# Final Report

Wicklow Harbour Dredging, Disposal at Sea Site Selection

Report No. M1062-AYE-ENV-R-002

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Wicklow County Council

# Document Control

**Project**

Wicklow Harbour Dredging, Disposal at Sea Site Selection

**Client**

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Final Report

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## Glossary of Terms and Abbreviations

| | |
|---|---|
| AA | Appropriate Assessment |
| AIMU | Assessment of Impact of the Maritime Usage |
| Al | Aluminium |
| As | Arsenic |
| BIM | Bord Iascaigh Mhara |

| | |
|---|---|
| Cd | Cadmium |
| Cr | Chromium |
| Cu | Copper |
| CWE | Coastal Watch Europe |
| CZMD | Coastal Zone Management Division |
| DAFM | Department of Agriculture, Food and the Marine |
| DaS | Dumping at Sea (permit) |
| DBT | Dibutyltin |
| EPA | Environment Protection Authority |
| GIS | Geographical Information System |
| GSI | Geological Society Ireland |
| Hg | Mercury |
| IFI | Inland Fisheries Ireland |
| ITM | Irish Transverse Mercator |
| IWDG | Irish Whale and Dolphin Group |
| Li | Lithium |
| MARA | Marine Area Regulatory Authority |
| MBES | Multibeam Ecosounder |
| MPA | Marine Protection Area |
| MPDM | Marine Protection Development Management Act |
| MSO | Marine Survey Office |
| NHA | Natural Heritage Area |
| NPWS | National Parks and Wildlife Service |
| OCP | Organochlorinated pesticides |
| OSPAR | Oslo and Paris Conventions |
| PAH | Polyaromatic Hydrocarbons |
| Pb | Lead |
| PCB | Polychlorinated Biphenyls |
| pNHA | Proposed Natural Heritage Area |
| SAC | Special Area of Conservation |
| SFPA | Sea Fisheries Protection Authority |
| SPA | Special Protection Area |
| SSB | Spawning Stock Biomass |
| TBT | Tributyltin |
| THC | Total Hydrocarbons |
| TSHD | Trailer Suction Hopper Dredger |
| UAU | Underwater Archaeology Unity |
| WCC | Wicklow County Council |
| WFD | Water Framework Directive |
| WID | Water Injection Dredging |
| Zn | Zinc |

# [1] Introduction

## [1.1] Project Overview

Wicklow County Council (WCC) proposes to undertake periodic maintenance dredging works within the Wicklow Harbour, which is subject to natural accretion of sandy and silty material. As part of this, WCC is seeking a suitable disposal at sea site located within reasonable distance from Wicklow Harbour, to place this dredge material over a long-term period. Currently available and pre-approved offshore licensed sites are considered unsustainable in the long term.

Ayesa were commissioned by WCC to undertake the initial and high-level investigation to identify potential 'disposal at sea' candidate sites, via desk-based review and engagement with key stakeholders. This is a feasibility study ahead of any further investigation and detailed study into the identified optimum location.

## [1.2] Report Objectives

This document represents the Final Report for this investigation, and outlines the following:

1. Identifies the requirements of the disposal at sea site, in terms of suitable distance from Wicklow Harbour and size requirements, relative to the maintenance dredging needs,
2. Describes the characteristics and quantities of material proposed to be dredged from the Wicklow Harbour, and thereafter placed at sea (subject to approval),
3. Outlines the methodology and findings of the desk-top review and exclusion mapping exercise used in identifying potential candidate sites,
4. Presents the potential candidate sites shortlisted, and justification for this,
5. Presents the outcomes of engagement with key stakeholders,
6. Presents the chosen optimum disposal site, and justification for this, and
7. Provides recommendation and a road-map for the next step in the investigation process, including the conduct of detailed site investigations at the identified optimum location for disposal at sea, and studies required to comply with the Dumping at Sea (DaS) permit.

## [1.3] Legislative Context

Dumping at Sea is regulated under the Dumping at Sea Acts 1996 to 2010. The Coastal Zone Management Division (CZMD) of the Department of Agriculture, Food and the Marine had the responsibility of implementing the provisions of these Acts, i.e. permitting and enforcement of dumping at sea operations, up until 2010. The Foreshore and Dumping at Sea (Amendment) Act, 2009 transferred the responsibilities for controlling dumping at sea from CZMD to the Environmental Protection Agency (EPA). The Dumping at Sea Acts 1996 to 2010 provide for a system of regulating the dumping of prescribed material at sea and provides for the implementation of the requirements of International Conventions regulating the disposal of materials, including dredge material, at sea (EPA, 2012).

The purpose of a Dumping at Sea (DaS) permit is to regulate the dumping of material at sea.

Dump site selection is a fundamental element of any dumping at sea application, and EPA have produced (in coordination with AQUAFACT) the Dumping Site Selection Guidance Note in 2012 to inform how this process should be undertaken. This Final Report has been prepared cognisant of these Guidelines.

# [2] Project Description

## [2.1] Project Background & Location

WCC proposes to undertake periodic maintenance dredging works within the Wicklow Harbour, which is subject to natural accretion of sandy and silty material. As part of this, WCC is investigating a suitable disposal at sea site located within reasonable distance from Wicklow Harbour, to dispose of this dredge material over a long-term period.

A historical disposal at sea site is situated close to Wicklow Harbour (see Image 1), and WCC intended to a Dumping at Sea Permit to the Environmental Protection Agency (EPA) for this site in 2023/2024. However, on completion of a detailed benthic survey by MERC Consultants in 2023, the area was found to be of significant ecological importance, largely in relation to the presence of coarse/mixed substrate habitat akin to that of the Wicklow Reef Special Area of Conservation (SAC) located south-east of this site. The substrate type found here supports a diverse range of species including most notably the *Sabellaria alveolata* (Honeycomb Worm) and may be the only known example of this habitat off the Irish and British Coast (NPWS, 2014). As a result of these findings, WCC were cognisant of their environmental responsibility, and decided to not proceed with a Dumping at Sea Permit application for this site, and an alternative disposal site is being sought as part of the investigation outlined in this Interim Report.

As a temporary measure and until a new disposal site is identified and approved, WCC is in the process of seeking an 8-year Dumping at Sea Permit for the Arklow Bank Disposal Site (see Image 1), previously approved for offshore disposal at sea activities in 2011 for dredging works at Arklow Harbour (EPA Dumping at Sea Permit S0002-01, dated April 2011). However, the distance to be travelled from Wicklow Harbour (25.5km each way) renders this site unsustainable in the long-term. Therefore, alternative disposal sites are being investigated within a more reasonable distance to Wicklow Harbour.

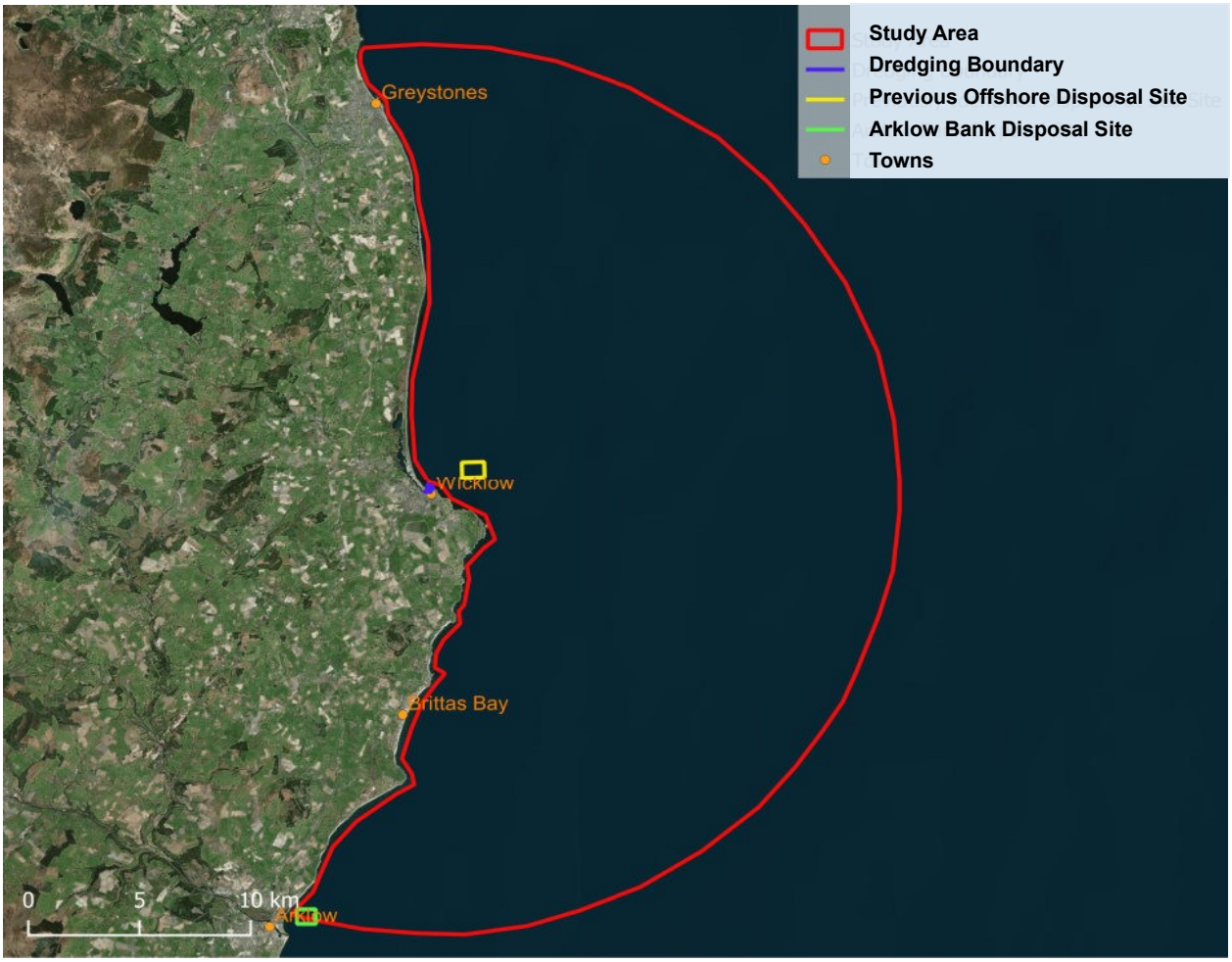


**Image 1. Wicklow Harbour Dredge Site and Disposal at Sea Sites**

## [2.2] Dredge & Disposal Requirements

The purpose of the dredging activities proposed is to maintain a safe seabed level within and in the approaches to the Wicklow Harbour. The site is currently subject to an accretion of material (largely silts and silty sands). Whilst unconfirmed, this accretion is suspected to be a combination of material transported down the River Vartry, as well as coastal longshore material which enters the harbour during an easterly storm. The river inflow results in softer sediment being deposited along the margins of the harbour area, leaving a typical scour channel through the centre.

