Harbour Porpoise (*Phocoena phocoena*) [1351]**	**1.** Pollution of marine environment from spills/leakages **2.** Noise and vibration **3.** Loss of prey biomass **4.** Physical disturbance	**Highly mobile marine mammal capable of ranging substantially beyond the SAC boundary. Potential exposure within the Project ZoI to underwater noise, vessel activity/collision risk and changes to supporting habitat/prey. Functional connectivity identified.**	**Connectivity established, will be brought forward for Stage 2 assessment.**
	Grey Seal (*Halichoerus grypus*) [1364]		**Mobile marine mammal capable of undertaking extensive foraging movements beyond the SAC. Potential exposure within the Project ZoI to underwater noise, vessel activity/collision risk and changes to supporting habitat/prey. Functional connectivity identified.**	**Connectivity established, will be brought forward for Stage 2 assessment.**

Site	QIs or SCIs	Impact Mechanisms	S-P-R Assessment	Brought to Stage 2 (Y/N)
River Shannon and River Fergus Estuaries SPA [004077]	Whooper Swan (*Cygnus cygnus*) [A038]	1. Pollution of marine environment from spills/leakages 2. Noise and vibration 3. Loss of prey biomass 4. Physical disturbance	Species presence has potential to overlap with MUL area. Connectivity exists	Connectivity established, will be brought forward for Stage 2 assessment.
	Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]		Key reliance on intertidal eelgrass and mudflat; sensitive to smothering/turbidity and prey loss. Direct connectivity exists.	Connectivity established, will be brought forward for Stage 2 assessment
	Shelduck (*Tadorna tadorna*) [A048]		Estuarine invertebrate feeder; potential exposure to sediment plume and turbidity. Connectivity present.	Connectivity established, will be brought forward for Stage 2 assessment
	Wigeon (*Mareca penelope*) [A855]		Uses estuarine, intertidal and wetland habitats for feeding, roosting. Potential disturbance and effects on supporting habitat cannot be excluded. Connectivity identified.	Connectivity established, will be brought forward for Stage 2 assessment.
	Teal (*Anas crecca*) [A052]		Uses shallow estuarine margins; potential exposure to turbidity and prey reduction. Connectivity exists.	Connectivity established, will be brought forward for Stage 2 assessment
	Pintail (*Anas acuta*) [A054]		Mainly forage in shallow estuary/mudflats; potential exposure. Connectivity present.	Connectivity established, will be brought forward for Stage 2 assessment
	Shoveler (*Spatula clypeata*) [A857]		Uses shallow wetland and brackish habitats. Potential disturbance and effects on supporting habitat cannot be excluded at screening. Connectivity identified.	Connectivity established, will be brought forward for Stage 2 assessment.
	Scaup (*Aythya marila*) [A062]		Diving duck dependent on benthic prey in estuary; direct overlap with potential disturbance.	Connectivity established, will be brought forward for Stage 2 assessment
	Cormorant (*Phalacrocorax carbo*) [A017]		Forages widely in estuarine/marine areas; local displacement possible. Connectivity exists.	Connectivity established, will be brought forward for Stage 2 assessment
	Ringed Plover (*Charadrius hiaticula*) [A137]		Intertidal forager; sensitive to smothering/turbidity. Connectivity exists.	Connectivity established, will be brought forward for Stage 2 assessment
	Golden Plover (*Pluvialis apricaria*) [A140]		Although frequently associated with terrestrial feeding areas, the species uses wetland and estuarine habitats for feeding and roosting. Connectivity identified.	Connectivity established, will be brought forward for Stage 2 assessment
	Grey Plover (*Pluvialis squatarola*) [A141]		Estuarine intertidal forager; pathway via prey disturbance. Connectivity exists.	Connectivity established, will be brought forward for Stage 2 assessment
	Lapwing (*Vanellus vanellus*) [A142]		Uses wet grassland, estuarine margins and intertidal areas for feeding and roosting. Potential disturbance and effects on supporting habitat cannot be excluded at screening. Connectivity identified.	Connectivity established, will be brought forward for Stage 2 assessment
	Knot (*Calidris canutus*) [A143]		Strong dependence on mudflat invertebrates; sensitive to smothering/turbidity. Connectivity exists.	Connectivity established, will be brought forward for Stage 2 assessment
	Dunlin (*Calidris alpina alpina*) [A149]		Key intertidal feeder; exposure to turbidity and prey reduction. Connectivity exists.	Connectivity established, will be brought forward for Stage 2 assessment

Site	QIs or SCIs	Impact Mechanisms	S-P-R Assessment	Brought to Stage 2 (Y/N)
	Black-tailed Godwit (*Limosa limosa*) [A156]		**Strong intertidal dependence; pathway for smothering/turbidity exists.**	**Connectivity established, will be brought forward for Stage 2 assessment**
	Bar-tailed Godwit (*Limosa lapponica*) [A157]		**Forages in intertidal areas; sensitive to turbidity and prey loss.**	**Connectivity established, will be brought forward for Stage 2 assessment**
	Curlew (*Numenius arquata*) [A160]		**Forages both estuarine and terrestrial; partial exposure to intertidal disturbance. Weak but present connectivity.**	**Connectivity established, will be brought forward for Stage 2 assessment**
	Redshank (*Tringa totanus*) [A162]		**Key intertidal species; directly vulnerable to disturbance and turbidity.**	**Connectivity established, will be brought forward for Stage 2 assessment**
	Greenshank (*Tringa nebularia*) [A164]		**Uses intertidal shallows; potential exposure to sediment impacts.**	**Connectivity established, will be brought forward for Stage 2 assessment**
	Black-headed Gull (*Chroicocephalus ridibundus*) [A179]		**Generalist waterbird that regularly uses estuarine and intertidal habitats. Potential pathways exist through disturbance, water-quality changes and alteration of supporting foraging habitat. Connectivity identified.**	**Connectivity established, will be brought forward for Stage 2 assessment**
	Wetlands and Waterbirds [A999]		**Feature encompasses full assemblage; overall wetland quality could be affected by habitat disturbance/turbidity. Connectivity present.**	**Connectivity established, will be brought forward for Stage 2 assessment**
Illaunonearaun SPA [004114]	Barnacle Goose (*Branta leucopsis*) [A045]	**1.** Pollution of marine environment from spills/leakages **2.** Noise and vibration **3.** Loss of prey biomass **4.** Physical disturbance	Foraging resource base primarily terrestrial (improved grassland, pasture), rather than intertidal benthos. Species average foraging range extent just outside of project. No pathway for significant impacts from dredging activities predicted.	No connectivity exists, therefore this SCI has been screened out and will not be considered for Stage 2 Assessment.
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA[004161]	Hen Harrier (*Circus cyaneus*) [A082]	**1.** Pollution of marine environment from spills/leakages **2.** Noise and vibration **3.** Loss of prey biomass **4.** Physical disturbance	Species associated with upland habitats, not coastal or estuarine. No functional link to marine works.	No connectivity exists, therefore this SCI has been screened out and will not be considered for Stage 2 Assessment.

Site	QIs or SCIs	Impact Mechanisms	S-P-R Assessment	Brought to Stage 2 (Y/N)
Kerry Head SPA [004189]	Fulmar (*Fulmarus glacialis*) [A009]	1. Pollution of marine environment from spills/leakages 2. Noise and vibration 3. Loss of prey biomass 4. Physical disturbance	Fulmars breed on exposed coastal cliffs and forage mainly offshore in open marine waters. The dredging site at Kilrush Marina lies within a sheltered estuary, outside the typical foraging range of breeding fulmars at Kerry Head. No functional connectivity.	No connectivity exists, therefore this SCI has been screened out and will not be considered for Stage 2 Assessment.
	Chough (*Pyrrhocorax pyrrhocorax*) [A346]		Chough are terrestrial foragers using coastal grasslands and pastures adjacent to nesting cliffs. They do not rely on estuarine or subtidal habitats where dredging impacts may occur. No source–pathway–receptor link exists.	No connectivity exists, therefore this SCI has been screened out and will not be considered for Stage 2 Assessment.
Loop Head SPA [004119]	Kittiwake (*Rissa tridactyla*) [A188]	1. Pollution of marine environment from spills/leakages 2. Noise and vibration 3. Loss of prey biomass 4. Physical disturbance	Kittiwakes are surface-feeding seabirds breeding on sea cliffs. No breeding colonies are located in the immediate vicinity of Kilrush Marina, and the proposed dredging works are confined to sheltered estuarine waters. The foraging range of kittiwakes extends offshore rather than within the inner Shannon Estuary. Weak connectivity, screened out.	No connectivity exists, therefore this SCI has been screened out and will not be considered for Stage 2 Assessment.
	Guillemot (*Uria aalge*) [A199]		Guillemots nest in colonies on exposed cliffs and forage by pursuit-diving in open waters, generally outside sheltered estuaries. The project area is well removed from breeding or foraging habitats used by guillemots. No functional connectivity.	No connectivity exists, therefore this SCI has been screened out and will not be considered for Stage 2 Assessment.
Mid-Clare Coast SPA [004182]	**Cormorant (*Phalacrocorax carbo*) [A017]**	1. Pollution of marine environment from spills/leakages 2. Noise and vibration 3. Loss of prey biomass 4. Physical disturbance	**Mobile marine-foraging species with potential functional connectivity between the SPA and Project area. Potential exposure to underwater/above-water noise, vessel disturbance and changes to supporting foraging habitat. Connectivity identified.**	**Connectivity established, will be brought forward for Stage 2 assessment**
	Barnacle goose (*Branta leucopsis*) [A045]		Predominantly feeds on coastal grassland and associated grazing habitat. Although capable of commuting between feeding and roosting areas, no functional link.	No connectivity exists, therefore this SCI has been screened out and will not be considered for Stage 2 Assessment.
	Ringed plover (*Charadrius hiaticula*) [A137]		The MUL area is approximately 12 km from the SPA and lies outside the typical local foraging movements identified for this species. No functional connectivity.	No connectivity exists, therefore this SCI has been screened out and will not be considered for Stage 2 Assessment.
	Sanderling (*Calidris alba*) [A144]		The MUL area is approximately 12 km from the SPA and lies outside the typical local movements between feeding and roosting areas. No functional connectivity.	No connectivity exists, therefore this SCI has been screened out and will not be considered for Stage 2 Assessment.
	Purple Sandpiper (*Calidris maritima*) [A148]		No functional linkage between supporting habitat within Mid-Clare Coast SPA and the sheltered estuarine MUL area has been identified. No connectivity.	No connectivity exists, therefore this SCI has been screened out and will not be considered for Stage 2 Assessment.

Site	QIs or SCIs	Impact Mechanisms	S-P-R Assessment	Brought to Stage 2 (Y/N)
	Dunlin (*Calidris alpina*) [A149]		At approximately 12 km separation, no functional linkage to the MUL area has been identified.	No connectivity exists, therefore this SCI has been screened out and will not be considered for Stage 2 Assessment.
	Turnstone (*Arenaria interpres*) [A169]		Exhibits strong site fidelity to coastal feeding and roosting habitat associated with the SPA. No functional linkage between these supporting habitats and the MUL area has been identified.	No connectivity exists, therefore this SCI has been screened out and will not be considered for Stage 2 Assessment.
	Wetland and Waterbirds [A999]		The Project does not overlap the wetland habitats supporting the Mid-Clare Coast SPA assemblage. The modelled sediment pathway is substantially more localised than the approximately 12 km separation between the Project and SPA; therefore no pathway for alteration of the SPA's wetland resource has been identified.	No connectivity exists, therefore this SCI has been screened out and will not be considered for Stage 2 Assessment.

2.5.1. Assessment of Mobile Annex II Marine Species

Due to the foraging ranges of Annex II marine mammal species found in Irish waters, the following species listed as QIs in SACs in Ireland have been assessed in terms of their potential to occur in the Project area:

- Harbour seal (*Phoca vitulina*)
- Grey seal (*Halichoerus grypus*)
- Harbour porpoise (*Phocoena phocoena*)
- Bottlenose dolphin (*Tursiops truncatus*)

Two species of pinniped, the grey seal (*Halichoerus grypus*) and harbour seal (*Phoca vitulina*), inhabit Irish waters year-round and are recorded along the south Irish coast. Both are listed as species of Least Concern on the IUCN Red List (Bowen, 2016; Lowry, 2016).

Both species have established haul-out sites along all coastlines of Ireland for resting, breeding, and engaging in social activity (Cronin et al., 2004; Ó Cadhla et al., 2007). The largest proportion of the grey seal population is hauled out ashore during the annual moult which begins in November and continues until April (Ó Cadhla and Strong, 2007). Grey seals also aggregate in large colonies during the breeding season between August and December (Ó Cadhla *et al*., 2013), with peak pup production during October and November (Lyons, 2004). Grey seals tend to breed on exposed rocky shores, on sandbars or in sea caves with ready access to deeper water.

The nearest sites designated for grey seal and harbour seal, Blasket Islands SAC and Galway Bay Complex SAC, are located approximately 94 km and 59 km from the Project respectively. There are no established haul-out sites or known core resting areas for either seal species within the Shannon Estuary, including the waters near Kilrush. As such, any interaction with seals is expected to involve only occasional individuals passing through the area, and the likelihood of significant disturbance from the proposed dredging activities is considered low.