### [2.2.1] Quantities and Frequency of Dredging

The quantities and frequency of dredging is outlined in Table 1 overleaf. This table provides a conservative assumption of quantities to be dredged. The quantities have been presented in three datasets, as is required by the EPA, including dry tonnes, *insitu* $m^3$, and wet tonnes.

Four potential methods of dredging are proposed to be utilised, including Trailer Suction Hopper Dredger (TSHD), Mechanical Dredging, Water Injection Dredging (WID) and plough dredging. The material to be dredged via the latter two methods will not require offshore disposal. A maximum 2-week programme is anticipated for each dredge and offshore disposal occasion however this period may be longer based on the volume to be dredged and the plant available.

**Table 1. Dredge Frequency and Quantities from Wicklow Harbour**

| | | Primary Year | Secondary Year | Secondary Year | Primary Year | Secondary Year | Secondary Year | Primary Year | Secondary Year | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dredge Area Name** | **Method of Dredging** | **2025 (dry tonnes)** | **2026 (dry tonnes)** | **2027 (dry tonnes)** | **2028 (dry tonnes)** | **2029 (dry tonnes)** | **2030 (dry tonnes)** | **2031 (dry tonnes)** | **2032 (dry tonnes)** | **Total (dry tonnes)** | **Total (dry tonnes)** |
| Port Area | TSHD/ Mechanical | 80,850 | 23,100 | 23,100 | 46,200 | 23,100 | 23,100 | 46,200 | 23,100 | **288,750** | **415,800** |
| | WID | 26,950 | 0 | 0 | 26,950 | 0 | 0 | 26,950 | 0 | **80,850** | |
| | Plough | 5,775 | 5,775 | 5,775 | 5,775 | 5,775 | 5,775 | 5,775 | 5,775 | **46,200** | |

| **Dredge Area Name** | **Method of Dredging** | **2025 (insitu $m^3$)** | **2026 (insitu $m^3$)** | **2027 (insitu $m^3$)** | **2028 (insitu $m^3$)** | **2029 (insitu $m^3$)** | **2030 (insitu $m^3$)** | **2031 (insitu $m^3$)** | **2032 (insitu $m^3$)** | **Total (insitu $m^3$)** | **Total (insitu $m^3$)** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Port Area | TSHD/Mechanical | 105,000 | 30,000 | 30,000 | 60,000 | 30,000 | 30,000 | 60,000 | 30,000 | **375,000** | **540,000** |
| | WID | 35,000 | 0 | 0 | 35,000 | 0 | 0 | 35,000 | 0 | **105,000** | |
| | Plough | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | **60,000** | |

| **Dredge Area Name** | **Method of Dredging** | **2025 (wet tonnes)** | **2026 (wet tonnes)** | **2027 (wet tonnes)** | **2028 (wet tonnes)** | **2029 (wet tonnes)** | **2030 (wet tonnes)** | **2031 (wet tonnes)** | **2025 (wet tonnes)** | **Total (wet tonnes)** | **Total (wet tonnes)** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Port Area | TSHD/Mechanical | 157,500 | 45,000 | 45,000 | 90,000 | 45,000 | 45,000 | 90,000 | 45,000 | **562,500** | **810,000** |
| | WID | 52,500 | 0 | 0 | 52,500 | 0 | 0 | 52,500 | 0 | **157,500** | |
| | Plough | 11,250 | 11,250 | 11,250 | 11,250 | 11,250 | 11,250 | 11,250 | 11,250 | **90,000** | |

***Note:*** *The material to be dredged via WID and plough dredging will not require offshore disposal.*

### [2.2.2] Characteristics of Dredge Site and Material

The depths of the dredge site (Wicklow Harbour) range from 0.1m to 7.8m according to a recently completed bathymetric survey (Hydromaster Ltd., 2023). The shallower depths are primarily focused along the margins of the harbour area (areas of lower river flow), leaving a typical scour channel through the centre.

Sediment sampling was completed at fourteen locations within the Wicklow Harbour in 2021, thirteen of which were marine based and located in the planned dredge area (all apart from S10) (SOCOTEC, 2021). These results have been presented in Table 2 below. Overall, the physical characteristics of the sediments within the dredge area are consistent with estuarine sediments (silt / silty sand).

**Table 2. Physical Characteristics from Sediment Sampling at Dredge Site (SOCOTEC, 2021)**

| Unit | % | % | Mg/m3 | % M/M | % M/M | % | % | % | N/A |
|---|---|---|---|---|---|---|---|---|---|
| Client Ref: | Total Moisture @ 120°C | Total Solids | Particle Density | TOC | Carbonate Equiv (%CO3) | Gravel (>2mm) | Sand (63-2000 µm) | Silt (<63 µm) | Visual Inspection |
| S1 | 34.3 | 65.7 | 2.76 | 0.36 | 6.48 | 8.7 | 42.4 | 48.9 | Grey SILT |
| S1b | - | - | - | - | - | 0.2 | 22.1 | 77.7 | - |
| S2 | 36.1 | 63.9 | 2.75 | 0.57 | 7.20 | 0.0 | 56.6 | 43.4 | Grey SILT |
| S2b | - | - | - | - | - | 2.0 | 35.3 | 62.6 | - |
| S3 | 53.5 | 46.5 | 2.74 | 1.04 | 10.20 | 0.0 | 36.8 | 63.2 | Grey sandy SILT |
| S3b | - | - | - | - | - | 0.9 | 58.2 | 41.0 | - |
| S4 | 48.8 | 51.2 | 2.72 | 1.18 | 9.36 | 32.5 | 36.2 | 31.2 | Grey SILT |
| S5 | 46.5 | 53.5 | 2.69 | 1.47 | 8.88 | 4.6 | 21.0 | 74.4 | Grey SILT |
| S6 | 46.1 | 53.9 | 2.74 | 1.78 | 10.6 | 0.00 | 29.3 | 70.7 | Grey SILT |
| S7 | 23.0 | 77.0 | 2.73 | 0.54 | 6.36 | 39.8 | 57.3 | 2.9 | Grey silty SAND |
| S8 | 27.4 | 72.6 | 2.72 | 0.56 | 3.84 | 1.9 | 91.7 | 6.4 | Grey silty SAND |
| S9 | 29.2 | 70.8 | 2.70 | 0.37 | 4.56 | 0.0 | 94.8 | 5.2 | Grey SAND |
| S10 | 32.5 | 67.5 | 2.70 | 0.21 | 5.28 | 0.0 | 72.9 | 27.1 | Grey SAND |
| S11 | 32.6 | 67.4 | 2.76 | 1.21 | 8.88 | 0.0 | 49.7 | 50.3 | Grey silty SAND |

Chemical testing was also completed in the Harbour, including analysis of heavy metals (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, Al and Li), Dibutyltin (DBT), Tributyltin (TBT), Polyaromatic Hydrocarbons (PAH), Total Hydrocarbons (THC), Polychlorinated Biphenyls (PCB), and Organochlorinated pesticides (OCP). In the marine samples (S1, S2, S3, S4, & S7), no threshold levels were exceeded and therefore the material is not considered to be contaminated. The full set of laboratory results are included in Appendix 2.

Benthic surveys were conducted at four locations within the Harbour by MERC in 2023. Video imagery of the dredge area indicates no surface hard substrata or epifauna. It was found that there were minor differences in the Folk classification of the four stations. Station 1 was classified as Muddy Sand, Station 2 was Slightly Gravelly Sand, Station 3 was Gravelly Sand and Section 4 was classified as Slightly Gravelly Muddy Sand. Softer sediments were found to be focused along the margins of the harbour, and coarser sediments towards the mouth of the Harbour.

Faunal communities identified at these stations were typical of finer sediment, estuarine habitats and contained few taxa and individuals. Taxa common to all stations included the polychaetes *Nephtys hombergii*, *Tharyx robustus* and *Spio martinensis*. Animals from other phyla were less common but included the amphipod *Ampelisca brevicornis*, the bivalves *Macomangulus tenuis* and *Abra alba* and a few bryozoans (MERC, 2023).

### [2.2.3] Offshore Disposal Site Size Requirements

Based on the size of TSHD to be employed for the dredging operations at the Wicklow Harbour, an offshore disposal site of approximately 700m x 500m is considered suitable.

### [2.2.4] Alternatives to Marine Disposal Considered

EPA Dumping Site Selection Guidance Note (Aquafact, 2012) requires developers to explore other options for the disposal of dredge material, as an alternative to the disposal at sea method.

As such, an Alternatives to Dumping at Sea Report was prepared by Anthony D Bates Partnership on behalf of Wicklow County Council (2024) within which a number of alternatives were considered but subsequently ruled out, as detailed in the below table.

**Table 3. Alternative to Marine Disposal Considered**

| Alternatives to Marine Disposal | | Reasons for Infeasibility |
|---|---|---|
| **Prevention** | | Dredging is only undertaken when absolutely necessary to allow trade to safely navigate the approach channels and berths. To minimise the volume of dredging undertaken, the Wicklow Port already operates a limited access procedure in their navigation channels for trade vessels. This restricts the size of trade vessels that can reach suitable berths at times other than high water. Further feasible methods to minimise the volumes dredged have not been identified. Due to the high cost of dredging, excessive or unnecessary dredging is avoided. |
| **Beneficial Use** | Land Reclamation/Improvement | Wicklow Port is situated within Wicklow Town and is therefore confined by the surrounding facilities. Areas are present that could be reclaimed to provide further port facilities but these include a popular recreational beach and moorings for leisure craft. Furthermore, the council believe that the current land available is adequate for the port's current trade. Finally, the target dredge material contains a high proportion of silt, which does not have appropriate engineering characteristics for new port lands that require high bearing capacity and minimal long-term settlement. On this basis, there is no demand for land reclamation in the area and the majority of the material present would not be suitable without significant treatment. As treatment is required, to remove the fine-grained sediments, the material would not be permitted to be used for land reclamation under By-products Regulation 27. |

| | | |
|---|---|---|
| | Beach Nourishment | The composition of the sediments to be dredged does not correspond with the material present at beaches along the coastline (coarse beaches). No notable erosion is present at the local beaches. In cases where no erosion is present on a beach when sediment of a similar particle distribution to that insitu is placed it is likely to be eroded as the equilibrium has been altered. Therefore, the placement of fine-grained material would only be short-term, with dispersion almost certain over the medium to long term. On this basis, there is no demand for beach nourishment in the area and the material present is not suitable. |
| | Wetland Habitat/Enhancement | There is no significant wetland located within 30kms of Wicklow Port and Wicklow County Council are not aware of any wetlands that are degrading within their jurisdiction generally. On this basis, the use of the dredged material in wetlands is not deemed a viable option. |
| | Landfill Cover/Liner | Demand for cover/liner is not expected to increase as no new landfill sites are planned locally. Other existing licensed sites are either too small in relation to quantities to be disposed or are too remote from the site. While the dredged material from the Harbour is fine in nature it does not contain sufficient clay material and therefore would be unsuitable to be used as a landfill liner.<br>A local landfill was approached but they declined the material as either a waste or as a beneficial use material. If an arrangement could be made with the landfill operators to accept dredged material, it would be necessary to land the material either in the Port, dewater and transport to the site by road. It is planned to use hydraulic or hydrodynamic dredgers primarily. Therefore, to facilitate landing ashore site, pipeline and dewatering lagoon will be required. Alternative plant could be utilised but would reduce efficiency and increase dredging duration. The costs of establishing such a logistical process are significantly greater than the current management process. Furthermore, the environmental impact of substantially increased heavy vehicular traffic through the local community may be unacceptable to the local planning authority.<br>For the above reasons landing dredged sediment ashore for treatment and transport to a landfill site is unfeasible at this time. |
| | Aggregate Industry | The use of Wicklow Port maintenance dredge material for aggregates was considered however a number of current issues were identified:<br>• Lack of regulation of marine aggregates industry and guidance on its implementation;<br>• Fine nature of sediment present with the presence of organics;<br>• Elevated saline and pH levels;<br>• Mechanical dredging not undertaken by the Port;<br>• Hydraulic dredgers used cannot be unloaded at quays.<br>The local council's roads department was approached to determine if the material could be utilised in any of the local road projects but they concluded that the fine-grained nature of the material would not be suitable.<br>For the above reasons landing dredged sediment ashore at a suitable location for use as aggregates is not deemed feasible. |
| **Recycling** | Sediment Cell Maintenance | Wicklow Port has included both water injection dredging and ploughing dredging within their maintenance dredging strategy to minimise the volume of sediment being removed from the harbour sediment cell and disposed of at sea. Therefore, beneficial use through sediment cell maintenance will be undertaken when these campaigns are undertaken. |

| | |
|---|---|
| **Processing/Recovery** | The sediment dredged annually by Wicklow Port is clean uncontaminated material. Therefore, there is no benefit from processing the material, excluding dewatering and desalination, for the specific beneficial uses outlined above. |

After consideration of the above assessment, it was deemed that disposal at sea is considered the Best Practical Environmental Option for the management of dredged material from Wicklow Harbour.

### [2.2.5] Environmental Concerns of Disposal at Sea Activities

Disposal at sea activities give rise to a series of potential ecological concerns.

While non-toxic sediment composed primarily of sand, mud, fine silt, and some gravel might not be directly lethal from an ecological perspective, it can still impact fish and shellfish species in the Irish Sea through various mechanisms. Even with strong currents, licensed dumping of dredged sediment can have negative consequences, including:

- Increased suspended sediment: Generation of suspended sediment plumes from the disposal action which generates turbid conditions within the water column. The distance that the plume may travel and time with which sediment is suspended in the water column depends on the hydrodynamic conditions at the time.
- Localised smothering: Some sediment can settle and smother benthic (bottom-dwelling) communities near the dumping site despite the currents.
- Habitat alteration: The dumped material can alter the natural composition of the seabed, impacting the habitat suitability for certain species.
- Food web disruption: Reduced prey availability due to filter feeder decline and habitat alteration can disrupt the food web, affecting predator populations.

It is important to note that the specific impacts of sediment dumping depend on various factors, such as:

- Quantity and composition of the sediment: The amount and type of sediment being placed offshore plays a crucial role in the severity of the impact.
- Dumping location and frequency: The proximity of the disposal site to sensitive habitats and the frequency of disposal events influences the overall effect.
- Hydrodynamic conditions: While strong currents can help disperse the sediment, local water flow and bottom topography variations can affect the spread and impact.

Whilst less significant in their magnitude of impact, other concerns of disposal at sea activities include:

- Physical disturbance to marine seabed infrastructure (i.e., pipelines, cables).
- Interference with navigation/shipping lanes.
- Sedimentation impacts upon industrial intake systems.
- Disturbance of archaeological features (i.e., shipwrecks).

- Access restriction into zones designated for renewable energy sites.

All of the above has been considered in the conduct of the investigation for alternative offshore disposal sites, as outlined in the following sections.

# [3] Desktop Study & Exclusion Mapping

The first step in the investigation of alternative offshore disposal sites was the conduct of an initial desk-based data review and exclusion mapping exercise within a defined study area, to determine zones of exclusion/restriction on account of their ecological, industrial, or commercial sensitivity.

## [3.1] Study Area

The Study Area for this investigation, as outlined in Image 1, encompasses a 21km radius. This 21km distance (as the crow flies) was determined by the distance of the Arklow Bank Disposal Site from the Wicklow Harbour, as noted in Section [1.1]. Using this distance, seaward radial from the dredging site at Wicklow Harbour, the study area was determined.

## [3.2] Methodology and Data Sources

A desktop study on the regional maritime area off the coast of Wicklow was completed, to determine areas of restriction/exclusion whereby the disposal activities may be incompatible with. This included:

- Areas previously studies and excluded for dump at sea activities (see Section [2.1] for details).
- Areas of importance for ecological conservation, including:
  - Marine Protected Areas (MPAs)
  - Natura 2000 Protected Sites (Special Areas of Conservation and Special Protection Areas).
  - Natural Heritage Areas (NHAs) and Proposed Natural Heritage Areas (pNHAs).
- Areas designated under the Water Framework Directive (2000/60/EC), the Shellfish Waters Directive (79/923/EEC) and the Bathing Waters Directive (76/160/EEC).
- Areas of commercial and recreational fishing.
- Spawning, feeding and nursery grounds and migration routes of commercially important fisheries.
- Migration routes of marine mammals.
- Aquaculture sites.
- Areas of commercial, industrial and/or infrastructural importance, including:
  - Renewable energy sites such as offshore wind farms and wave and tidal stream devices.
  - Engineering uses of the seafloor such as undersea cables and pipelines.
  - Seabed extraction areas.
  - Oil and gas Lease/Licence areas.
  - Shipping lanes.
  - Intake sites for industrial uses such as cooling, desalination and aquaculture.

- Military exclusion zones.
- Marine archaeological interests such as shipwrecks.
- Beaches and other areas used for recreational purposes.

The above data was sourced from online resources and through consultation with key stakeholders, as outlined in the table below.

**Table 4. Datasets Utilised & Sources**

| Dataset | Source |
|---|---|
| Previous and current Dump at Sea sites | Environmental Protection Agency (EPA). www.data.gov.ie. |
| Protected Sites (SAC, SPA, NHA, pNHA) | National Parks and Wildlife Service (NPWS). www.data.gov.ie. |
| Protected Sites (OSPAR) | OSPAR Commission. |
| Water Framework Directive | Environmental Protection Agency (EPA), www.data.gov.ie |
| Fisheries Spawning and Nursery Grounds | Ireland's Marine Atlas. www.data.gov.ie. Consultation with the Sea Fisheries Protection Agency (SFPA). |
| Aquaculture and Fishery sites | Ireland's Marine Atlas |
| Outfalls, Discharge Points and Licensed Waste Facilities | Environmental Protection Agency (EPA). www.data.gov.ie. |
| Sediment Classification, Benthic Habitats | Ireland's Marine Atlas. INFOMAR |
| Shipwrecks | Ireland's Marine Atlas. INFOMAR. |
| Mussel Seed Beds | Consultation with Bord Iascaigh Mhara (BIM) and the Marine Institute (MI). |
| Fisheries interests/efforts (both offshore and inshore) for vessels >12m | Consultation with the Marine Institute (MI). |
| Renewable Energy Sites | Ireland's Marine Atlas. www.data.gov.ie. |
| Marine Landforms/Lineworks | Ireland's Marine Atlas. |
| Seascapes Character | Ireland's Marine Atlas. |
| Shipping and Navigation | Ireland's Marine Atlas. |
| Article 17 Data | National Parks and Wildlife Service (NPWS) www.data.gov.ie. |
| Supplementary biotope/substrate data | Data from previous ecological surveys conducted by AQUAFACT for a renewable farm development. |

Once sourced, available data was downloaded and imported into QGIS, a Geographical Information System (GIS). This allowed data to be overlain into a master QGIS Project file, identifying zones of exclusion/restriction, and highlighting areas of suitability for dump at sea activities.