The Otter (*Lutra lutra*), listed as a qualifying interest of the Lower River Shannon SAC, is known to use the coastal and riparian habitats around Kilrush Creek for commuting and foraging. However, Kilrush Marina and its surroundings are already subject to regular marine activity, vessel movement, and human presence. Any otters within the area are therefore likely to be accustomed to ambient disturbance levels. While short-term disturbance during dredging works may occur, it is not expected to result in any significant adverse effects on otter behaviour or habitat use.

The harbour porpoise is the most widespread and frequently recorded species in Irish waters, sighted largely in inshore waters in the Celtic Sea throughout the entire year (Ó Cadhla *et al*., 2004; Berrow *et al*., 2010; Wall *et al*., 2013; Rogan *et al*., 2018). Porpoise sightings tend to differ by season, with densities peaking in summer (Berrow *et al*., 2010). There are sixteen SACs designated for harbour porpoises. They are listed as a species of Least Concern on the International Union for Conservation of Nature (IUCN) Red List (Braulik *et al*., 2020).

Bottlenose dolphins are one of the most frequently recorded cetaceans in Ireland (NPWS, 2019) and have been observed throughout Irish waters year-round. The Lower River Shannon SAC lists bottlenose dolphins as a QI due to the presence of the resident Shannon population, making the Shannon Estuary one of the most important habitats for cetaceans in Ireland and Europe (O'Brien *et al*., 2009; Rogan *et al*., 2018). Standardised boat surveys combined with mark–recapture photo-identification in the Lower River Shannon SAC (June–October 2018) estimated a total population of 139 bottlenose dolphins (95% CI: 121–160; CV = 0.109), within the range of previous estimates since 1997 thus indicating a stable population size (Rogan *et al*., 2018). The population size estimated by Rogan *et al*., 2018 was similar to that estimated by Blázquez *et al.,* 2020, based on surveys conducted in 2015 which provided an abundance of 145 extant individuals. Two critical areas of habitat within the SAC have been identified and have consistently shown to be important to dolphins in the estuary year-round, including a large area at the estuary mouth near Kilcredaun and a smaller area off Moneypoint (Rogan *et al*., 2018). These two areas are approximately 15 and 6 kilometres respectively from the area of the proposed works. Year-round surveys have shown a seasonal reduction in the number of bottlenose dolphins present within the estuary in winter which suggests the home range of this population extends beyond the extent of the Lower River Shannon SAC (Rogan *et al*., 2018). They are listed as a species of Least Concern on the IUCN Red List (Wells *et al*., 2019).

The relevant SACs designated for Annex II marine mammal species are detailed in **Table 2-5**.

Table 2-5: Hydrological distance of SACs designated for marine mammal species in Ireland.

SAC (Site code)	Qualifying Interest				
	Harbour seal (*Phoca vitulina*) (1365)	**Grey seal (*Halichoerus grypus*) (1364)**	**Harbour porpoise (*Phocoena phocoena*) (1351)**	**Bottlenose dolphin (*Tursiops truncatus*) (1349)**	**Distance from Site**
Slyne Head Peninsula SAC [002074]				✓	116 Km
West Connacht Coast SAC [002998]			✓	✓	127 Km
Slyne Head Islands SAC [000328]		✓			120 Km
Inishbofin and Inishshark SAC [000278]		✓			145 Km
Kilkieran Bay and Islands SAC [002111]	✓				99 Km
Clew Bay Complex SAC [001482]	✓				187 Km
Duvillaun Islands SAC [000495]		✓		✓	201 Km
Galway Bay Complex SAC [000268]	✓				**59 Km**
Inishkea Islands SAC [000507]		✓			206 Km
Killala Bay/Moy Estuary SAC [000458]	✓				236 Km
Lower River Shannon SAC [002165]				✓	**0 Km**
Ballysadare Bay SAC [000622]	✓				330 Km
Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC [000627]	✓				327 Km
Blasket Islands SAC [002172]		✓	✓		**94 Km**
Slieve Tooey/Tormore Island/Loughros Beg Bay SAC [000190]		✓			340 Km
Donegal Bay (Murvagh) SAC [000133]	✓				363 Km
West of Ardara/Maas Road SAC [000197]	✓				356 Km
Kenmare River SAC [002158]	✓		✓		139 Km

SAC (Site code)	Qualifying Interest				
	Harbour seal (*Phoca vitulina*) (1365)	**Grey seal (*Halichoerus grypus*) (1364)**	**Harbour porpoise (*Phocoena phocoena*) (1351)**	**Bottlenose dolphin (*Tursiops truncatus*) (1349)**	**Distance from Site**
Rutland Island and Sound SAC [002283]	✓				356 Km
Glengarriff Harbour and Woodland SAC [000090]	✓				198 Km
Roaringwater Bay and Islands SAC [000101]		✓	✓		194 Km
Horn Head and Rinclevan SAC [000147]		✓			402 Km
Slaney River Valley SAC [000781]	✓				462 Km
Rockabill to Dalkey Island SAC [003000]			✓		574 Km
Lambay Island SAC [000204]	✓	✓	✓		602 Km
Saltee Islands SAC [000707]		✓			416 Km
St. John's Point SAC [000191]				✓	341 Km
Inishmore Island SAC [000213]			✓		**87 Km**
Porcupine Bank Canyon SAC [003001]				✓	360 Km
South-west Porcupine Bank SAC [002329]				✓	385 Km
Belgica Mound Province SAC [002327]			✓	✓	196 Km
Hook Head SAC [000764]			✓	✓	391 Km
Carnsore Point SAC [002269]			✓		438 Km
Blackwater Bank SAC [002953]			✓		458 Km
Bunduff Lough and Machair Trawalua/Mullaghmore SAC [000625]			✓		336 Km
Codling Fault Zone SAC [003015]			✓		592 Km

SAC (Site code)	Qualifying Interest				
	Harbour seal (*Phoca vitulina*) (1365)	**Grey seal (*Halichoerus grypus*) (1364)**	**Harbour porpoise (*Phocoena phocoena*) (1351)**	**Bottlenose dolphin (*Tursiops truncatus*) (1349)**	**Distance from Site**
Lough Swilly SAC [002287]			✓		448 Km
Gweedore Bay and Islands SAC [001141]			✓		372 Km

Noise Disturbance to Habitats Directive Annex II Species

The dredging operations and associated vessel movements have the potential to generate underwater noise and vibration, which may cause temporary disturbance to sensitive marine fauna, particularly marine mammals and fish species. Mechanical dredging equipment and support vessel activities can produce low to moderate levels of underwater acoustic emissions that may disrupt normal behaviour, including foraging, communication, or navigation. Species listed under Annex II of the Habitats Directive, such as the Harbour Porpoise (*Phocoena phocoena*), are known to be particularly sensitive to anthropogenic noise. Previous studies have assessed the potential impacts of noise on marine mammals (Weilgart, 2007; Southall *et al.,* 2007; Wright *et al.,* 2007). Acoustic masking is the term used when a frequency of anthropogenic noise overlaps with the frequencies used by marine mammals, which reduces their ability to detect important sounds for communication, navigation and prey detection (Weilgart, 2007). Acoustic masking can occur anywhere within an organism's auditory range (Wright *et al.,* 2007), and can result in increased information ambiguity and, in extreme circumstances, inability for cetaceans to orientate themselves, hunt or evade predation in the marine environment (Wright *et al.,* 2007). Potential effects of noise disturbance on marine mammals can result in lethal effects, physical injury, auditory injury and behavioural response. Otters (*Lutra lutra*) spend 75% of their lives on land. They can be relatively tolerant of disturbance and adjust to circumstances. They are often present in urban areas with considerable human activity nearby. There are no criteria to assess the significance of underwater noise on the Eurasian otter however it is thought they are similar to those of pinnipeds (Ghoul & Reichmuth, 2014).

Southall *et al*. (2019) have categorised pinnipeds (listed as phocid carnivores) and cetaceans into different functional groups based on several laboratory studies, audiometric data, and comparisons of anatomy (**Table 2-6**). The functional groups for cetaceans were created in relation to their known auditory ability and functional frequencies, whilst all pinniped species were assessed based on their auditory ability in air, as well as their auditory ability in water.

While the anticipated noise levels are not expected to result in permanent hearing damage or physical harm, there remains the potential for temporary behavioural disturbance within the zone of acoustic influence. The significance of such impacts depends on the presence, abundance, and sensitivity of qualifying species within nearby European Sites, and must therefore be assessed in the context of the conservation objectives of those sites.

Table 2-6: Functional frequencies of various cetaceans and pinnipeds found in Irish waters (adapted from Southall *et al.* (2007 & 2019)).

Hearing Group	Species in Irish Waters (examples)	Functional Hearing Range (approx.)	Key Sensitivities
Low-Frequency (LF) Cetaceans	Baleen whales (Minke, Fin, Humpback, Blue, Sei)	7 Hz – 35 kHz	Highly sensitive to low-frequency impulsive and continuous noise (pile driving, dredging, vessel noise).
Mid-Frequency (MF) Cetaceans	Dolphins (Bottlenose, Common, Striped, Pilot whales, Killer whales)	150 Hz – 160 kHz	Sensitive to mid-frequency broadband noise (sonar, vessel engines, dredgers).
High-Frequency (HF/VHF) Cetaceans	Harbour porpoise	275 Hz – 160 kHz (peak ~120–140 kHz)	Most sensitive of all groups; disturbance at low received levels, particularly from impulsive sources.
Phocid Pinnipeds in Water (PCW)	Grey seal, Harbour seal	50 Hz – 86 kHz	Sensitive to both impulsive and continuous sources at lower to mid-frequencies.
Phocid Pinnipeds in Air (PCA)	Grey seal, Harbour seal	75 Hz – 30 kHz	More limited sensitivity than underwater hearing.

Assessment

Overall, the proposed dredging activities have the potential to give rise to short-term underwater noise and physical disturbance within the project footprint and surrounding waters. Given the location of the works, the absence of core seal haul-outs in the Shannon Estuary, and the fact that otters in the Kilrush area are already exposed to regular human activity, the likelihood of significant effects on these species is considered low. However, bottlenose dolphins (a qualifying interest of the Lower River Shannon SAC) and harbour porpoise (recorded widely in Irish waters and highly sensitive to acoustic disturbance) represent the most relevant receptors for potential impact. While predicted noise levels are not expected to cause permanent auditory injury, temporary disturbance, acoustic masking, and displacement within the zone of influence remain possible, particularly during periods of sustained vessel or dredger operation. Likely significant effects on otter, bottlenose dolphin, harbour porpoise, harbour seal and grey seal cannot therefore be excluded, and these species are carried forward to Stage 2.

2.6. Plans or Projects That Might Act in Combination

As outlined above, the obligation to undertake AA under the 2011 Birds and Natural Habitats Regulations derives from the Habitats Directive. Regulation 42(1) of the 2011 Regulations requires that:

> *A screening for Appropriate Assessment of a plan or project for which an application for consent is received, or which a public authority wishes to undertake or adopt, and which is not directly connected with or necessary to the management of the site as a European Site, shall be carried out by the public authority to assess, in view of best scientific knowledge and in view of the conservation objectives of the site, if that plan or project, individually or* ***in combination with other plans or projects*** *is likely to have a significant effect on the European site*.

It is therefore required that the potential impacts of the proposed Project be considered in combination with other relevant plans or projects. Given the nature of the proposed activities associated with the Project, the potential project impact mechanisms (or sources of impact) are:

1. Pollution of marine environment from spills/leakages
2. Noise and vibration
3. Loss of prey biomass
4. Physical disturbance

The assessment of potential in-combination effects considers other plans and projects that may result in significant effects to QIs and SCIs of SACs and SPAs. To inform the assessment of potential in-combination effects a review of consent applications for projects in the vicinity of the proposed Project included on the following websites was completed in September 2026:

- DHPLG - EIA Portal[11]
- Clare County Council - Planning System[12]
- An Coimisiún Pleanála
- DHLGH – Foreshore Applications[13]
- Aquaculture Information Management System (AQUAMIS) by DAFM[14]
- Ireland's Marine Atlas[15]
- MARA Licence Applications

The focus of this section is on the Lower River Shannon SAC [002165] and the River Shannon and River Fergus Estuaries SPA [004077], as these are the Natura 2000 sites within which the project is situated.

2.6.1. Threats and Pressures

The Natura 2000 Standard Data Form for the Lower River Shannon SAC identifies a variety of pressures affecting estuarine habitats and qualifying interests, including:

- Nutrient and chemical inputs from agriculture, industry, and domestic discharges;
- Physical modifications to estuarine habitats, including land reclamation and coastal defence works;
- Disturbance to marine mammals from vessel activity, underwater noise, and fishing interactions;
- Spread of invasive Spartina anglica, altering sediment dynamics.

In the context of Kilrush, the most relevant in-combination pressures are water quality pressures (linked to agriculture and wastewater), background vessel activity, and the presence of invasive species.

Table 2-7: Ranked threats and pressures to Lower River Shannon SAC relevant to Kilrush.

Rank	Category	Relevance at Kilrush Harbour
Medium	Grazing / Fertilisation	Agricultural runoff into estuary catchments.
Medium	Marine and freshwater aquaculture	Present upstream; limited near Kilrush.
Medium	Polderisation / land reclamation	Limited locally but historic reclamation evident.
Low	Discharges (industrial/agricultural/domestic)	Domestic discharges via small agglomerations.
Low	Nautical sports / vessel traffic	Small-scale at Kilrush but cumulatively relevant.
Low	Invasive non-native species (Spartina)	Well-established in mudflat/saltmarsh habitats.
Low	Sea defence and coastal works	Localised embankments and quayside structures.

The River Shannon and River Fergus Estuaries SPA supports internationally important numbers of wintering waterbirds. Pressures include:

- Water quality deterioration from upstream sources;
- Reclamation and aquaculture, reducing intertidal feeding habitat;
- *Spartina anglica* spread, encroaching on mudflats and saltmarsh;
- Disturbance from vessel traffic and boating, affecting foraging and roosting behaviour.

At Kilrush, the main concern is disturbance from marine activity, although existing background levels are relatively low compared with the busy commercial ports upstream.

Table 2-8: threats and pressures in River Shannon and River Fergus Estuaries SPA relevant to Kilrush.

Rank	Category	Relevance at Kilrush Harbour
High	Discharges (agriculture, domestic, industry)	Contributes to nutrient load but largely upstream.
Medium	Nautical sports and boating activity	Local leisure and sailing common at Kilrush.
Medium	Shipping lanes	Kilrush is peripheral to main estuary channel.
Medium	Marine and freshwater aquaculture	More prevalent upstream; little direct overlap.
Low	Spread of Spartina	Locally established in intertidal habitats.

2.6.2. Plans

Several statutory plans provide the policy framework for development in the Shannon Estuary and its catchment, including:

- **Clare County Development Plan 2023–2029**, which supports Kilrush as a service town with associated harbour functions;
- **Limerick Development Plan 2022–2028**, relevant upstream;
- **Strategic Integrated Framework Plan for the Shannon Estuary 2013–2020**, which identified port expansion areas and safeguarded key navigation channels.
- **Regional Spatial and Economic Strategy (RSES) for the Southern Region 2020-2032**, which provides the strategic regional framework for development and infrastructure across the Southern Region, including Shannon Estuary.
- **National Marine Planning Framework (NMPF) 2021**, which establishes the national spatial and policy framework for maritime activities.
- **Water Framework Directive (WFD) 2000**, which establishes environmental objectives for surface, transitional and coastal waters.
- **River Basin Management Plan (RBMP) 2022-2027**, which provides the programme of measures for achieving WFD objectives.

These plans collectively promote the sustainable use of the estuary for transport, tourism, and industry. Likely significant effects on the conservation objectives of the European sites considered, arising from this Project in combination with the plans listed above, particularly the County Development Plan and the RSES for the Southern Region, cannot be excluded at this stage. These plans are therefore brought forward to Stage 2.

2.6.3. Projects

Numerous small-scale planning applications (housing, farm infrastructure, wastewater systems) exist in the Kilrush area, but these are not of a scale to interact significantly with the dredging works. Larger projects are listed in **Table 2-9**.

Table 2-9: Assessment of potential in-combination effects with projects.

Website	Project Details	File Reference	Date Application Received	Assessment of Potential Cumulative or In-combination Effects	Potential significant effect assessment
DHPLG - EIA Portal	A search of the DHPLG EIA Portal was undertaken to examine projects with potential for in-combination effects.	-	-	-	No potential significant cumulative or in-combination effects
Clare County Council - Planning System	A search of the Clare planning databases was undertaken to examine projects with potential for in-combination effects.	-	-	Applications made typically to Clare County Council and published on the planning database within the ZOI consisted of extensions and renovations to existing houses, and retention of existing developments. These are small-scale terrestrial developments which do not have the potential to result in cumulative effects in combination with the proposed Project.	No potential significant cumulative or in-combination effects
An Coimisiún Pleanála (ACP)	The Port of Foynes expansion in Ireland is a multi-phased Strategic Infrastructure Development (SID) process managed by ACP. It involves extensive public consultation and the development of a detailed Environmental Impact Assessment for regulatory approval.	ACP - 301561 MARA - MAC20230024	08/05/2018	This is a large project that could increase regional shipping, dredging and industrial activity. It is located >30 km upstream of Kilrush; hydrodynamic modelling and the known behaviour of sediment plumes indicate no plume connectivity. Increased regional shipping is a broad background pressure but does not combine spatially with Kilrush dredging to create a plausible pathway for in-combination adverse effects.	No potential significant cumulative or in-combination effects
	Expansion of the Bauxite Disposal Area, extension to the existing Salt Cake Disposal Cell and extension of the permitted borrow pit at Aughinish Alumina Limited.	318302 & 312146	24/10/2023 & 8/12/2021	These works are terrestrial industrial expansions at Aughinish, c. >30 km upstream of Kilrush. Potential pathways are limited to indirect water-quality changes via runoff or leachate. However, the project includes lined containment, regulatory controls, and is subject to EPA licensing. No mechanism for additive plume, noise, or disturbance effects in Kilrush ZoI.	No potential significant cumulative or in-combination effects

Website	Project Details	File Reference	Date Application Received	Assessment of Potential Cumulative or In-combination Effects	Potential significant effect assessment
Maritime Area Regulatory Authority (MARA)	Marine environmental surveys for the purposes of site investigation for GNI at Cariacon/Foynes (to be determined)	MUL250010	28/07/2025	Site investigations are localised geophysical/geotechnical surveys with temporary footprint and low pollution risk. They do not generate ongoing sediment plumes or long-term habitat loss that would combine with Kilrush impacts.	No potential significant cumulative or in combination effects
	A survey campaign at the Moneypoint Generating Station site carried out by ESB to inform the engineering design of the proposed Moneypoint Hub Project. The marine surveys will include geophysical, geotechnical, environmental, and met ocean surveys. (Granted)	LIC230008	24/11/2023	Survey works are temporary and limited in extent. No persistent ecological pressures that overlap with Kilrush ZoI; therefore negligible potential for in-combination effects.	No potential significant cumulative or in combination effects
	A Marine Site Investigation carried out on behalf of Shannon Foynes Port Company to support the preliminary and detailed engineering design of the Deep-Water Terminal Development on Foynes Island. (Granted)	LIC230014	16/11/2023	Site investigation/survey works are temporary and upstream (>30 km); they do not produce sustained sediment plumes or water-quality changes that could combine with Kilrush effects.	No potential significant cumulative or in combination effects
	Maintenance dredging at four sites around the Aughinish Alumina Ltd (AAL) jetty, Shannon Estuary, Co. Limerick. (Granted)	LIC230004	17/11/2023	AAL maintenance dredging is larger in scale and occurs upstream. Potential for cumulative effects would require overlapping plumes or coincident timing and disposal activities. Hydrodynamic modelling and site separation indicate no plume connectivity to Kilrush. Provided disposal and monitoring at Aughinish complies with licence conditions, no pathway for additive long-term significant effects at Kilrush is identified.	No potential significant cumulative or in combination effects

Website	Project Details	File Reference	Date Application Received	Assessment of Potential Cumulative or In-combination Effects	Potential significant effect assessment
	Upgrade of wastewater infrastructure by Uisce Éireann, including a wastewater terminal pumping station and outfall pipeline with diffuser arrangement (Granted)	MAC20230028	04/07/2025	An upgraded outfall can alter local water-quality conditions. The Foynes / Limerick works are upstream of Kilrush; potential cumulative water-quality effects at Kilrush would require persistent downstream transport of contaminants beyond modelled decay, modelling indicates dilution and attenuation with distance. Therefore, combination risk is low but should be controlled by discharge consents.	No potential significant cumulative or in combination effects
	Deployment of up to 300MW of floating solar photovoltaic (PV) units and ancillary infrastructure including mooring systems, inter-array cabling and export cables in Lower River Shannon (To be determined)	MAC20230032	N/A	Potential effects (shading, local hydrodynamics) would be site-specific. As this project is outside of the ZoI no interaction is expected.	No potential significant cumulative or in combination effects
	Provision of a Floating Pontoon and Cantilever Platform for Rescue Services, Limerick (To be determined)	MAC240037	N/A	Localised, low magnitude works; no pathway for additive effects with Kilrush maintenance dredging.	No potential significant cumulative or in combination effects
	Extension of existing 300mm ID concrete combined outfall pipeline with 15m segment of 500mm OD HDPE SDR17 pipeline equipped with 3 duckbill style diffusers and concrete anchoring in Foynes Harbour (To be determined)	MAC20240010	N/A	Similar to other outfall works: potential local water-quality implications upstream; due to distance and dilution no credible pathway for in-combination effects at Kilrush provided discharge standards are maintained	No potential significant cumulative or in combination effects
	Reconstruction/altering of existing coastal defences along the Shannon Estuary near Shannon Town, (To be determined)	MAC20230035	N/A	This project is located over 30 km upstream of Kilrush and is primarily terrestrial/coastal engineering in nature. Potential effects are limited to localised disturbance, sediment release, and temporary construction activity in its immediate area. No overlap in ZoI for sediment plumes, noise, or vessel activity with the Kilrush maintenance dredging project.	No potential significant cumulative or in combination effects

2.6.4. Aquaculture Operations

Aquaculture is an established activity within the wider Shannon Estuary, with licensed sites supporting both mussel and oyster cultivation. The closest aquaculture sites and designated shellfish waters are located within Poulnasherry Bay, situated approximately 5–6 km to the west of Kilrush Harbour.

However, the following considerations apply:

- **Hydrodynamic separation**: Modelling and site conditions confirm that the suspended sediment from dredging at Kilrush Harbour will remain highly localised, settling rapidly within the immediate vicinity of the works with no deposition predicted in Poulnasherry Bay.

  Nature of activity: The Kilrush dredging is a short-term, small-scale maintenance campaign, whereas impacts to shellfish waters would require sustained or large-scale discharges to cause measurable deterioration.

- **Regulatory safeguards**: Ongoing water quality monitoring and the requirement to comply with shellfish water quality standards provide additional assurance against cumulative or in-combination impacts.

While aquaculture and designated shellfish waters exist within the wider Shannon Estuary, the nearest areas at Poulnasherry Bay will not be subject to significant effects in water quality and therefore there is no potential for in-combination effects with aquaculture operations or shellfish water designations.

2.6.5. Dredging

While dredging is routine throughout the Shannon Estuary, campaigns are geographically separated. Modelling demonstrates that plumes are short-lived and highly localised. No additive plume or sediment load is predicted between Kilrush and upstream dredging locations.

2.6.6. Navigation and Marine Traffic

The Shannon Estuary is a busy navigation route for deep-draft vessels bound for Aughinish, Foynes, and Moneypoint. By contrast, Kilrush is primarily a marina and fishing harbour with small-scale vessel movements. Any disturbance is therefore highly localised and not significant in-combination with upstream commercial traffic.

2.6.7. Diffuse and Point Source Pollution

Agricultural run-off and wastewater discharges contribute to background nutrient enrichment and reduced water quality in the estuary. The Kilrush dredging campaign is temporary and unlikely to materially exacerbate these pressures.

2.6.8. Conclusion

The proposed dredging at Kilrush Harbour occurs within a section of the Shannon Estuary already subject to ongoing pressures including water quality impacts, vessel disturbance, and spread of invasive species. However:

- The scale and duration of dredging is minor compared with industrial port dredging upstream.
- Hydrodynamic modelling confirms highly localised effects, with no downstream or upstream connectivity to other dredging operations.
- The harbour is peripheral to the main navigation channel, reducing overlap with large vessel traffic.

No projects with the potential to act in combination with the Project were identified within the in-combination spatial scope of 2.5 km and temporal scope of eight years (MARA, 2026a). Likely significant effects in combination with other projects can therefore be excluded. Likely significant effects in combination with the Clare County Development Plan 2023 to 2029 and the Southern RSES cannot be excluded, and these plans are carried forward to Stage 2.

2.7. Screening Outcome

The assessment has determined, in light of best available scientific data, that there is potential for significant effects on conservation features of SACs and SPAs resulting from the Project, *i.e.,* the likelihood of significant effects on all European sites has not been ruled out. Therefore, it is recommended that this Project be brought forward to Stage 2 Appropriate Assessment. The assessment determined that likely significant effects from the Project in combination with the Clare County Development Plan 2023 to 2029 and the Regional Spatial and Economic Strategy (RSES) for the Southern Region 2020 to 2032 cannot be excluded, consistent with the MARA screening determination (MARA, 2026a). No projects with the potential to act in combination with the Project were identified. The findings of the assessment are summarised in **Table 2-10**.

Table 2-10: Summary of the Appropriate Assessment Screening outcome.