Four key areas of consideration with regards to exclusion/restriction areas were:

1. **Ecological considerations**, including Protected Sites, areas designated under the WFD, areas of key commercial fishing efforts, spawning/nursery grounds and sensitive substrate/habitat types.
2. **Commercial and Infrastructure considerations**, including the presence of renewable energy sites along the east coast of Ireland, shipping/navigation concerns, and engineering uses of the seabed (i.e., cables, pipelines).
3. **Industrial considerations**, including intake and outfall systems.
4. **Social & cultural considerations,** including recorded shipwrecks, and areas of recreational use (i.e., beaches, swimming zones etc.).

The following sections provide detail into the mapping exercise and assessments made in relation to these considerations, and how they influenced the identification of candidate sites for disposal at sea activities.

## [3.3] Ecological Considerations

### [3.3.1] Protected Sites

Refer to Map 1 in Appendix 1.

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as the "Habitats Directive", provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000. These are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/ECC) as codified by Directive 2009/147/EC.

There are five SACs and two SPAs located within the Study Area, including:

- The Wicklow Reed SAC [Site Code 002274]
- The Murrough Wetlands SAC [Site Code 002249]
- Bray Head SAC [Site Code 000714]
- Magherabeg Dunes SAC [Site Code 001766]
- Buckroney-Brittas Dunes and Fen SAC [Site Code 000729]
- The Murrough SPA [Site Code 004186]
- Wicklow Head SPA [Site Code 004127]

There is a Fisheries Natura Declaration for mussel fishing (No. 3 of 2018) present in the Study Area, as illustrated in Map 1, which specifies a prohibited area for mussel fishing. The area essentially encompasses the Wicklow Reef.

As mentioned previously, the Wicklow Head SAC provided the most influence to the investigation of candidate sites. The Wicklow Reef is an example of a subtidal reef constructed by the honeycomb worm *Sabellaria alveolata*. Such reefs are widespread but uncommon. *Sabellaria*

*alveolata* subtidal reefs are known to occur in the Mediterranean but this example is an extremely unusual feature and may be the first record for Britain and Ireland (NPWS, 2014).

From review of available secondary data, *Sabellaria* subtidal reefs are known to extend beyond the boundaries of this SAC, particularly in the reaches to the north of it. These reefs are constructed by the related species *Sabellaria spinulosa* (Ross Worm) and are also a priority habitat under OSPAR convention. This has significantly influenced the proposed locations of the candidate sites as part of this investigation. Further discussion on substrate types and their sensitivity is included in Section [3.3.4] below.

A significant potential impact of disposal at sea in respect of Protected Sites is the indirect impact of sedimentation (should dispersion extend to their boundaries), impacting susceptible protected species from the perspective of localise smothering, habitat alteration and food web disruption.

### [3.3.2] Ecologically Significant Sites

The basic national designation for wildlife and their habitats is the Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) designated under the Wildlife (Amendment) Act 2000.These areas are considered important for the habitats present, or which holds species of plants and animals whose habitat needs protection.

Under the Wildlife Amendment Act (2000) NHAs are legally protected from damage. NHAs are not part of the Natura 2000 network and so the Appropriate Assessment process does not apply to them. Proposed NHAs (pNHA) are sites of significance for wildlife and habitats published on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. The pNHAs cover approximately 65,000ha and designation will proceed on a phased basis over the coming years (NPWS).

There are no NHAs within the Study Area, but five pNHAs, including:

- Wicklow Head pNHA [Site Code 000734]
- Wicklow Town Sites pNHA [Site Code 001929]
- The Murrough pNHA [Site Code 00730]
- Magherabeg Dunes pNHA [Site Code 001766]
- Buckroney-Brittas Dunes and Fen pNHS [Site Code 000729]

### [3.3.3] Water Framework Directive (WFD) Status and Risk

Refer to Maps 2 and 3 in Appendix 1.

The Water Framework Directive (WFD) was agreed by all individual European Union (EU) member states in 2000 and provides a comprehensive framework for water quality management across the EU. The directive requires that all member states adopt a comprehensive integrated basin-based approach to water management.

Rivers, lakes, estuaries and coastal waters can be awarded one of five statuses including ‘high’, ‘good’, ‘moderate’, ‘poor’ and ‘bad’. Ecological status for surface water bodies is primarily driven by the Biological Quality Elements (BQEs) which includes fish, aquatic flora, macroinvertebrates and phytoplankton. Standards for general physico-chemical parameters, specific pollutants and

hydromorphology are set at levels in order that they are sufficient to support the status of the BQEs.

The key objectives of the directive are to maintain a 'high' status of waters where it exists, prevent any deterioration in the existing status of waters and achieve at least 'good' in relation to all waters by 2015, latest by 2027. Those rivers classed as being 'at risk' relates to the potential of that watercourse meeting the 'good' Ecological Status.

The Coastal Waterbody Southwestern Irish Sea – Killiney Bay (Code IE_EA_100_0000) stretches the length of the coastline from Dalkey to Castletown and has been assigned a WFD status of 'High' (WFD 2016-2021). It's currently assigned as 'not as risk' from meeting its ecological status requirements and no key pressures have been identified to jeopardise this.

### [3.3.4] Sensitive Substrate/Habitat Types

Candidate sites were evaluated through a structured approach within a 21 km radius of Wicklow Harbour, leading to the selection of locations that would be least impacted by sediment dumping activities. This process began with an examination of the substrate characteristics of the area followed by an assessment of direct and indirect impacts to provide a balanced in the decision-making process for assessing the candidate locations.

#### [3.3.4.1] INFOMAR Seabed Surveys

INFOMAR is a joint venture between the Geological Survey Ireland (GSI) and the Marine Institute to carry our national seabed surveys**.** Ireland's seabed mapping efforts initially began with the aim of developing a marine baseline dataset to underpin national security as well as future economic, environmental, infrastructural and policy decisions for Ireland as set out in the INFOMAR Proposal and Strategy. With over twenty years of seabed mapping undertaken to date, this endeavour is being steadily achieved with over 700,000 km² of the seafloor within the Irish designated area mapped to date in high resolution. As of 2019, the INFOMAR database (>120 terabytes (TB) and growing) comprises a range of geophysical data measurements including multibeam echosounder (MBES) bathymetry and backscatter, shallow seismic profiles, gravity, magnetics, sidescan sonar and oceanographic water column profiles. It also houses information on physical ground-truthing samples and over 420 shipwreck discoveries.

Within the 21km radius study area, detailed substrate sediment type descriptions are available thanks to the INFOMAR mapping project. The physical aspects of the seafloor habitats are described according to level 3 of the EUNIS habitat classification scheme (also known as 'broad-scale habitats').

The broadscale habitats within the study area can be seen in Map 4 in Appendix 1 and include:

**Table 5. INFOMAR Broadscale Habitats within the Study Area (see Map 4 in Appendix 1)**

| EUNIS code | Habitat Description | Substrate | Energy Level |
|---|---|---|---|
| MC52 | Atlantic circalittoral sand | Sand | Moderate Energy |
| MB52 | Atlantic infralittoral sand | Sand | High Energy |
| MB42 | Atlantic infralittoral mixed sediment | Mixed Sediment | High Energy |
| MC42 | Atlantic circalittoral mixed sediment | Mixed Sediment | High Energy |

| | | | |
|---|---|---|---|
| MC32 | Atlantic circalittoral coarse sediment | Coarse substrate | Moderate Energy |
| MD32 | Atlantic offshore circalittoral coarse sediment | Coarse substrate | Moderate Energy |

### [3.3.4.2] AQUAFACT Surveys in the Study Area.

AQUAFACT have been involved in numerous benthic surveys within the survey area and the wider western Irish Sea. Benthic and Intertidal ecology surveys have been conducted for four separate offshore wind energy projects between Carnsore Point and Clogherhead as well as Dumping at Sea surveys within Dublin Bay. In addition, AQUAFACT conducted surveys as part of the South-West Irish Sea Survey (SWISS) BIOMÔR project in conjunction with National Museums in Wales (Wilson *et al.,* 2001) which assessed the benthic biodiversity of the Southern Irish Sea.