AA Screening outcome	
Brief description of the Project.	The objective of the Project is to undertake maintenance dredging of the existing access channel on the seaward approaches to Kilrush Creek, Kilrush, County Clare. The works involve the removal of accumulated sediments that have reduced the navigability of the channel leading to Kilrush Marina and the inner harbour area. The dredged material is proposed to be levelled with a plough dredge in accordance with relevant environmental legislation and permitting requirements. The Project is essential to ensure the continued safe access for vessels using the marina and to maintain the operational functionality of the harbour. The locations of the dredging works are shown in **Figure 1-1.**
European site(s)	
List of the European site(s) in the Zone of Influence.	The conservation features of the following SACs and SPAs are listed in **Table 2-1, Table 2-2,** and **Table 2-4** alongside conservation objectives. **SACs** • Lower River Shannon SAC [002165] • Inishmore Island SAC [000213] • Galway Bay Complex SAC [000268] • Blasket Islands SAC [002172] **SPAs** • River Shannon and River Fergus Estuaries SPA [004077] • Mid-Clare Coast SPA [004182] • Kerry Head SPA [004189] • Loop Head SPA [004119] • Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA [004161] • Illaunonearaun SPA[004114]

Assessment summary	
Description of the potential impact mechanisms from the Project that have likely significant effects on the conservation features.	All potential impact mechanisms are detailed in **Section 2.3**. Here follows the impact mechanisms for which likely significant effects have been identified: 1. Pollution of marine environment from spills/leakages 2. Noise and vibration 3. Loss of prey biomass 4. Physical disturbance
Conservation features with the potential to be impacted by the Project.	• Estuaries [1130] • Mudflats and sandflats not covered at low tide [1140] • Large shallow inlets and bays [1160] • Reefs [1170] • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] • Bottlenose dolphin (*Tursiops truncatus*) [1349] • Harbour porpoise (*Phocoena phocoena*) [1351] • Otter (*Lutra lutra*) [1355] • Sea lamprey (*Petromyzon marinus*) [1095] • River lamprey (*Lampetra fluviatilis*) [1099] • Atlantic salmon (*Salmo salar*) [1106] • Harbour Seal (*Phoca vitulina*) [1365] • Grey Seal (*Halichoerus grypus*) [1364] • Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] • Shelduck (*Tadorna tadorna*) [A048] • Teal (*Anas crecca*) [A052] • Pintail (*Anas acuta*) [A054] • Scaup (*Aythya marila*) [A062] • Cormorant (*Phalacrocorax carbo*) [A017] • Ringed Plover (*Charadrius hiaticula*) [A137] • Grey Plover (*Pluvialis squatarola*) [A141] • Knot (*Calidris canutus*) [A143] • Dunlin (*Calidris alpina alpina*) [A149] • Black-tailed Godwit (*Limosa limosa*) [A156] • Bar-tailed Godwit (*Limosa lapponica*) [A157] • Curlew (*Numenius arquata*) [A160] • Redshank (*Tringa totanus*) [A162] • Greenshank (*Tringa nebularia*) [A164] • Whooper Swan (*Cygnus cygnus*) [A038] • Wigeon (*Mareca penelope*) [A855] • Shoveler (*Spatula clypeata*) [A857] • Golden Plover (*Pluvialis apricaria*) [A140] • Lapwing (*Vanellus vanellus*) [A142] • Black-headed Gull (*Chroicocephalus ridibundus*) [A179] • Wetlands and Waterbirds [A999]
Description of the potential direct or indirect impacts of the Project in combination with other plans or projects on the European sites.	No projects have been identified to have potential in combination effects with the Kilrush Maintenance Dredging Project. The Clare County Development Plan 2023-2029 and the Regional Spatial and Economic Strategy (RSES) for the Southern Region 2020-2032 Plans have been screened in for further consideration at Stage 2.

Concluding statement.	It is concluded that there is a potential pathway between the Project impact mechanisms, alone or in combination with other plans or projects, and some of the conservation features of European sites. The assessment is presented in full in **Section 2.5 to 2.6**. The Project will be brought forward to Stage 2 for further consideration of the potential for adverse effects on the integrity of the screened in European sites, in view of their conservation objectives.

3. Stage 2: Natura Impact Statement

3.1. Overview

Stage 2 of the Appropriate Assessment process considers whether the plan or project, alone or in combination with other projects or plans, will have adverse effects on the integrity of a European site, and includes any mitigation measures necessary to avoid, reduce or offset negative effects. The proponent of the plan or project will be required to submit a Natura Impact Statement (NIS), that examines the plan or project and the relevant European sites, to identify and characterise any possible implications for the site in view of the site's conservation objectives, accounting for in-combination effects. This should provide information to enable the competent authority to carry out the appropriate assessment. If the assessment deems that adverse effects on the integrity of a site cannot be excluded, then the process must proceed to Stage 3, or the plan or project should be abandoned.

Regarding the European sites and their associated conservation features identified in the ZoI of the Project, which were not excluded in Stage 1, an appropriate assessment is required to identify the impacts associated with the Project that may have a significant adverse impact. A summary of the screening outcome from the Stage 1 AA Screening can be found in **Section 2.7, Table 2-10**.

This NIS gives a detailed ecological assessment of European sites and their associated conservation features, considering *inter alia* site-specific or activity-specific impacts. In preparation of this NIS, the DELGH (2009; revised 2010)/NPWS-DAHG (2012) guidance document on marine NIS in SACs was used as described below:

The assessment of impacts for **Annex I Habitats** needs to:

- consider the principal ecological components or broad community types of Annex I Habitats.
- consider the extent to which Annex I Habitats vary under natural conditions when assessing the likely significance of impact mechanisms.
- consider the degree to which Annex I Habitats are impacted by specific impact mechanisms (consider habitat attributes and their resident species) in terms of degree of change and recoverability.
- understand the likely resistance and resilience of Annex I Habitats to the impact mechanisms.
- carefully consider the physical, chemical, and biological nature of Annex I Habitats.

- The assessment of impacts on **Annex II Species** needs to:
  - consider many aspects of the likely impact and its effects on individuals and or population of Annex II Species at sites and to their likely habitats.
  - ensure that the assessment approach focuses on direct effects (*e.g.,* physical harm, detrimental changes to or interference with natural behaviour) and indirect effects (*e.g.*, changes in prey distribution and habitat use) to ensure a comprehensive approach.

In line with NPWS-DEHLG (2009; revised 2010) guidance, the Stage 2 AA consists of three main steps:

1. **Impact Prediction** - where the likely impacts of the Project are examined. A source-pathway-receptor model has been used to assess potential for impact.
2. **Assessment of Effects** – where the effects of the Project are assessed as to whether they have any adverse effects on the integrity of European Sites as defined by conservation objectives.
3. **Mitigation Measures** – where mitigation measures are identified to ameliorate any adverse effects on the integrity of any European site.

3.2. Impact Prediction

The following sections consider the risk of potential effects associated with **Impact mechanism 1** to **4**. The assessment of potential impacts from the proposed Project on conservation features considered the negative threats and pressures affecting the conservation objectives of these conservation features as listed on the NPWS website. These species are conservation features of the **Lower River Shannon SAC (002165)**, **River Shannon and River Fergus Estuaries SPA (004077), Mid-Clare Coast SPA (004182), Inishmore Island SAC (000213), Galway Bay Complex SAC (000268),** and **Blasket Islands SAC (002172)**.

- Pollution of marine environment from spills/leakages
- Noise and vibration
- Loss of prey biomass
- Physical disturbance

Table 3-1 presents a quick reference summary of the project impact mechanisms listed above with regards to the conservation features.

Table 3-1: Impact mechanisms relevant to the conservation features.

Ecological Group	Conservation feature [code]	Impact Mechanism			
		1. Pollution of marine environment from spills/leakages	2. Noise and vibration	3. Loss of prey biomass	4. Physical disturbance
Annex I - Habitats Lower River Shannon SAC	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	**Potential Direct Effect**			**Potential Direct Effect**
	Estuaries [1130]	**Potential Direct Effect**	**Potential Indirect Effect**		**Potential Direct Effect**
	Mudflats and sandflats not covered at low tide [1140]	**Potential Direct Effect**	**Potential Indirect Effect**		**Potential Direct Effect**
	Large shallow inlets and bays [1160]	**Potential Direct Effect**	**Potential Indirect Effect**		**Potential Direct Effect**
	Reefs [1170]	**Potential Direct Effect**	**Potential Indirect Effect**		**Potential Direct Effect**
Annex II – marine mammal species Lower River Shannon SAC	Bottlenose dolphin (*Tursiops truncatus*) [1349]	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**
	Otter (*Lutra lutra*) [1355]	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**
Annex II marine mammal – Inishmore Island SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**
Annex II marine mammal – Galway Bay Complex SAC	Harbour seal (*Phoca vitulina*) [1365]	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**
Annex II marine mammal – Blasket Islands SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**
	Grey seal (*Halichoerus grypus*) [1364]	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**

Ecological Group	Conservation feature [code]	Impact Mechanism			
		1. Pollution of marine environment from spills/leakages	2. Noise and vibration	3. Loss of prey biomass	4. Physical disturbance
Annex II - diadromous fish species Lower River Shannon SAC	Sea lamprey (Petromyzon marinus) [1095]	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**
	River lamprey (Lampetra fluviatilis) [1099]	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**
	Atlantic salmon (Salmo salar) [1106]	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**
Bird Species - River Shannon and River Fergus Estuaries SPA	Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**
	Shelduck (*Tadorna tadorna*) [A048]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**
	Teal (*Anas crecca*) [A052]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**
	Pintail (*Anas acuta*) [A054]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**
	Scaup (*Aythya marila*) [A062]	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**
	Cormorant (*Phalacrocorax carbo*) [A017]	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**
	Ringed Plover (*Charadrius hiaticula*) [A137]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**
	Grey Plover (*Pluvialis squatarola*) [A141]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**
	Knot (*Calidris canutus*) [A143]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**
	Dunlin (*Calidris alpina alpina*) [A149]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**
	Black-tailed Godwit (*Limosa limosa*) [A156]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**
	Bar-tailed Godwit (*Limosa lapponica*) [A157]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**
	Curlew (*Numenius arquata*) [A160]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**

Ecological Group	Conservation feature [code]	Impact Mechanism			
		1. Pollution of marine environment from spills/leakages	2. Noise and vibration	3. Loss of prey biomass	4. Physical disturbance
	Redshank (*Tringa totanus*) [A162]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**
	Greenshank (*Tringa nebularia*) [A164]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**
	Whooper Swan (*Cygnus cygnus*) [A038]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**
	Wigeon (*Mareca penelope*) [A855]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**
	Shoveler (*Spatula clypeata*) [A857]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**
	Golden Plover (*Pluvialis apricaria*) [A140]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**
	Lapwing (*Vanellus vanellus*) [A142]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**
	Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	**Potential Direct Effect**	**Potential Direct Effect**		**Potential Direct Effect**
	Wetlands and Waterbirds [A999]	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Indirect Effect**	**Potential Direct Effect**
Bird Species – Mid-Clare Coast SPA	Cormorant (*Phalacrocorax carbo*) [A017]	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**	**Potential Direct Effect**

3.2.1. Potential Impact Mechanism 1 - Pollution of marine environment from spills/leakages

Accidental spills or leakages from machinery poses a potential risk to the marine environment during the dredging operations. Such incidents could result in the release of polluting substances, including hydrocarbons (e.g. diesel, lubricants, hydraulic fluids), into the surrounding water column or sediment. These substances can be toxic to aquatic organisms, particularly filter feeders, benthic invertebrates, bird species and fish species, and may contribute to the degradation of water quality within the zone of influence. Furthermore, any accidental release of contaminants may lead to indirect impacts on qualifying interests of nearby Natura 2000 sites, including designated bird species reliant on intertidal or subtidal foraging habitats. While the risk of such events is typically low if best practice measures are in place, it remains a relevant potential impact pathway and must be considered in the overall assessment of likely significant effects.

3.2.1.1. Potential Receptors

Habitats (Annex I & supporting features)

- Estuaries [1130] – highly productive habitats that can trap and accumulate pollutants.
- Mudflats and sandflats not covered by seawater at low tide [1140] – important for benthic fauna and foraging birds.
- Reefs [1170] – sensitive to smothering and hydrocarbon contamination.
- Large shallow inlets and bays [1160] – enclosed waters can retain pollutants for longer.
- Wetlands and Waterbirds [A999] – sensitive habitats supporting SCI communities could be contaminated.

Marine Mammals (Annex II species)

- Bottlenose dolphin [1349] – risk from ingestion of contaminated prey or exposure in foraging areas.
- Otter [1355] – vulnerable through contaminated prey or direct contact in coastal habitats.
- Harbour porpoise [1351] – sensitive to waterborne pollutants via bioaccumulation in prey.
- Grey seal & harbour seal – potential ingestion of contaminated prey or oiling of fur affecting thermoregulation.

Diadromous Fish (Annex II species)

- Atlantic salmon[1106] – sensitive to poor water quality during marine and estuarine life stages.

- Sea lamprey [1095] and river lamprey [1099]– sensitive to toxic substances during juvenile and adult stages.