While some of the information from these studies is not in the public domain, the extensive benthic grab faunal and sediment surveys and the drop-down video surveys and analysis have resulted in a familiarity with the biotopes associated with the broadscale substrate habitats listed above. These include:

**Table 6. Biotopes Associated with the INFOMAR Broadscale Substrate Types (AQUAFACT findings)**

| EUNIS | Habitat Description | JNCC Code |
|---|---|---|
| MC52 | Atlantic circalittoral sand | • SS.SSa.CMuSa.EpusOborApri – Echinocyamus pusillus, Ophelia borealis and Abra prismatica in circalittoral fine sand |
| MB52 | Atlantic infralittoral sand | • SS.SSa.IFiSa.Ncir – Nephtys cirrosa and Bathyporeia spp. in infralittoral sand<br>• SS.SSa.IFiSa. ScupHyd – Sertularia cupressina and Hydrallmania falcata on tide swept sublittoral sand with cobbles or pebbles |
| MB42 | Atlantic infralittoral mixed sediment | • SS.SCS.ICS.SSh – Sparse fauna on highly mobile sublittoral shingle (cobbles and pebbles)<br>• SS.SCS.ICS.Slan – Dense Lanice conchilega and other polychaetes in tide swept infralittoral sand and mixed gravelly sand |
| MC42 | Atlantic circalittoral mixed sediment | • SS.SBR.PoR.SspiMx -Sabellaria spinulosa on stable circalittoral mixed sediment<br>• SS.SMx.FluHyd – Flustra foliacea and Hydrallmania falcata on tide swept circalittoral mixed sediment<br>• SS.SMX.CMx.OphMx – Ophiothrix fragilis and/or Ophiocomina nigra brittlestar beds on sublittoral mixed sediment<br>• SS.SMx.OMx.PoVen – Polychaete-rich deep Venus community in offshore mixed sediments |
| MC32 | Atlantic circalittoral coarse sediment | • SS.SCS.CCS.SpiB – Spirobranchus triqueter with barnacles and bryozoans on unstable circalittoral cobbles and pebbles<br>• SS.SCS.CCS.MedLumVen – Mediomastus fragilis, Lumbrineris |

| | | |
|---|---|---|
| | | spp. and venereid bivalves in circalittoral coarse sand or gravel<br>• SS.SCS.CCS.Pkef – Protodorvillea kefersteini and other polychaetes in impoverished circalittoral mixed gravelly sand |
| MD32 | Atlantic offshore circalittoral coarse sediment | • SS.SCS.OCS.HeloPkef – Hesionura elongata and Protodorvillea kefersteini in offshore coarse sand |

Of these common biotope communities with the western Irish Sea, the priority habitat for *Sabellaria* reef (SS.SBR.PoR.SspiMx -*Sabellaria spinulosa* on stable circalittoral mixed sediment) has been identified in areas to the north of the Wicklow Reef SAC and extending over the location of the discontinued Wicklow dredge disposal site.

The tube-building polychaete *Sabellaria spinulosa* occurs in this biotope at high abundances on mixed sediment. These species typically form loose agglomerations of tubes forming a low-lying matrix of sand, gravel, mud and tubes on the seabed. The infauna comprises typical sublittoral polychaete species such as *Protodorvillea kefersteini*, *Pholoe* spp., *Harmothoe* spp, *Scoloplos armiger, Mediomastus fragilis, Lanice conchilega* and cirratulids, together with the bivalve *Abra alba*, and tube building amphipods such as *Ampelisca* spp. The epifauna comprise a variety of bryozoans including *Flustra foliacea, Alcyonidium diaphanum* and *Cellepora pumicosa*, in addition to calcareous tubeworms, pycnogonids, hermit crabs and amphipods. The reefs formed by *Sabellaria* consolidate the sediment and allow the settlement of other species not found in adjacent habitats leading to a diverse community of epifaunal and infauna species. The development of such reefs is assisted by the settlement behaviour of larval *Sabellaria* which are known to selectively settle in areas of suitable sediment and particularly on existing *Sabellaria* tubes. These reefs are particularly affected by dredging or trawling and in heavily dredged or disturbed areas an impoverished community may be left (e.g. SS.SCS.CCS.Pkef) particularly if the activity or disturbance is prolonged. However, it is likely that reefs of *Sabellaria spinulosa* can recover quite quickly from short-term or intermediate levels of disturbance as found by Vorberg (2000) in the case of disturbance from shrimp fisheries and recovery will be accelerated if some of the reef is left intact following disturbance as this will assist larval settlement of the species. (Information from Tillin *et al.,* 2018).

As this biotope is typically found in areas with strong currents and high water movement, they tend to occur in areas with mixed and coarse sediment. As such they are not typically found in locations where fine sand is deposited. This aided in the selection of sites where it is unlikely to be disposing of dredged material over *Sabellaria* reef (see further in Table 8).

*Sabellaria spinulosa* are often found in areas of high-water movement with some degree of sediment transport essential for tube-building and feeding. *Sabellaria spinulosa* reefs adjacent to aggregate dredging areas appear unimpacted by dredging. Evidence suggests that given the dynamic sedimentary environments in which sabellariids live, their populations can certainly persevere in turbid conditions in spite of 'typical' natural levels of burial and that recovery from light sedimentation (<5cm depth) burial events is high. No direct evidence is available for the length of time that *Sabellaria* can survive after heavy burial (>30cm) events, but the sensitivity is assessed as medium (Tillin *et al.,* 2018). It is therefore inadvisable to have a dredge disposal site where the is the possibility of heavy sedimentation on this priority habitat.

#### [3.3.4.3] Drop Down Video Dredge Disposal Site - MERC 13th April 2023

MERC consultants conducted a dropdown video survey of the dredge disposal site in April 2023. Analysis of the footage revealed extensive *Sabellaria* reef formations within the site, similar to previous DDV surveys carried out by AQUAFACT in an adjacent area. These are likely *Sabellaria spinulosa* reef and represent a dynamic highly diverse ecosystem that would be sensitive to the heavy burial sedimentation that would occur had this site proceeded as the disposal site. Recommendations to abandon this location as the disposal site and begin the process of searching for alternative location were appropriate.

#### [3.3.4.4] Benthic Survey of Wicklow Harbour Dredge Site – MERC 15th May 2023

**Review of benthic sediment data:**

MERC consultants carried out a benthic survey of the Wicklow Harbour dredge site in March and April 2023. Four stations were sampled within the harbour with a 0.1m$^2$ Day grab and three replicate samples for faunal analysis were collected at each location. An additional sample was gathered for granulometry, and all the sediment sampling took place on the 13th of March 2023.

MERC recorded that Wicklow Harbour dredge area sediments were primarily fine estuarine sediments, such as mud and sand. Specifically, stations 1, 2, 3, and 4 predominantly contained fine to very fine sands, with particle sizes ranging from 63 to 249µm. The proportion of these sand fractions reportedly varied significantly, with station 4 having the least (50%) and station 2 the most (79%). Stations 1 and 4 also had considerable amounts of silt/clays, constituting 24% and 33% of the sediment, respectively, while this fraction was minimal at stations 2 and 3 (around 5%). Coarser sands and gravels were also found at these stations. The total organic carbon content from the sites was found to be low to moderate, ranging from 1.68% at station 3 to 6.28% at station 4, with higher silt/clay content correlating with greater organic carbon levels.

Faunal communities at these stations were described as typical of finer sediment and estuarine environments and were relatively sparse in taxa and individual numbers. Common species noted across all stations include the polychaetes *Nephtys hombergii*, *Tharyx robustus*, and *Spio martinensis*, along with less frequent occurrences of other animals such as the amphipod *Ampelisca brevicornis*, bivalves *Macomangulus tenuis* and *Abra alba*, and a few bryozoans.

**Review of dropdown video data:**

Dropdown video analysis revealed that the seabed in the harbour area, particularly at the sample stations, consisted mainly of fine sands. The video quality was poor due to low visibility underwater at the time of the survey, but it was still evident that the area lacked significant epifauna.

**Habitat assessment:**

The sampled harbour sediments were identified as belonging to the JNCC biotope infralittoral mobile sand in estuaries with variable salinity, classified under SS.SSa.SSaVS.MoSaVS.

### [3.3.5] Commercial Fishing & Aquaculture

Refer to Map 5 and in Appendix 1.

From a fishing and aquaculture standpoint, the desktop study for identifying potential sediment dumping sites off the coast of Wicklow considered key areas to minimise impacts on these

activities. The study prioritised preserving areas essential for commercial and recreational fishing, aquaculture operations, and the natural habitats that support these activities.

Key considerations for the study of approximately 700 $km^2$ of seabed included:

- Fishing grounds: Pelagic and demersal activities.
- Protection of Spawning, Feeding, and Nursery Grounds: These are essential for maintaining sustainable fish populations, which are linked to the health of the fishing industry.
- Aquaculture Sites: Areas designated for aquaculture were assessed to avoid any adverse effects from sediment dumping, which could impact water quality and marine life health essential for aquaculture productivity.

Overall, the selection of potential offshore disposal sites was guided by minimising disruption to these areas, ensuring the continued viability and sustainability of fishing and aquaculture activities in the region.

#### [3.3.5.1] Results of Stakeholder Correspondence

During the conduct of the desktop study reported under this Interim Report, several statutory bodies were consulted with to obtain information. The following sections provide a summary of these communications:

**Sea Fisheries Protection Agency (SFPA):**

The SFPA reported that whelk, crab, and lobster potting are the predominant fishing activities around Wicklow throughout the season. The area sees activity from approximately 40 vessels originating from Dun Laoghaire, Greystones, Wicklow, and Arklow, with the number varying throughout the year. When conditions for mussel seed recruitment are favourable, mussel seed vessels also operate in this region (Personal communication, SFPA).

**The Marine Institute (MI):**

The Marine Institute's data access is limited, particularly for vessels under 12 meters in length. Meaning that they do not have precise spatial data for these smaller vessels, which are a significant part of the whelk fishery that could be impacted by sediment dumping. Given the 25-kilometer radius discussed (approximately 15 miles), activities involving larger vessels, including those utilizing beam trawls, might also be affected.

The MI provided GeoTIFF files for vessels exceeding 12 meters in length. The MI also advised that consideration should be made of the Wicklow Head SAC where specific fishery exclusions apply, including any activities involving dredge spoil.

**Bord Iascaigh Mhara (BIM):**

BIM provided the 2023 report on Wicklow Head mussel seed report and also shapefiles for seed mussel beds from 1970 to 2022. Additionally, they recommend reviewing the article on *Sabellaria* and the accompanying map that illustrates the distribution of the beds around Wicklow Head. BIM advised that access to the INFOMAR bathymetric data and the coarse sediment map was established, available at the INFOMAR Marine Data Download Portal.