Birds (SCIs)

- Waterbird SCIs in River Shannon and River Fergus Estuaries SPA – *e.g*. cormorant, redshank, curlew, bar-tailed godwit, black-tailed godwit, shelduck, whooper swan, wigeon, shoveler, golden Plover, Lapwing *etc*., which rely on intertidal prey that could be affected by contamination.

3.2.1.2. Impact Assessment

Accidental spills or leakages of hydrocarbons or other hazardous substances from dredging plant, support vessels, or machinery present a potential risk to the marine environment during dredging activities. Such releases could enter the surrounding water column or settle into sediments within the zone of influence, leading to acute or chronic toxic effects. Sensitive benthic habitats, including estuaries [1130], mudflats and sandflats [1140], reefs [1170], and large shallow inlets and bays [1160], may be directly affected through smothering, adsorption of contaminants, or reduced oxygenation. Contaminant exposure could also impact benthic invertebrate communities that form the prey base for a variety of SCI species, potentially leading to indirect reductions in foraging success. Mobile Annex II species such as bottlenose dolphin, harbour porpoise, grey seal, harbour seal, Atlantic salmon, sea lampreys, and otter may be exposed via ingestion of contaminated prey or direct contact in affected waters. While the likelihood of significant pollution events is low in the absence of mitigation the potential for short-term adverse effects on water quality and sensitive ecological receptors remains a relevant impact pathway.

3.2.1.3. Mitigation Measures

Habitats (Annex I & supporting features)

- Implement a comprehensive pollution prevention plan covering fuel storage, transfer, and handling procedures.
- Refuelling of vessels and machinery will be carried out in designated, bunded areas away from intertidal or sensitive habitats where practicable.
- Spill kits and absorbent materials will be kept on all vessels and at all working locations, with personnel trained in their use.
- Immediate clean-up protocols will be in place for any accidental release to prevent contaminant spread into estuarine or intertidal habitats.

Marine Mammals (Annex II species)

- Vessel operations will follow industry-standard environmental management systems (*e.g*. MARPOL) to minimise the risk of oil discharges.
- Maintain buffer zones between refuelling/storage areas and otter foraging grounds.
- In the unlikely event of a significant spill, operations will be halted and the MMO (Marine Mammal Observer) notified to monitor for potential effects on dolphins, seals, or porpoises in the vicinity.

Diadromous Fish (Annex II species)

- Use biodegradable, non-toxic hydraulic fluids in machinery where feasible, reducing risk in the event of leakage.

Birds (SCIs)

- Avoid fuel storage and refuelling in intertidal areas used by foraging waterbirds.
- In the event of a spill, deploy booms or absorbent barriers rapidly to prevent contamination of mudflats and sandflats supporting prey species.
- Schedule high-risk activities (*e.g*. bulk fuel transfers) outside peak wintering periods to minimise overlap with sensitive assemblages (From 1st October to 31st March).

General Best Practice

- Develop and implement a Construction Environmental Management Plan (CEMP) with a dedicated Pollution Incident Response Plan.
- Train all crew and site personnel in pollution emergency response procedures, including rapid deployment of spill containment and reporting protocols.
- All plant and equipment will be subject to an inspection regime for leaks or defective fittings before operation.
- Maintain a contact chain for reporting and responding to environmental incidents to ensure rapid mitigation of potential impacts.

3.2.1.4. Conclusion

The risk of pollution from accidental spills or leakages during dredging operations is a recognised impact pathway with potential to affect a broad range of sensitive receptors within and beyond the immediate works area. Receptors include Annex I estuarine and intertidal habitats, filter-feeding and benthic invertebrate

communities, and species that depend on these systems, including Annex II marine mammals (e.g. bottlenose dolphin, otter), migratory fish (e.g. salmon, lamprey species), and SCI waterbirds designated within the River Shannon and River Fergus Estuaries SPA. These species may be affected either directly (through physical exposure or ingestion) or indirectly (via trophic disruption or habitat contamination). While estuarine environments possess some natural resilience to disturbance, persistent or large-scale pollution events could lead to acute or chronic ecological effects if unmanaged.

However, the likelihood of such events occurring is low due to the adoption of rigorous mitigation and pollution prevention protocols, which are standard within well-regulated marine dredging projects. These include bunded fuel storage, regular inspection and maintenance of plant and equipment, spill containment systems, and the availability of emergency spill response kits and trained personnel on-site. Specific mitigation tailored to sensitive species and habitats, such as maintaining safe distances from designated shorelines and coordinating with Marine Mammal Observers (MMOs), further reduces the risk of direct exposure.

In summary, while a pollution event remains a theoretical risk during marine operations, the combination of appropriate best-practice measures, receptor-specific mitigation, and the inherent resilience of the estuarine system ensures that the potential for significant adverse effects on the conservation objectives of nearby Natura 2000 sites is negligible. Provided the mitigation measures outlined in **Section 3.2.1.3** are fully implemented and maintained throughout the project lifecycle, no long-term or irreversible effects on qualifying habitats or species are anticipated as a result of accidental contamination.

3.2.2. Potential Impact Mechanism 2 – Noise and vibration

The dredging operations and associated vessel movements have the potential to generate underwater noise and vibration, which may cause temporary disturbance to sensitive marine fauna, particularly marine mammals and fish species. Mechanical dredging equipment and support vessel activities can produce low to moderate levels of underwater acoustic emissions that may disrupt normal behaviour, including foraging, communication, or navigation. Species listed under Annex II of the Habitats Directive, such as the Harbour Porpoise (*Phocoena phocoena*), are known to be particularly sensitive to anthropogenic noise. While the anticipated noise levels are not expected to result in permanent hearing damage or physical harm, there remains the potential for temporary behavioural disturbance within the zone of acoustic influence. The significance of such impacts depends on the presence, abundance, and sensitivity of qualifying species within nearby European Sites, and must therefore be assessed in the context of the conservation objectives of those sites.

3.2.2.1. Potential Receptors

Marine Mammals (Annex II species)

- Bottlenose dolphin [1349] – sensitive to mid-frequency underwater noise; behavioural disturbance possible.
- Harbour porpoise [1351] – highly sensitive to acoustic disturbance; disturbance at relatively low noise levels.
- Otter [1355] – potential disturbance from shoreline noise and vibration, especially in foraging/commuting areas.
- Harbour seal [1365] – Less sensitive than cetaceans, but short-term behavioural disturbance is possible if foraging near the works.
- Grey seal [1364] - Less sensitive than cetaceans, but short-term behavioural disturbance is possible if foraging near the works.

Diadromous Fish (Annex II)

- Atlantic salmon [1106] – migrating through estuary, susceptible to underwater noise during passage.
- Sea lamprey [1095] – estuarine phase could overlap with works.
- River lamprey [1099] – similar exposure potential in estuarine environment.

Habitats (Annex I)

- Reefs [1170], Estuaries [1130], Mudflats and sandflats [1140], Large shallow inlets and bays [1160] – habitats themselves are not directly sensitive to noise/vibration, but the species they support (fish, invertebrates, marine mammals, birds) are.

Birds (SCIs)

- Light-bellied Brent Goose [A046], Shelduck [A048], Teal [A052], Pintail [A054], Scaup [A062], Whooper Swan [A038], Wigeon [A855], Shoveler [A857], Golden Plover [A140], Lapwing [A142] Black-headed Gull [A179] – Potential disturbance from vessel noise and activity, with diving species (*e.g*. Scaup) more vulnerable during foraging.
- Cormorant [A017] – May experience disturbance or reduced foraging efficiency due to underwater noise and vessel presence.
- Waders (Ringed Plover [A137], Grey Plover [A141], Knot [A143], Dunlin [A149], Black-tailed Godwit [A156], Bar-tailed Godwit [A157], Curlew [A160], Redshank [A162], Greenshank [A164]) – Sensitive to disturbance from surface noise and vibration, potentially displaced from intertidal foraging areas.

- Wetlands and Waterbirds [A999] – Assemblage feature may be indirectly affected if disturbance leads to displacement of key populations.

3.2.2.2. Impact Assessment

The proposed dredging operations will generate both underwater noise (from vessel engines) and airborne noise/vibration (from equipment and vessel activity). Marine mammals, including Bottlenose Dolphin, Harbour Porpoise, and Otter may be exposed within the estuarine zone of influence. Cetaceans are highly sensitive to acoustic disturbance, particularly harbour porpoise, which may respond at relatively low sound levels. Pinnipeds are less sensitive but may experience short-term behavioural disturbance when foraging near the works. Otter could be present in shoreline areas used for commuting or feeding however they are likely habituated to noise within the marina area. Other Annex IV species (such as common dolphin or migratory baleen whales) are less likely to occur in the inner estuary and therefore exposure risk is minimal.

Diadromous fish, including Atlantic Salmon, Sea Lamprey, and River Lamprey migrate through the Shannon Estuary and could be exposed to underwater noise during estuarine passage. While noise is not expected to cause injury, temporary behavioural disruption during sensitive migratory windows cannot be excluded.

Annex I habitats (*e.g*. Reefs, Estuaries, Mudflats and sandflats, Large shallow inlets and bays) are not directly sensitive to acoustic disturbance. However, they support prey species (fish, invertebrates, and benthic fauna) that may be indirectly affected, with potential knock-on effects for higher trophic levels such as birds and marine mammals.

Bird species associated with the River Shannon and River Fergus Estuaries SPA are also potential receptors. Waterfowl (Light-bellied Brent Goose, Shelduck, Teal, Pintail, Scaup Whooper Swan, Wigeon, Shoveler, Golden, Lapwing and Black-headed Gull) may experience displacement from intertidal or subtidal foraging areas due to vessel noise and activity, with diving species (*e.g*. Scaup) more vulnerable to disturbance. Cormorant may also be affected through temporary reduction in foraging efficiency linked to underwater noise and prey movements. Waders (Ringed Plover, Grey Plover, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank and Greenshank) are sensitive to surface noise and vibration and may be displaced from feeding areas, particularly in intertidal zones close to dredging. The assemblage feature Wetlands and Waterbirds may be indirectly impacted if disturbance leads to wider displacement of constituent populations.

Overall, noise and vibration impacts are expected to be localised, temporary, and reversible, but they cannot be excluded as a potential source of disturbance to designated features and species. Mitigation is therefore required.

3.2.2.3. Mitigation Measures

Marine Mammals (Annex II species)

To avoid disturbance to the population of bottlenose dolphins for which the Lower River Shannon SAC is designated along with otter, porpoise and seals, mitigation measures consistent with DAHG (2014) guidance will be implemented for all dredging operations.

- A suitably qualified Marine Mammal Observer (MMO) will be appointed for the duration of works. The MMO will conduct a 30-minute pre-start watch within 500 m of the dredging vessel. If dolphins are observed within this zone, start-up will be delayed until animals have left or a 30-minute clearance period has elapsed.
- A “ramp-up” or “soft start” procedure will be used to gradually introduce sound to the environment.
- Dredging will only commence in daylight hours when effective visual monitoring is possible.
- If dredging is paused for more than 30 minutes, pre-start monitoring will be repeated before recommencement.
- Clear communication protocols will be established between the MMO and site management to control commencement and resumption of works.
- Vessel speeds will be limited to reduce the risk of collision with dolphins.
- Any close approach of bottlenose dolphins to the works area will be reported to the National Parks and Wildlife Service.

Once dredging has commenced, operations may continue at night or during poor visibility, as continuous activity is considered less disruptive than repeated start-ups.

Birds (SCIs)

- Limit dredging near key foraging areas during peak wintering season From (1st October to 31st March) to reduce disturbance.
- Maintain minimum buffer distance from large rafts of feeding/diving birds where practicable.
- Minimise night-time lighting to avoid displacement from adjacent feeding areas.
- Adopt gradual movement of vessels near feeding flocks to reduce flushing events.

Diadromous Fish (Annex II)

- Minimise night-time lighting of works area to reduce disorientation of migrating fish.

Habitats (Annex I)

- Apply acoustic and operational controls already outlined for species (e.g., ramp-up, MMO, scheduling) to indirectly protect the ecological integrity of habitats through reduced disturbance to dependent fauna.

3.2.2.4. Conclusion

The proposed dredging operations will generate underwater noise and vibration that could result in temporary behavioural disturbance to qualifying interest species, particularly marine mammals, diadromous fish, and waterbirds, as well as indirect effects on Annex I habitats through impacts on associated prey species. While these effects are anticipated to be localised, short-term, and reversible, they cannot be excluded in the absence of mitigation.

Implementation of the prescribed measures, including marine mammal mitigation protocols, vessel speed restrictions, temporal and spatial controls to reduce disturbance to birds and fish, and soft-start procedures, will ensure that the risk of significant adverse effects is minimised. With these controls in place, the works are not expected to result in permanent or population-level impacts on any Qualifying Interests or Special Conservation Interests of nearby European Sites.

Accordingly, it is concluded that, following mitigation, noise and vibration arising from the proposed Project will not adversely affect the integrity of Natura 2000 sites, either alone or in combination with other plans or projects, in view of their conservation objectives.