### [3.3.5.2] Mussel Seed (*Mytilus edulis*)

In Ireland, mussel farming uses two main methods: rope-grown and bottom (seabed) culture. The rope-grown method, found along the West Coast, involves suspending mussel seed in "stockings" from longlines in the water. The bottom culture method involves transplanting wild mussel seed from natural settlement beds to culture sites to grow to commercial size (J. A., Knights *et al,* 2007).

Sourcing bottom mussel seed from the seabed can be challenging, primarily due to its highly variable availability, both temporally and spatially. Factors influencing mussel recruitment, such as adult reproductive output, hydrodynamics, larval survival, availability of settlement substrates, and post-settlement mortality, further add to the intricacy of this process. Mussels, typically dioecious, exhibit varying spawning patterns depending on location and conditions, making the task even more challenging (J. A., Knights *et al,* 2007).

Seawater currents, primarily driven by tides and wind, influence the movement of mussel larvae. Environmental factors such as temperature, food concentration, and predation also affect larval growth and mortality rates. Due to environmental conditions, mussels may delay settlement and can undergo several settlement phases (J. A., Knights *et al,* 2007).

As mentioned, BIM provided a full set of shapefiles for seed mussel bed surveys from 1970 to 2022. These locations were closely reviewed via GIS in relation to recommendations of candidate sediment dumping sites, with areas of this fishery avoided where possible (refer to Map 5 in Appendix 1).

### [3.3.5.3] Whelk Fisheries (*Buccinum undatum*)

Whelks, a cold-water species found at depths ranging from 15 to 1,200 meters, are primarily distributed on soft substrata, but mature individuals move to hard ground near the shore to spawn during winter. Most whelk landings are from the southern Irish Sea, though the fishery is expanding northwards and offshore. The highest densities of whelks are observed on the Codling and Rusk Banks in tidal solid currents at depths of less than 20 m. Whelks show variable growth and maturation rates across different local populations (Edward, F. *et al*, 1995 & 2000).

In terms of geographic distribution, whelks are found on mud, sand, and gravel banks aligned north-south in strong tidal currents, mostly within 5 nautical miles from the shore. The Irish fishery is segmented into four sectors, with significant activity near the ports where the catch is landed. The Dublin Sector to the north has relatively low densities and accounts for about 16% of landings. The sector around Wicklow and Arklow, known as the Arklow sector, is where approximately 40% of the catch is landed and includes the densely populated Codling Bank (Edward, F. et al, 1995 & 2000).

Overall, while the whelk fishery is concentrated near the coastline and specific banks, it varies significantly in density and catch size across different sectors, with ongoing research and proposals to manage the fishery sustainably. Whelk is fished extensively in a 21 km coastal zone stretching along the east coast of Ireland.

### [3.3.5.4] Brown Crab (*Cancer pagurus*)

While the Irish Sea does have brown crab populations, they're more commonly fished and found along the entire Irish coast, not just the Irish Sea. The western coasts of the North Atlantic are prime fishing grounds for brown crabs. Places like Wexford, Galway, and Donegal are known

landing ports for crab. Brown crabs can be found over a wide range of substrates, such as sand, gravel and rock. They are found in depths between 6 m and 200 m, but more usually between 6 and 80 m, with the larger crab occurring offshore. Brown crabs are predominately caught using baited soft-eye, side-entry pots. While traditionally an inshore fishery, a significant portion of the catch comes from offshore vessels that can keep the crabs alive in holding tanks until they reach port (O'Dwyer, F. *et al*, n.d.).

### [3.3.5.5] Oyster (Ostrea edulis)

The figure below shows the natural oyster beds along the Wexford coast mapped by Tirion (Amsterdam) in 1754. However, all are considered defunct and therefore create no cause for concern in relation to the choice of candidate sites.


**Image 2. Defunct Oyster Beds (Source: History of the Irish oyster. Trinity Centre for Environmental Humanities)**

### [3.3.5.6] Inshore Fishing

The Irish Sea supports a variety of commercially important fish and shellfish species. Below are some of the prominent species that might be found in association with sandy/ muddy substrates, with a specific consideration of the Wicklow area:

- Shellfish:
  - Dublin Bay Prawn (*Nephrops norvegicus*): A burrowing prawn commercially fished throughout the Irish Sea. While data specific to Wicklow is limited, landings are reported across the eastern Irish Sea.

- Scallops (*Pecten maximus*): Scallop dredging is a well-established industry in the Irish Sea. A suitable sandy seabed is present off the Wicklow coast, but dredging effort is likely to concentrate on more commercially productive areas elsewhere.

- Brown crab (*Cancer pagurus*): Although not exclusive to sandy substrates, brown crab are sometimes found in sandy areas. There is some potting in the Wicklow area.

- Whelk (*Buccinum undatum*): Whelk are scavengers found on various seabed types, including sand. They are commercially harvested, but landings data by region are limited.

- Razor Clams (*Ensis* species): Razor clams burrow in sandy sediments and are commercially fished in some areas.

• Finfish:

- Plaice (Pleuronectes platessa): This flatfish thrives on sandy bottoms and is commercially fished throughout the Irish Sea.

- Sole (Solea sole): Sole is another commercially fished flatfish that prefers sandy substrates.

- Cod (Gadus morhua): While cod prefer rocky reefs for spawning, they can be found foraging in sandy areas.

### [3.3.6] Nursery/Spawning Sites

Refer to Map 6 and in Appendix 1.

The Atlantic cod (*Gadus morhua*) is a primarily demersal fish that can exhibit pelagic behaviours under certain conditions, such as feeding or spawning. It inhabits a wide range from shallow shorelines to depths of up to 600 m.

Notably, the Irish Sea cod population spawns at two main sites in the western and eastern Irish Sea between February and April. This stock has historically been vital for commercial fisheries, but recent decades have seen a decline in spawning stock biomass (SSB) and productivity, leading to decreased fish landings.

Spawning occurs from December to June, during which a female cod can produce many batches of eggs, releasing 3 to 6 million eggs per batch. These eggs, which become part of the plankton, hatch after about two weeks. The larval cod remain in the plankton for up to two months before transitioning to juveniles, also known as 'codling', and moving to the seabed to form schools.

Research using DNA probes in 2006 and 2008 confirmed the specific locations of cod spawning grounds in the Irish Sea. The development of eggs and larvae is temperature-dependent, with the larval phase lasting about three months at 8°C. Juveniles favour complex sublittoral habitats, such as seagrass beds and rocky areas, which offer protection from predators (North Western Inshore Fisheries and Conservation Authority).

The cod spawning areas are not considered a significant constraint to the choice of disposal site, as cod eggs float within the water column and lie suspended at the halocline.

## [3.4] Commercial and Infrastructure Considerations

### [3.4.1] Renewable Energy

Refer to Map 7 and in Appendix 1.

There is currently one operating windfarm within the Study Area. The Arklow Bank Wind Farm (Phase 1) is a 25-Megawatt offshore wind farm, consisting of seven turbines approximately 10km off the coast of Arklow.

There are a number of other windfarms at various stages of the planning and development process. This includes Codling Wind Park, Arklow Bank Wind Farm Phase 2, Latitude 52 Offshore Wind Farm, and Banba Offshore Wind Farm. Of these, in May 2020, Codling was confirmed as having Relevant Project status – now referred to as Phase 1 status – under the Transitional Protocol published as part of the proposed Marine Planning and Development Management Act (MPDM). The operation and associated infrastructure of these windfarms has been considered in the selection of candidate sites. The other two candidate sites identified do not intersect with any of these proposed developments.

### [3.4.2] Shipping

Refer to Map 8 and in Appendix 1.

The Dublin-Cherbourg Ferry, operated by Irish Ferries, utilises a route located outside of the Study Area and therefore is not anticipated to be impacted by any dump at sea operations proposed under this investigation. A review of Shipping Vessel Densities on Ireland's Marine Atlas reveals a high density of activity around the Wicklow and Arklow Harbours and a key shipping route north to the Dublin Port, but a medium to low density of activity throughout the rest of the Study Area.

There are eleven navigation buoys within the Study Area. These are operated by the Commissioners of Irish Light.

Shipping routes and requirements of navigation has been ruled out as a significant constraint for the Project. This is on account of the infrequency of dump at sea activities proposed for the Wicklow Harbour. The dredging vessel will be operated cognisant of navigational safety requirements during its operations.

### [3.4.3] Engineering Uses of Seabed (i.e., Cables / Pipelines)

There is currently no known publicly available data for subsea cables and pipelines off the east coast of Ireland. The Maritime Area Regulatory Authority (MARA) and the Marine Survey Office have been contacted for information however no responses have been received to date.

## [3.5] Industrial Considerations

### [3.5.1] Intakes and Outfalls

There are a number of stormwater outfalls, primary and secondary discharge points near the towns of Arklow, Wicklow and Greystones in the Study Area. These discharge points are 1.5km or less

from the coastline and thus will not be impacted by a disposal site which are better suited further distance from the coastline.

## [3.6] Social / Recreational Considerations

### [3.6.1] Recorded Shipwrecks

From available datasets, records of nine shipwrecks have been identified within the Study Area (refer to Map 9 in Appendix 1).

### [3.6.2] Recreational Zones

It is important that the offshore disposal operations do not cause disturbance to recreational areas, the most notable in this context being beaches. Beach within the Study Area include the beach spanning from Greystones to Wicklow, the Silverstand Beach, the beach adjacent to the Blainroe Gold Glub, Magheramore Beach, Magherabeg Beach and Brittas Bay Beach have been given consideration in this review. Other recreational activities present along the coastline of the Study Area include golf courses and cliff walks, neither of which will be impacted.