3.2.3. Potential Impact Mechanism 3 - Loss of Prey Biomass

The proposed dredging activities have the potential to result in a temporary loss or reduction of benthic and epibenthic prey biomass within the affected areas, which may impact species that rely on these resources for foraging. Physical disturbance of the seabed during dredging can displace, injure, or remove infaunal and epifaunal organisms, including polychaetes, molluscs, and small crustaceans, which form important components of the diet for a range of protected species. In particular, fish, marine mammals such as bottlenose dolphins (*Tursiops truncatus*), and diving waterbirds designated as qualifying interests of nearby European Sites (*e.g*. the River Shannon and River Fergus Estuaries SPA) may be affected if their foraging grounds are temporarily degraded or their prey availability is significantly reduced. While recolonisation of disturbed areas typically occurs over time, the scale, timing, and frequency of the proposed works must be considered in assessing the potential for short-term prey depletion and whether this could lead to significant ecological impacts on designated species within Natura 2000 sites.

3.2.3.1. Potential Receptors

Marine Mammals (Annex II species)

- **Bottlenose dolphin [1349]** – primary qualifying interest of the Lower River Shannon SAC; relies on estuarine fish populations which may in turn depend on benthic prey.
- **Otter [1355]** – opportunistic predator of fish and crustaceans, potentially affected by temporary reductions in prey resources in shallow estuarine zones.

Diadromous Fish (Annex II species)

- **Atlantic salmon** – juvenile smolts and adults migrate through estuary; dependent on prey-rich estuarine habitats during transitional phases.
- **Sea lamprey** – estuarine adults require sufficient prey fish biomass to complete migration cycle.
- **River lamprey** – may be exposed to reduced prey availability during estuarine passage.

Birds (SCIs)

- **Diving species** (*e.g.*, **Scaup**, **Cormorant**) – sensitive to reduced fish and invertebrate prey in benthic foraging zones.
- **Assemblage feature Wetlands & Waterbirds** – may be indirectly affected if prey depletion leads to displacement or reduced carrying capacity within foraging habitats.

3.2.3.2. Impact Assessment

The proposed dredging activities will temporarily disturb and remove benthic and epibenthic communities, including polychaetes, molluscs, and small crustaceans, which form a critical component of the estuarine food web. This disturbance may result in a short-term reduction in prey biomass within the affected areas. The extent of the impact will depend on the scale of dredging, the spatial overlap with foraging areas of protected species, and the rate of natural recolonisation of disturbed sediments, which typically occurs over months to years in dynamic estuarine environments.

Bottlenose dolphin, a qualifying interest of the Lower River Shannon SAC, relies on estuarine fish populations, which themselves may be indirectly affected by a reduction in benthic prey. However, given the highly mobile nature of dolphins and the wide availability of alternative foraging areas within the Shannon Estuary, any localised depletion of prey is expected to cause at most temporary, minor behavioural disturbance. The otter is also a qualifying interest of the Lower River Shannon SAC and forages in shallow estuarine areas, which could also experience reduced prey availability in the immediate works area. As their foraging territories are

extensive and prey resources are replenished over time, significant adverse effects on the conservation objectives of this species are not anticipated.

Atlantic salmon, sea lamprey, and river lamprey migrate through the Shannon Estuary and may encounter temporary reductions in prey availability within disturbed zones. As their migratory behaviour relies more on passage than local foraging, impacts are expected to be minimal. Short-term reductions in prey biomass are unlikely to significantly affect migratory success or population status.

Diving species such as Scaup and Cormorant could experience reduced prey abundance within benthic foraging zones directly impacted by dredging. However, the spatial footprint of works is limited relative to the overall extent of suitable foraging habitat in the estuary, and alternative feeding grounds remain accessible. The Wetlands and Waterbirds assemblage feature may be indirectly affected through displacement if prey resources are temporarily reduced in localised areas. Given the scale and duration of the works, such effects are predicted to be minor and reversible, with no significant long-term consequences for the integrity of the SPA.

Overall, while a temporary reduction in benthic prey biomass is expected in the dredge area, the effects on screened-in receptors are predicted to be localised, short-term, and reversible. Mobile species such as dolphins, salmonids, lampreys, and waterbirds can shift to alternative foraging areas within the extensive Shannon Estuary. Accordingly, significant adverse effects on the conservation objectives of relevant European sites are not anticipated, provided standard best-practice measures are implemented.

3.2.3.3. Mitigation Measures

To minimise the potential for significant ecological impacts arising from temporary reductions in benthic prey biomass, the following receptor-specific mitigation measures will be implemented:

Marine Mammals (Annex II species)

- Avoid prolonged works in shallow margins commonly used by otters, minimising the duration of prey disruption in these zones.

Diadromous Fish (Annex II species)

- Where possible, phase dredging to allow rapid recolonisation of benthic communities between operations.

Birds (SCIs)

- Avoid peak wintering season (1st October to 31st March) for the most disturbance-sensitive species where feasible.
- Maintain buffer distances from large rafts of diving birds actively feeding in adjacent waters.

- Ensure dredging footprints are as small and localised as possible to maintain extensive alternative foraging grounds.

General Best Practice

- Monitor benthic communities post-works to verify recovery rates, enabling adaptive management if impacts persist.
- Coordinate dredging campaigns with other estuary users (e.g. aquaculture, fisheries) to avoid cumulative prey depletion.

3.2.3.4. Conclusion

The proposed dredging activities will result in a temporary and localised reduction of benthic and epibenthic prey biomass within the works footprint. While this disturbance has the potential to affect foraging opportunities for marine mammals, diadromous fish, and waterbirds, these impacts are expected to be minor, short-term, and reversible. All screened-in receptors are highly mobile and can access alternative foraging habitats within the extensive Shannon Estuary, while benthic communities are expected to naturally recolonise disturbed sediments over time.

With the implementation of the receptor-specific mitigation and best-practice measures set out above, no significant adverse effects on the conservation objectives of the Lower River Shannon SAC, River Shannon and River Fergus Estuaries SPA, or other relevant European sites are predicted.

3.2.4. Potential Impact Mechanism 4 – Physical Disturbance

The proposed dredging operations have the potential to cause physical disturbance to the marine environment within the dredging footprint. This disturbance may result from the direct removal of seabed sediments, which can lead to temporary habitat loss or alteration, and from increased turbidity caused by sediment resuspension during dredging activities. Such physical impacts may affect benthic communities, particularly in areas supporting sensitive or slow-recovering species. While these effects are generally localised and temporary in nature, their potential to impact the conservation objectives of nearby European Sites must be carefully assessed, particularly where qualifying habitats or species are located within or adjacent to the zone of influence of the proposed works.

Sediment transport modelling for the plough dredging of fine sands and silts indicates that dredged material is effectively dispersed under both neap and spring tidal conditions, with only minor deposition predicted at isolated shoreline locations. Localised deposition is expected to be minimal, generally below 0.2 kg/m² (equivalent to <0.1 mm), with isolated higher values (up to ~2.8 mm) in small areas such as Skagh Point. Maximum accumulation is estimated at approximately 35 mm following five planned campaigns over eight

years, confirming that significant long-term build-up is unlikely. Overall, the modelling supports the conclusion that deposition effects are minimal and largely confined to small, localised areas.

In addition to the direct disturbance caused by dredging activities, the operation of project vessels has the potential to cause additional physical disturbance to marine fauna. Increased vessel traffic in and around the dredge area may lead to displacement of sensitive species, such as marine mammals and waterbirds, from important foraging or resting areas. Vessel movements can also increase the risk of collision with large marine fauna, including basking sharks, seals, and cetaceans. For species reliant on undisturbed intertidal or nearshore habitats, such as otters, increased vessel activity and lighting could cause temporary avoidance behaviour, thereby reducing habitat use in the vicinity of the works. While such disturbance is typically short-term and reversible once activity ceases, it remains an important impact pathway to consider, particularly where vessels operate in close proximity to known areas of ecological importance.

3.2.4.1. Potential Receptors

Habitats (Annex I)

- **Estuaries [1130]** – sensitive to sediment removal, resuspension, and increased turbidity.
- **Mudflats and sandflats not covered by seawater at low tide [1140]** – risk of disturbance to benthic infauna and prey availability for birds.
- **Reefs [1170]** – may be sensitive to smothering from resuspended sediments.
- **Large shallow inlets and bays [1160]** – potential for localised turbidity and benthic disturbance.

Marine Mammals (Annex II species)

- **Bottlenose dolphin** – potential displacement due to vessel activity, collision risk, and turbidity effects on prey.
- **Harbour porpoise** – sensitive to displacement and vessel interactions.
- **Otter (*Lutra lutra*) [1355]** – disturbance of shoreline/nearshore habitats, avoidance behaviour in response to vessel activity.
- **Other Annex IV species (*e.g.* basking shark, marine turtles, large cetaceans)** – low likelihood of occurrence, but at risk of vessel collision when present.

Fish (Annex II species)

- **Atlantic salmon** – potential disruption of migration pathways due to vessel activity and localised turbidity.
- **Sea lamprey** – susceptible to turbidity and sedimentation during estuarine migration.
- **River lamprey** – as above.

Birds (SCIs)

- **Diving species (e.g. Scaup, Cormorant)** – disturbance from vessel traffic, turbidity effects reducing foraging efficiency.
- **Intertidal waders (*e.g.* Redshank, Curlew, Dunlin, Knot *etc.*)** – displacement from foraging habitats if disturbed by vessel presence or altered sediment conditions.
- **Other waterfowl (*e.g.* Light-bellied Brent Goose, Shelduck, Teal *etc.*)** – potential disturbance from vessel movements near intertidal feeding areas.
- **Assemblage feature Wetlands & Waterbirds** – indirect displacement or disturbance of constituent species within estuarine habitats.

3.2.4.2. Impact Assessment

The proposed dredging operations will result in direct and indirect physical disturbance within the marine environment. Direct disturbance will arise from the removal of seabed sediments in the dredging footprint. This disturbance will cause temporary habitat loss and alteration, as well as displacement of benthic communities that underpin the estuarine food web. There are naturally high suspended solid concentrations in the Shannon Estuary as a result of relatively high current speeds and high volumes of river runoff. This suspended solid load moves with the tides and currents and can ultimately settle to the seafloor. This creates an environment and communities adapted to and tolerant of a level of sediment deposition on the seafloor.

The infaunal communities encountered in the study area during DDV analysis are consistent with the NPWS *subtidal sand to mixed sediment with Nucula nucleus community complex* community type for the area, alongside Laminaria-dominated assemblages at the more structurally complex rocky fringe. These communities are well adapted to naturally dynamic conditions, including high levels of suspended sediment and periodic siltation, due to the relatively strong tidal currents in the estuary (up to 1.5 m/s). The drop-down video survey confirmed that sediment conditions and associated assemblages remain stable and consistent with historic records, supporting the conclusion that the benthic environment is resilient to disturbance and dominated by silt-tolerant and opportunistic species.

Sensitivity assessments of the identified biotopes indicate low to medium vulnerability to dredging-related pressures, with infaunal sand and mud communities (SS.SSa.IMuSa.ArelSa) found to be largely tolerant of smothering, turbidity fluctuations, and sediment penetration, while Laminaria-dominated habitats (IR.MIR.KR.Ldig.Bo) show greater sensitivity to heavy siltation and abrasion but remain unlikely to be significantly impacted given local hydrodynamic conditions and minimal predicted deposition. Sediment transport modelling further confirms that plough dredging of fine sand and silt results in effective dispersion,

with only minor, localised deposition (≤ 35 mm over five campaigns in eight years), thereby limiting the risk of lasting habitat alteration. Although the model provides the ultimate fate of material settling to the seafloor from the dredging operation, it does not take into account the further dispersion and dilution of re-suspended dredged material from the sea floor. Sedimentation at the levels predicted (worst case scenario) will have little additional effect on epi- or infaunal communities in this region.

Overall, the benthic environment of the project area is considered resilient, with impacts from dredging expected to be temporary, spatially limited, and within the natural variability of the system. Recovery potential is high, and with the implementation of standard best practice measures, the risk of significant adverse effects on benthic habitats or qualifying features of nearby European sites is considered low.

The intertidal survey recorded biotopes consistent with the NPWS community type *'Fucoid-dominated intertidal reef community complex'*, characteristic of rocky shore habitats within the Shannon Estuary. These communities are naturally adapted to fluctuating sediment regimes resulting from the large catchment size and high suspended sediment loads typical of the estuary. Strong tidal currents (up to 1.5 m/s) and substantial freshwater input generate high baseline turbidity and dynamic sediment transport conditions, resulting in faunal and floral assemblages tolerant of intermittent sediment deposition. The biotopes identified are generally resilient, with most exhibiting *low to medium* sensitivity to light siltation events (<5 cm), as may occur during maintenance dredging.

Hydrodynamic modelling confirms effective dispersion of fine material generated during plough dredging, with suspended sediments widely dispersed throughout the outer and middle estuary within approximately 18 hours under both neap and spring tidal conditions. Localised deposition is expected to be minimal, generally below 0.2 kg/m² (equivalent to <0.1 mm), with isolated higher values (up to ~2.8 mm) in small areas such as Skagh Point. Even assuming cumulative deposition over multiple dredging campaigns, sediment settlement remains well within the tolerance thresholds of the recorded biotopes. The continual tidal action will rapidly redistribute any deposited material, limiting the potential for prolonged smothering or habitat alteration. Given the timing of dredging operations (commencing four hours before high water) and the inherent resilience and recovery capacity of the intertidal assemblages, significant long-term effects on the structure or function of intertidal habitats are not anticipated.

Indirect disturbance will occur through increased turbidity associated with sediment resuspension during dredging activities. Elevated turbidity levels may temporarily reduce light penetration, impairing primary productivity in shallow waters and causing localised stress to filter-feeding organisms. While these effects are generally confined to the immediate dredging plume and are reversible following cessation of activity, there is potential for short-term reductions in prey availability for species reliant on benthic and epibenthic

organisms, including waterbirds, fish, and marine mammals. Given the spatially restricted footprint of works relative to the wider Shannon Estuary, the overall scale of prey depletion is expected to be limited, with alternative foraging areas available to mobile species.

Vessel activity associated with the project introduces an additional pathway of physical disturbance. The presence and movement of dredging vessels and support craft may cause temporary displacement of sensitive receptors, such as marine mammals (*e.g*. bottlenose dolphin, harbour porpoise, grey seal) and qualifying waterbird species. Disturbance may manifest as short-term avoidance behaviour or reduced use of foraging and resting habitats adjacent to the works. Vessel operations also increase the potential risk of collision with large marine fauna such as basking shark, dolphins, or seals, although such risks are low given the relatively small scale and duration of the proposed campaign compared to background navigation and marine traffic in the estuary.

Overall, the impacts of physical disturbance from dredging and associated vessel activity are expected to be temporary, localised, and reversible. Benthic habitats are predicted to recover within a reasonable timeframe, and mobile qualifying species of the SACs and SPAs are likely to relocate temporarily to alternative suitable habitats within the extensive Shannon Estuary system. With the implementation of standard best-practice measures and mitigation (including seasonal restrictions, vessel speed controls, and MMO monitoring), significant adverse effects on the integrity of European sites are not anticipated.

3.2.4.3. Mitigation Measures

To minimise the potential for significant adverse effects arising from physical disturbance during dredging, and associated vessel operations, the following receptor-specific and general mitigation measures will be implemented:

Habitats (Annex I)

- Restrict dredging to the Project footprint in order to reduce the extent of direct seabed disturbance.
- Adherence to timing and tonnage descriptions in the licence application.

Marine Mammals (Annex II species)

- Employ a Marine Mammal Observer (MMO) to monitor for the presence of dolphins, porpoises, and seals during vessel operations, with authority to halt activities if animals are observed in close proximity.
- Vessel speed restrictions in the dredging zone to reduce collision risk and disturbance.

Birds (SCIs)

- Schedule dredging outside peak overwintering months (1st October to 31st March) where feasible, to minimise displacement of sensitive waterbird species.
- Maintain distance from large flocks of feeding or roosting birds; operations will not commence or will temporarily pause if significant aggregations are recorded within the immediate works area.
- Minimise night-time lighting to avoid displacement or disorientation of nocturnal and roosting bird species.

Diadromous Fish (Annex II species)

- Adherence to methodology outlined in the project description to reduce turbidity plumes, ensuring suspended sediment concentrations remain within thresholds that avoid significant stress to migratory fish.

General Vessel Activity

- Implement a vessel traffic management plan to coordinate dredging and support vessel movements, thereby reducing disturbance pressure and collision risk.

Monitoring & Adaptive Management

- Conduct post-dredging benthic surveys to verify recovery of disturbed habitats and prey biomass.
- Report any accidental interactions (*e.g*. marine mammal approach, bird displacement, fish kills) to NPWS and apply adaptive mitigation where necessary.

3.2.4.4. Conclusion

The proposed dredging operations are expected to cause localised, temporary physical disturbance within the footprint of the works. The sediment transport modelling for the plough dredging of fine sand and silt indicates that the majority of material remains in suspension and disperses widely throughout the estuary under both neap and spring tidal conditions. Minor deposition is predicted at discrete locations along the shoreline, such as Cappagh, Ballymote West, Slattery Island, Moyne Point, and Ballymacrinan Bay. These findings suggest that long-term sediment accumulation is minimal, and the potential for significant habitat smothering is low.

Benthic habitats and communities within the immediate dredging footprint will experience temporary removal or alteration, with minor resuspension-related effects extending into adjacent areas. While this may temporarily reduce prey availability for certain mobile species, including fish, marine mammals, and diving birds, the highly mobile nature of these receptors, combined with the relatively small scale and short duration of the works, means that any adverse effects are expected to be short-term, reversible, and localised. Vessel activity may also lead to temporary displacement of species such as otters, waterbirds, and marine mammals,

but these impacts are anticipated to be minor given the routine presence of vessels and human activity in the Kilrush Marina area.

Overall, when considered in the context of species-specific sensitivities, ecological function, and the widespread dispersion of dredged material demonstrated by the modelling, the physical disturbance associated with the proposed works is unlikely to result in significant adverse effects on the conservation objectives of nearby Natura 2000 sites. Implementation of standard best-practice mitigation measures, including operational controls, pre-start monitoring, and buffer zones for sensitive species, will further reduce the potential for ecological impacts and ensure that physical disturbance remains within acceptable, reversible limits.

3.3. Summary of Mitigation Measures

Mitigation measures have been developed to ensure that the proposed dredging activities will not result in adverse effects on the integrity of any European site, with reference to the Site-Specific Conservation Objectives. These measures are based on the outcomes of the screening and impact assessment, the zone of influence derived from hydrodynamic and sediment dispersion modelling, and best practice guidance for marine projects in Ireland and the EU.

Habitats (Annex I & Supporting Features)

- Implement a comprehensive Pollution Prevention Plan covering fuel storage, transfer, and handling.
- Refuelling of vessels and machinery will take place in designated, bunded areas away from intertidal or otherwise sensitive habitats where practicable.
- Spill kits and absorbent materials will be kept on all vessels and at all working locations; personnel will be trained in their use.
- Immediate clean-up protocols will be in place for any accidental release to prevent spread into estuarine or intertidal habitats.
- Restrict dredging strictly to the permitted footprint to minimise seabed disturbance.
- Timing and tonnage restrictions will be applied where necessary to reduce the scale of habitat disturbance.

Marine Mammals (Annex II species)

- A qualified Marine Mammal Observer (MMO) will be appointed for the duration of works.
- MMO to conduct a 30-minute pre-start watch within 500 m of the vessel; dredging will not commence if marine mammals are observed until they leave the zone or a 30-minute clearance has elapsed.
- Apply “soft-start/ramp-up” procedures when commencing dredging.
- Dredging will commence only in daylight hours when effective visual monitoring is possible; if paused >30 minutes, pre-start monitoring must be repeated.
- Clear communication protocols will be maintained between MMO and crew for start/resume decisions.
- Vessel operations will follow MARPOL and equivalent best-practice environmental management standards to minimise hydrocarbon risks.
- Buffer zones will be maintained between refuelling/storage areas and otter foraging habitats.
- Vessel speeds will be limited within the dredging zone to reduce collision risk.
- Close approaches of bottlenose dolphins will be reported to NPWS.

- In the unlikely event of a spill, operations will be halted and the MMO notified to monitor potential effects.
- Dredging will be scheduled outside peak dolphin foraging activity (e.g. crepuscular hours) where feasible.
- Works in shallow margins commonly used by otters will be minimised in duration.
- Once dredging has started, continuous operations may proceed into night hours, as this is considered less disruptive than repeated stop-start cycles.

Diadromous Fish (Annex II species – salmon, sea lamprey, river lamprey)

- Limit dredging intensity to ensure suspended sediment concentrations remain within safe thresholds.
- Use biodegradable, non-toxic hydraulic fluids in machinery where feasible.
- Minimise night-time lighting to reduce disorientation of migrating fish.
- Phase dredging campaigns where possible to allow benthic communities to recolonise between operations.

Birds (SPA Qualifying Interests)

- Schedule dredging outside the peak overwintering season (1st October to 31st March) where feasible, to minimise displacement of sensitive waterbirds.
- Maintain buffer distances from large rafts of feeding or roosting birds; dredging will pause if significant aggregations occur nearby.
- Avoid fuel storage and refuelling in intertidal areas used by foraging waterbirds.
- In the event of a spill, deploy booms or absorbent barriers rapidly to protect mudflats and sandflats supporting prey species.
- Minimise night-time lighting to avoid displacement or disorientation of nocturnal and roosting bird species.
- Adopt gradual vessel movements near feeding flocks to reduce flushing events.

Monitoring & Adaptive Management

- Conduct post-dredging benthic surveys to verify recovery of disturbed habitats and prey biomass.
- Implement a vessel traffic management plan to coordinate dredging and support vessel movements, reducing collision risk and disturbance.
- Report accidental interactions (e.g. marine mammal approach, fish kills, significant bird displacement) to NPWS and implement adaptive mitigation as required.

3.4. Plans or Projects that might act in-combination

As set out in **Section 2.6**, a detailed review of threats, pressures, and potential interacting activities within the ZoI has been carried out to determine whether cumulative or in-combination effects could arise from the proposed project. This review considered a range of relevant activities and pressures, including aquaculture operations, dredging activities, navigation and marine traffic, diffuse and point-source pollution, and other existing or planned projects within the Shannon Estuary and surrounding coastal areas.

The Clare County Development Plan 2023 to 2029 and the RSES for the Southern Region 2020 to 2032 support the continued development of the Shannon Estuary for port, industrial, marine tourism and recreational uses, including the economic and marine tourism role of Kilrush Harbour (CDP11.22, CDP12.9 and RPO 79). Implementation of these plans may give rise to pressures that share a pathway with the Project, namely increased vessel activity and underwater noise, coastal and harbour development affecting estuarine habitats, and discharges affecting water quality. The AA determination for the Clare County Development Plan concluded that the Plan will not adversely affect the integrity of any European site, either alone or in combination with other plans or projects, subject to the mitigation measures in its Natura Impact Report and the implementation of the Plan objectives (Clare County Council, 2023). Projects arising under either plan also require screening for appropriate assessment and, where necessary, appropriate assessment before consent.

No plan-led project has been identified within the in-combination spatial scope of 2.5 km or temporal scope of eight years. The Project is maintenance of an existing channel and does not facilitate new development or cause permanent habitat loss. Its effects are temporary, recurring for five to ten days every two years, and confined to the approach channel and its immediate surroundings. Effects from the Project would not therefore add measurably to plan-led pressures on the Conservation Features listed in **Table 2-10**. Adverse effects on the integrity of the Lower River Shannon SAC, River Shannon and River Fergus Estuaries SPA, Mid-Clare Coast SPA, Inishmore Island SAC, Galway Bay Complex SAC and Blasket Islands SAC arising from the Project in combination with the Clare County Development Plan 2023 to 2029 and the Southern RSES can therefore be excluded.

Aquaculture sites in the estuary, particularly shellfish production areas in Poulnasherry Bay, were identified as the closest aquaculture activity with potential overlap. However, these sites are located outside the ZoI and are physically separated from the works footprint. Given this spatial separation and the relatively small-scale and temporary nature of the proposed dredging operations, no cumulative interaction with aquaculture operations is expected. Similarly, historic and permitted dredging activities have already been subject to regulatory assessment and licensing, and the proposed project is not expected to overlap temporally or spatially in a manner that could give rise to additive impacts.

Navigation and marine traffic are ongoing pressures in the estuary, but the proposed works are of limited duration and will utilise standard vessel types already operating in the system. As such, they do not represent a significant intensification of this activity. Diffuse and point-source pollution inputs, including wastewater discharges and land-based run-off, represent background pressures on estuarine water quality. However, the project will implement strict pollution prevention measures, ensuring that no additional contribution to these pressures occurs.

Taking these factors together, the Project will not add measurably to existing pressures on the Shannon Estuary, and will not act with other plans or projects to adversely affect the integrity of the Lower River Shannon SAC, River Shannon and River Fergus Estuaries SPA, Mid-Clare Coast SPA, Inishmore Island SAC, Galway Bay Complex SAC or Blasket Islands SAC, in view of their conservation objectives.

3.5. Natura Impact Statement Conclusion

This report has been prepared with regard to the relevant provisions of the EU Council Directive 92/43/EEC and Ireland's EU (Birds and Natural Habitats) Regulations 2011 (as amended). This NIS has been prepared as it was not possible in the Screening for AA to rule out, on the basis of objective information, that the proposed operation at the Project site will not have a likely significant effect on SACs and SPAs. The NIS has examined and analysed, in light of the best scientific knowledge, how the proposed operations could impact on the QIs of SACs and SCIs of SPAs, *i.e.,* conservation features, and whether the predicted impacts would adversely affect the integrity of protected sites.

Mitigation measures have been identified which ensure that any impacts on the conservation objectives of conservation features for which SACs and SPAs are designated will be avoided so that there will be no risk of adverse effects to the protected sites.