# [4] Identification Potential Candidate Sites

## [4.1] Key Considerations

On completion of the desktop review and exclusion mapping exercise, and as outlined in the previous section, three key constraints/ restrictions have been identified that provided the greatest influence into the locations of the potential candidate sites. These include:

1. Sensitive substrate / habitat type: Presence of *Sabellaria alveolata* (honeycomb worm) reef, the reef-forming polychaete present in coarse/mixed sediment substrate. The Wicklow Reef may be the only known example of this substrate off the Irish and British coast. It is considered to support significant ecological biodiversity. Additionally, *Sabellaria spinulosa* (Ross Worm) reef is also known from the area.
2. Mussel seed dredging: SFPA note the importance of the coastline for seed mussel recruitment, with beds fished since 1970 (see Map 5 in Appendix 1). The majority of beds are focused south and north of Wicklow Head (the centre of this investigations Study Area).
3. The association between whelk and brown crab fisheries in the Irish Sea is multi-faceted. Ecologically, both species are part of the benthic community, living at the bottom of the sea. Their habitats often overlap, and the pots used in their fisheries can affect the same areas and species, making the management of these fisheries interdependent.

   Where possible, whilst keeping in mind the practicalities of distance and the long-term sustainable use of the dump at sea site, the selected candidate sites avoid areas considered sensitive for the above key considerations.

## [4.2] Potential Candidate Sites

Three potential candidate sites have been identified, as illustrated in the below image.

Table 7 below provides detail of the three candidate sites, including their ITM coordinates at a central point of the site, their proximity to the dredge site at Wicklow Harbour, and their proximity to the nearest shoreline.

**Table 7. Potential Candidate Site Details**

| Site | ITM Coordinates | Depth Range | Approximate Distance from Dredge Site | Approximate Distance from Nearest Shoreline |
|---|---|---|---|---|
| **Site 1** | 734260,702845 | 11-28m | 9.0km | 2.5km |
| **Site 2** | 733039,697514 | 10-13m | 3.0km | 2.0km |
| **Site 3** | 739889,685683 | 13-23m | 12.0km | 7.5km |


**Image 3. Potential Candidate Sites**

An evaluation of the three candidate sites against the considerations outlined in Section 3 of this report is included in Table 8 overleaf.

## [4.3] Evaluation of Sites Against Considerations Outlined in Section 3

**Table 8. Evaluation of Potential Sites Against Considerations Outlined in Section 3**

| Considerations | Site 1 | Site 2 | Site 3 |
|---|---|---|---|
| | Located ca. 2.2 km from the closest SAC and SPA (The Murrough Wetlands SAC and The Murrough SPA). | Located ca. 1.7 km from the closest SAC and SPA (The Murrough Wetlands SAC and The Murrough SPA). | Located ca. 7.0 km from the closest SACs (The Wicklow Reef SAC and Magherabeg Dunes SAC). |
| **Protected Sites** | With respect to the hydrodynamics of this part of the Irish Sea, both proposed Sites 1 and 3 are likely to have strong currents. Site 2 will have relatively weaker currents and as a result will have longer period of time for deposition. The sediment plume throughout the study area is likely to extend southward, so it is unlikely that the plume from Site 3 will reach the Wicklow Reef SAC site, or the reef areas located to the north of this SAC. Similarly, the plume from Site 1 is unlikely reach the SAC or reef areas, considering the distances involved. The plume from Site 2 may partially pass through the Wicklow Reef SAC and reef areas, however considering that the current speed at the reef site and SAC will be relatively strong, heavy deposition at the SAC site will be unlikely. | | |
| **Ecologically Significant Sites** | All of the abovementioned match boundaries with the corresponding SACs or SPAs listed in Section [3.3.1] and therefore the same conclusions apply. | | |
| **Water Framework Directive (WFD) Status and Risk** | Located 470m from the eastern boundary of the Coastal Waterbody Southwestern Irish Sea – Killiney Bay (Code IE_EA_100_0000). Therefore, the disposal operations pose some risk to its ability to meet the required ecological thresholds. | Located 20m from the eastern boundary of the Coastal Waterbody Southwestern Irish Sea – Killiney Bay (Code IE_EA_100_0000). Therefore, the disposal operations pose some risk to its ability to meet the required ecological thresholds. | Located ca. 5.3 km from the eastern boundary of the Coastal Waterbody Southwestern Irish Sea – Killiney Bay (Code IE_EA_100_0000). Therefore, the disposal provides minimal risk to its ability to meet the required ecological thresholds. |
| | As outlined further in Section [4.3] regarding hydrodynamic conditions in the study area depositional conditions are anticipated to only occur for a very limited period over the tidal cycle given the strong tidal currents at Site 1 and 3. With regards to Site 2, weaker currents exist and therefore the plume will have a longer period for deposition. However, plumes from each of the candidate sites are anticipated to extend southward and therefore cause minimal effect to the WFD zone. | | |
| **Sensitive Substrate/Habitat Types** | Consideration was given to the priority habitat for *Sabellaria* reef (SS.SBR.PoR.SspiMx -*Sabellaria spinulosa* on stable circalittoral mixed sediment. As this biotope is typically found in areas with strong currents and high-water movement, they tend to occur in areas with mixed and coarse sediment. As such they are not typically found in locations were fine sand is deposited. This aided in the selection of sites where it is unlikely to be disposing of dredged material over *Sabellaria* reef, and Sites 1 and 3 are in these broad substrate types. Site 2 is located in an area where the biotope SS.SCS.CCS.SpiB – *Spirobranchus triqueter* with barnacles and bryozoans on unstable circalittoral cobbles and pebbles has been recorded. However, as it is a location with coarse or mixed sediment substrate, it is | | |

potentially suitable for *Sabellaria* reef and therefore drop-down video surveys would be required prior to any benthic grabbing surveys to confirm presence or absence.

Sites 1 and 3 are sufficient distance from the areas of *Sabellaria* reef for any sedimentation to be classified as heavy siltation over the reef habitat. Site 2 is located to the north of the *Sabellaria spinulosa* reef area of the original dredge disposal site which may experience light siltation from the sediment plume. Benthic surveys would be required to determine the extent of this reef area and its proximity to or presence in Site 2 before it became the final selection.

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| **Mussel Seed** | Site does not occur in proximity to any mussel seed fishery. | Mussel seed harvesting sites (dated 1972 and 2000) are located within 450m from this Site. | Site does not occur in proximity to any mussel seed fishery. |
| **Whelk Fisheries** | Whelk is fished extensively in a 21 km zone along the east coast of Ireland, and all sites fall within this zone. | | |
| **Pot Fishing (Brown Crab)** | None of the candidate sites appear to occur within areas of offshore pot fishing efforts. | | |
| **Inshore and Offshore Fishing** | See Table 10 overleaf. | | |
| **Renewable Energy** | Not located within an area designated for renewable energy development. | Not located within an area designated for renewable energy development. | Proposed on the edge of the sandy bank designated for the Arklow Wind Farm. Whilst the proposed dump at sea operations are not anticipated to cause any impact to the operation of the Farm, determining any access and/or constraints that the Farm may have is important. The Arklow Bank Wind Farm have therefore been included in the list of stakeholders to be consulted with. |
| **Shipping** | Not considered a constraint for the candidate site selection (see Section [3.4.2]). | | |
| **Engineering Uses of Seabed (i.e., Cables / Pipelines)** | Not considered a constraint for the candidate site selection (see Section [3.4.3]). | | |
| **Intakes and Outfalls** | Not considered a constraint for the candidate site selection (see Section [3.5.1]). | | |

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| **Recorded Shipwrecks** | Located >6 km from shipwreck sites. | Located within 890m of the aforementioned record. It is not anticipated that the dumping operations will cause any ill effect to the integrity of this shipwreck site given the anticipated direction of plume flow southwards (see further in Section [4.3]). | Located >6 km from shipwreck sites. |
| **Recreational Zones** | Located approx. 2.5 km from the beach spanning from Greystones to Wicklow. | Located approx. 2.0km from the beach spanning from Greystones to Wicklow. | Located approx. 7.0 km from the Magherabeg Beach. |
| | No impact from the dump at sea operations are predicted to these locations, or the recreational activities associated to them (i.e., swimming, marine sports). | | |

### [4.3.1] Inshore and Offshore Fishing

The following table shows an analysis of where different fishing activities are found in relation to the three candidate sites being assessed. From this table the key fishing activities found at the candidate sites appear to be whelk (all sites) and pelagic trawling (low to medium fishing activity in Sites 1 and 2). Mussel seed harvesting sites (dated 1972 and 2000) are located within 450m from Site 2.