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 operations together with the mitigation measures proposed, that the proposed operations will not pose a risk of adversely affecting (either directly or indirectly) the integrity of SACs or SPAs, either alone or in combination with other plans and projects, and that there is no reasonable scientific doubt in relation to this conclusion.

4. References

Arroyo, B., Leckie, F., Amar, A., McCluskie, A., & Redpath, S. (2014). Ranging behaviour of Hen Harriers breeding in special protection areas in Scotland. *Bird Study*, *61*(1), 48-55.

Berrow, S., Whooley, P., O'Connell, M. and Wall, D. (2010). Irish Cetacean Review (2000–2009). Irish Whale and Dolphin Group, Merchants Quay, Kilrush, Co. Clare. 60 pp. ISBN 0-9540552-4-1.

Blázquez, M., Baker, I., O'Brien, J.M. and Berrow, S.D. (2020). Population viability analysis and comparison of two monitoring strategies for bottlenose dolphins (*Tursiops truncatus*) in the Shannon Estuary, Ireland, to inform management. *Aquatic Mammals*, 46(3), 307–325.

Bowen, D. (2016). *Halichoerus grypus*. The IUCN Red List of Threatened Species 2016: e.T9660A45226042.

Braulik, G., Minton, G., Amano, M. and Bjørge, A. (2020). *Phocoena phocoena*. The IUCN Red List of Threatened Species 2020: e.T17027A50369903.

Cevenini, D., Cecere, J. G., De Pascalis, F., Tinarelli, R., Kubelka, V., Serra, L., Pilastro, A. and Assandri, G. (2025). Habitat selection of the threatened northern lapwing (*Vanellus vanellus*) breeding in an intensive agroecosystem. *European Journal of Wildlife Research*, *71*(2), 1-13.

CIEEM. (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. *Chartered Institute of Ecology and Environmental Management, Winchester.*

Clare County Council (2023). Appropriate Assessment Determination, Clare County Development Plan 2023-2029. 19 April 2023.

Clausen, K. K., & Bregnballe, T. (2022). Mapping important roost sites for waders to alleviate human-waterbird conflicts in the Danish Wadden Sea. *Ocean & Coastal Management*, *223*, 106147.

Colhoun, K., Rooney, E., Collins, J., Keogh, N.P., Lauder, A, Heardman, C. & Cummins, S. (2024). The Status and Distribution of Chough in Ireland: Results of the National Survey 2021. *Irish Wildlife Manuals, No. 151*. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

Cronin, M., Duck, C., Ó Cadhla, O., Nairn, R., Strong, D. and O'Keeffe, C. (2004). Harbour seal population assessment in the Republic of Ireland: August 2003. Irish Wildlife Manuals No. 11. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. 34 pp.

DEHLG. (2009). Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (Revised February 2010).

De Grave, S., Moore, S.J. and Burnell, G., 1998. Changes in benthic macrofauna associated with intertidal oyster, Crassostrea gigas (Thunberg) culture. *Journal of Shellfish Research*, 17(4), pp.1137-1142.

Dias, M. P., Granadeiro, J. P., Lecoq, M., Santos, C. D., & Palmeirim, J. M. (2006). Distance to high-tide roosts constrains the use of foraging areas by dunlins: implications for the management of estuarine wetlands. *Biological Conservation*, *131*(3), 446-452.

Environment Agency. (2003). River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003.

European Commission. (2000). Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC. *Office for Official Publications of the European Communities, Luxembourg.*

European Commission. (2002). Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC. *Office for Official Publications of the European Communities, Luxembourg.*

European Commission. (2007). EU Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC. Clarification of the concepts of alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the Commission.

European Union. (1992). Habitats Directive: Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

Environmental Protection Agency. (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR). May 2022.

Environmental Protection Agency. (2018). Shannon North Estuary Catchment Assessment 2010 - 2015 (HA 27). epacatchments.

European Union. (1992). Habitats Directive: Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

Goodship, N. M., & Furness, R. W. (2022). Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. *Nature Scot Research Report*, *1283*.

Ghoul, A. and Reichmuth, C. (2014). Hearing in the sea otter (*Enhydra lutris*): auditory profiles for an amphibious marine carnivore. *Journal of Comparative Physiology A*, 200(11), 967–981.

Gray, B. T., D. H. Gordon, and R. M. Kaminski. (1996). Activity Patterns of Dabbling Ducks Wintering in Coastal South Carolina. *Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies* 50:475-495

Guillemain, M., Mondain-Monval, J. Y., Weissenbacher, E., Brochet, A. L., & Olivier, A. (2008). Hunting bag and distance from nearest day-roost in Camargue ducks. *Wildlife Biology*, *14*(3), 379-385.

Fossitt, J.A. (2000). A guide to habitats in Ireland. *The Heritage Council*.

Jakubas, D., Indykiewicz, P., Kowalski, J., Iciek, T., & Minias, P. (2020). Intercolony variation in foraging flight characteristics of black-headed gulls *Chroicocephalus ridibundus* during the incubation period. *Ecology and Evolution*, *10*(12), 5489-5505.

Johnson, W. P., Schmidt, P. M., & Taylor, D. P. (2014). Foraging flight distances of wintering ducks and geese: a review. *Avian Conservation and Ecology*, *9*(2), 2.

Lowry, L. (2016). *Phoca vitulina*. The IUCN Red List of Threatened Species 2016: e.T17013A45229114.

Lyons, D.O. (2004). Summary of National Parks and Wildlife Service surveys for common (harbour) seals (*Phoca vitulina*) and grey seals (*Halichoerus grypus*), 1978 to 2003. Irish Wildlife Manuals, No. 13. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin.

Marchowski, D., Ławicki, Ł., Fox, A. D., Nielsen, R. D., Petersen, I. K., Hornman, M. & Koschinski, S. (2020). Effectiveness of the European Natura 2000 network to sustain a specialist wintering waterbird population in the face of climate change. *Scientific Reports*, *10*(1), 20286.

Morris, C.D, Riddoch, N.G., Duck, C.D., Waitland, S.A. & Russell, D.J.F. (2025). Aerial thermal-imaging survey of seals in Ireland in August 2024. Irish Wildlife Manuals, No. 158. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

NPWS (2014a). Conservation Objectives: Blasket Islands SAC 002172. Version 1.

NPWS (2014b). Conservation Objectives: Mid-Clare Coast SPA 004182. Version 1.

NPWS (2024). Conservation Objectives: Inishmore Island SAC 000213. Version 2.

NPWS (2026). Conservation Objectives: Galway Bay Complex SAC 000268. Version 2.

National Roads Authority. (2009). Guidelines for Assessment of Ecological Impact of Road Schemes.

OPR (2021). Practice Note PN01 Appropriate Assessment Screening for Development Management.

Oudman, T., Piersma, T., Ahmedou Salem, M.V., Feis, M.E., Dekinga, A., Holthuijsen, S., Ten Horn, J., van Gils, J.A. and Bijleveld, A.I. (2018). Resource landscapes explain contrasting patterns of aggregation and site fidelity by red knots at two wintering sites. *Movement Ecology*, *6*(1), p.24.

O'Brien, J. and Berrow, S. (2017) Assessment of Risk to Marine Mammals from Proposed Dredging and Dumping at Sea Activity, Fenit Harbour, Co. Kerry. Report prepared by IWDG Consulting for Malachy Walsh and Partners on behalf of Kerry County Council, 15 December 2017.

Ó Cadhla, O., Mackey, M., Aguilar de Soto, N., Rogan, E. and Connolly, N. (2004). Cetaceans and seabirds of Ireland's Atlantic Margin. Volume II: Cetacean distribution and abundance. Report on research carried out under the Irish Infrastructure Programme, University College Cork, Cork, Ireland. 82 pp.

Ó Cadhla, O., Strong, D., O'Keeffe, C., Coleman, M., Cronin, M., Duck, C., Murray, T., Dower, P., Nairn, R., Murphy, P., Smiddy, P., Saich, C., Lyons, D. and Hiby, A.R. (2007). An assessment of the breeding population of grey seals in the Republic of Ireland, 2005. Irish Wildlife Manuals No. 34. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Paillisson, J. M., Carpentier, A., Le Gentil, J., & Marion, L. (2004). Space utilization by a cormorant *(Phalacrocorax carbo L.*) colony in a multi-wetland complex in relation to feeding strategies. *Comptes rendus. Biologies*, *327*(5), 493-500.

Peng, H.B., Chan, Y.C., Huang, Y., Choi, C.Y., Zhang, S.D., Ren, S., Hassell, C.J., Zhu, Z., Melville, D.S., Ma, Z. and Lei, G. (2024). Intraseasonal movements between staging sites by migrating great knots: Longer distances to alternatives decrease the probability of such moves. *Biological Conservation*, *292*, p.110547.

Richardson, W. J., Greene, C. R., Malme, C. I., and Thomson, D. H. (1995). Marine Mammals and Noise. *San Diego, CA: Academic Press, Inc*. 576pp.

Rogan, E., Breen, P., Mackey, M., Cañadas, A., Scheidat, M., Geelhoed, S. and Jessopp, M. (2018). Aerial surveys of cetaceans and seabirds in Irish waters: occurrence, distribution and abundance in 2015–2017. Department of Communications, Climate Action and Environment and National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. 297 pp.

Robertson, A., Jarvis, A. M., & Day, K. R. (1995, June). Habitat selection and foraging behaviour of breeding Choughs *Pyrrhocorax pyrrhocorax* L. in county Donegal. In *Biology and Environment: Proceedings of the Royal Irish Academy* (pp. 69-74). Royal Irish Academy.

Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.J., Gentry, R.L., Greene, C.R., Kastak, D., Ketten, D.R., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A. and Tyack, P.L. (2007). Marine mammal noise exposure criteria: initial scientific recommendations. *Aquatic Mammals*, 33(4), 411–521.

Southall, B.L., Finneran, J.J., Reichmuth, C., Nachtigall, P.E., Ketten, D.R., Bowles, A.E., Ellison, W.T., Nowacek, D.P. and Tyack, P.L. (2019). Marine mammal noise exposure criteria: updated scientific recommendations for residual hearing effects. *Aquatic Mammals*, 45(2), 125–232.

Toner, P., Bowman, K., Clabby, K., Lucey, J., McGarrigle, M, Concannon, C., Clenaghan, C., Cunningham, P., Delaney, J., O'Boyle, S., MaCarthaigh, M., Craig, M., and Quinn, R. (2005). Water Quality in Ireland 2001-2003. *Environmental Protection Agency, Wexford.*

Veneranta, L., Heikinheimo, O., & Marjomäki, T. J. (2020). Cormorant (*Phalacrocorax carbo*) predation on a coastal perch (*Perca fluviatilis*) population: estimated effects based on PIT tag mark-recapture experiment. *ICES Journal of Marine Science*, *77*(7-8), 2611-2622.

Whittingham, M. J., Percival, S. M., & Brown, A. F. (2000). Time budgets and foraging of breeding golden plover Pluvialis apricaria. *Journal of Applied Ecology*, *37*(4), 632-646.

Wright, A. J., Soto, N. A., Baldwin, A. L., Bateson, M., Beale, C. M., Clark, C., Deak, T., Edwards, E. F., Fernández, A., Godinho, A., Hatch, L. T., Kakuschke, A., Lusseau, D., Martineau, D., Romero, L. M., Weilgart, L. S., Wintle, B. A., Notarbartolo-di-Sciara, G., Martín, V. (2007). Anthropogenic Noise as a Stressor in Animals: A Multidisciplinary Perspective. *Journal of Comparative Psychology*, *20, 250-273*.

[1] The most recent Article 17 report (2019) is available at https://www.npws.ie/publications/article-17-reports/article-17-reports-2019

[2] All site synopsis and respective conservation objectives documents can be assessed at Protected Sites in Ireland | National Parks & Wildlife Service (npws.ie)

[3] Scottish Natural Heritage. (2016). Assessing Connectivity with Special Protection Areas (SPAs). https://www.nature.scot/sites/default/files/2022-12/Assessing%20connectivity%20with%20special%20protection%20areas.pdf

[4] BSG Ecology - Assessment of importance of loss of foraging habitat to light-bellied brent geese https://bsg-ecology.com/portfolio_page/st-aidans-cbs-dublin-assessment-of-importance-of-loss-of-foraging-habitat-to-light-bellied-brent-geese/

[5] Natural England – Greater scaup https://publications.naturalengland.org.uk/publication/3750233

[6] Great Cormorant Phalacrocorax Carbo Species Factsheet | BirdLife DataZone

[7] https://wadertales.wordpress.com/2022/11/10/inland-feeding-by-coastal-godwits/

[8] https://publications.naturalengland.org.uk/file/1516017

[9] https://publications.naturalengland.org.uk/publication/2766079

[10] https://publications.naturalengland.org.uk/publication/1473930

[11] DHPLG - EIA Portal: https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal

[12] Clare County Council - Planning System: https://eplanning.ie/

[13] https://www.gov.ie/en/collection/d8ea9-aquacultureforeshore-licence-applications/

[14] https://dafm-maps.marine.ie/aquaculture-viewer/

[15] https://atlas.marine.ie/