**Table 9. Fishing Activities in Relation to the Three Candidate Sites**

| Sites | Site 1 | Site 2 | Site 3 | Observations from Ireland Marine Atlas |
|---|---|---|---|---|
| **Substrate** | Sand | Coarse Substrate | Sand | INFOMAR |
| **Depth Range** | 11-28m | 10-13m | 13-23m | INFOMAR |
| **Inshore Fishing** | **Observation** | **Observation** | **Observation** | **Irelands Marine Atlas** |
| Periwinkle Harvesting | None | None | None | This is a shoreline harvesting activity. |
| Dredge Fishing Effort | None | None | None | None shown |
| Line Fishing | None | None | None | None shown |
| Midwater Trawl Fishing | None | None | None | None shown |
| Nets Fishing | None | None | None | None shown |
| Beam trawl Effort | None | None | None | None shown |
| Bottom Trawl Fishing Effort | None | None | None | None shown |
| Seed mussel | Historically nearby (>950m) but no current | Historically nearby (450m) but no current sites | None | Mussel seed harvesting has historically occurred (most recently in 2000) 450m to Site 2. Harvesting has also occurred >950m from Site 3, but not since 1996/7. |
| Pot Fishing | Whelk | Whelk | Whelk | Whelk is fished extensively in 21 km zone. All candidate sites fall within this zone. |
| **Offshore – Fisheries Effort (2014-2018)** | **Observation** | **Observation** | **Observation** | **Irelands Marine Atlas** |
| Irish Beam Trawls Effort | None | None | None | None shown |
| Irish Bottom Otter Trawls Effort | None | None | None | None shown |
| Irish Dredges Effort | None | None | None | None shown |
| Irish Gill Nets Effort | None | None | None | None shown |
| Irish Longlines Effort | None | None | None | None shown |
| Irish Pelagic Trawls Effort | Yes | Yes | None | Low to medium fishing activity at Sites 1 and 2. |
| Irish Pots Effort | Whelk | Whelk | Whelk | Whelk fishing occurs at all three sites. |

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| Irish Seines Effort | None | None | None | None shown |
| International Beam Trawls Effort | None | None | None | Trawling occurs 800m east of Site 2, >1.5km southeast from Site 1 and 1km north and east from Site 3. |
| International Longlines Effort | None | None | None | None shown |
| International Bottom Otter Trawls Effort | None | None | None | None shown |
| International Dredges Effort | None | None | None | None shown |
| International Gill Nets Effort | None | None | None | None shown |
| International Pelagic Trawls Effort | None | None | None | Trawling occurs <1.5km and west east of Site 1, <1km east, south and west of Site 2, 1 and <1.7km northwest and west from Site 3. |
| International Pots Effort | None | None | None | None shown |
| International Seines Effort | None | None | None | None shown |

## [4.4] High-Level Hydrodynamic Review of Candidate Sites

The tidal currents in Irish sea are generally strong due to the high tidal range. Both Site 1 and 3 are likely to have strong currents, throughout the tidal cycles. Bed shear under tidal flows will be sufficient to mobilise and erode medium and coarse sand from the bed and thus depositional conditions will only occur for a very limited period over the tidal cycle. This suggests that the proposed sandy sediments to be deposited within the dredge disposal site will not remain and will be easily mobilised by the ambient tidal flows.

Site 2, which has relatively weaker currents will have a longer period for deposition. Local deposition is likely to occur north of the harbour. The sediment plume throughout the study area is likely to extend southward, so it is unlikely that the plume from Site 3 will reach the Wicklow Reef SAC site, or the reef areas located to the north of this SAC. Similarly, the plume from Site 1 is unlikely reach the SAC or reef areas, considering the distances involved. The plume from Site 2 may partially pass through the Wicklow Reef SAC and reef areas, however considering that the current speed at the reef site and SAC will be relatively strong, heavy deposition at the SAC site will be unlikely.

# [5] Stakeholder Consultation

As outlined in Section 4.1 of the EPA Guidelines (2012), consultation regarding the selection of a new dump site is considered vital. Therefore, a stakeholder engagement exercise was undertaken, with the intention of understanding views and potential concerns regarding the three candidate dump sites presented in the section above and obtain any further data/information requiring consideration.

## [5.1] Methodology of Stakeholder Engagement

Stakeholder engagement letters were issued by email via Wicklow County Council on 14 May 2024. A sample letter is included under Appendix 3, however in summary, each letter contained:

- A brief description of the Project, including the intention of the proposed dredging works at Wicklow Harbour, the proposed maintenance dredge methodologies and quantities, a summary of the nature of the dredge material, and what size of disposal site would be optimal,
- The methodology of the desktop review and exclusionary mapping exercise conducted to identify potential candidate offshore disposal sites,
- The key constraints that were discovered in identifying potential candidate offshore disposal sites and how these influenced decisions,
- Presentation of the chosen potential candidate offshore disposal sites, and
- A request for engagement by Friday 7th June 2024. This was later extended to 14th June 2024, given that a low feedback rate was being experienced.

Letters were issued to the following stakeholders, a list informed by the EPA's Dumping Site Selection Guidance Note (2012) and the context of the Project:

- The Environment Protection Agency (EPA).
- The Department of Agriculture, Food and the Marine (DAFM).
- The Department of the Environment, Community and Local Government.
- The Department of Arts, Heritage and the Gaeltacht (inclusive of the National Parks and Wildlife Service (NPWS) and the Underwater Archaeology Unit (UAU)).
- The Marine Survey Office (MSO).
- Marime Area Regulatory Authority (MARA).
- Bord Íascaigh Mhara (BIM).
- Marine Institute (MI).
- The Irish Whale & Dolphin Group (IWDG).
- The Sea Fisheries Protection Authority (SFPA).
- Inland Fisheries Ireland (IFI).
- An Taisce (The National Trust for Ireland).
- Birdwatch Ireland.

- Coast Watch Europe (CWE).
- The Arklow Bank Wind Farm.
- The Codling Wind Farm.
- Dublin Array Wind Farm.
- Wicklow Harbour Master.
- Wicklow Boat Charters.
- Wicklow Bay Sea Angling Club.
- Leinster Provincial Council (LPC) Boat Committee.

## [5.2] Outcomes of the Stakeholder Engagement

A summary of all responses received is included in Table 10 overleaf. The original responses have been included under Appendix 4.

To summarise the stakeholder engagement responses in respect of the three candidate sites:

- **Candidate Site 1:**
  - Concerns raised by various angling groups including the Wicklow Boat Charters, the Wicklow Bay Sea Angling Club, the LPB Boat Committee and from a private stakeholder who is a regular angler in the Wicklow Bay. The Site is considered important for various fish species and stakeholders are of the opinion that dumping could be detrimental to these fisheries.
- **Candidate Site 2:**
  - Concerns raised by An Taisce, specifically in relation to the potential risks of sedimentation upon QI species (namely the *Sabellaria alveolata* Honeycomb Worm) and Conservation Objectives (CO) of the Wicklow Reef SAC, due to its proximity to the SAC and the prevailing current direction within this area (southwards, towards the Reef).
  - Concerns raised by various angling groups including the Wicklow Boat Charters, the Wicklow Bay Sea Angling Club, the LPB Boat Committee and from a private stakeholder who is a regular angler in the Wicklow Bay. The Site is considered important due to abundance of different and rare species, which are not commonly found elsewhere on the East Coast. Stakeholders are of the opinion that dumping could be detrimental to these fisheries given the slower tidal movements in this area.
  - IFI have advised a preference for Candidate Sites 1 or 3.
- **Candidate Site 3:**
  - Safety and operational concerns raised by SSE Renewables in respect of the site's proximity (and potential intersection) with key infrastructure planned for the Arklow Bank Wind Farm.
  - BIM have raised concern due to the site's proximity to suitable seed mussel habitat.
  - Concerns raised by various angling groups including the Wicklow Boat Charters, the Wicklow Bay Sea Angling Club, the LPB Boat Committee and from a private stakeholder who is a regular angler in the Wicklow Bay. There are some species of

note in this area however stakeholders are of the opinion that, given the strong tidal race in the area, this would be the best of the three candidate disposal at sea sites.

Table 10. Outcomes of Stakeholder Engagement

| Stakeholder | Response Date | Form of Response | Name and Role of Responder | Response Summary |
|---|---|---|---|---|
| The Environment Protection Agency (EPA). | 24/05/2024 | Email | Dumping at Sea and Water Regulation Office | Given the EPA's role as the regulatory authority for Dumping at Sea, EPA will only provide comments on candidate sites via the application process. |
| The Department of Agriculture, Food and the Marine (DAFM). | No response received. | | | |
| The Department of the Environment, Community and Local Government. | No response received. | | | |
| Department of Housing, Local Government and Heritage (Development Applications Unit, Heritage) | No response received. | | | |
| Department of Housing, Local Government and Heritage (NPWS) | No response received. | | | |
| The Marine Survey Office (MSO). | No response received. | | | |
| Marime Area Regulatory Authority (MARA). | No response received. | | | |
| Bord Iascaigh Mhara (BIM). | 07/06/2024 | Email | Denise Maloney (Fisheries Inshore Support Officer) | The primary concern is with regards to Candidate Site 3, due to its proximity to suitable seed mussel habitat. There has been regular settlement south of Wicklow Head since 2010 as per BIM records. There is also a possibility of matured mussels aggregation following the cleaning of wind turbines in the area. Those mussels could potentially provide larvae for future beds in the area as larvae don't travel very far from where they have been emitted. |
| Marine Institute (MI). | No response received. | | | |
| The Irish Whale & Dolphin Group (IWDG). | 12/06/2024 | Email | Dr. Simon Berrow (CEO) | IWDG have no preferences of disposal at sea site, as all will have harbour porpoise present year-round and dolphins more |

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| | | | | infrequently (including bottlenose and common dolphin). Minke whales would be present during the summer months. Recommendation that the Client implements the NPWS 2014 Guidelines which requires a Marine Mammal Observer (MMO) to ensure no marine mammals are present in the area during disposal. |
| The Sea Fisheries Protection Authority (SFPA). | No response received. | | | |
| Inland Fisheries Ireland (IFI). | 14/06/2024 | Email | Matthew Carroll (Fisheries Environmental Officer) | A preference for Sites 1 or 3 advised. IFI's concerns are more focused on the dredging operations within the harbour, and before they commence would welcome the opportunity to comment on this aspect of operations. Wicklow Harbour is the entry point for significant salmonid populations migrating into the River Vartry Catchment and it is important that minimum impediment or disturbance to their migratory pattern results from dredging operations. Simple and practical measures employed during dredging operations such as timing and tidal conditions during dredging periods can minimise the disturbance to migratory fish. |
| An Taisce (The National Trust for Ireland). | 06/06/2024 | Letter | Seán O'Callaghan (Planning Officer) | Primary concern regards the location of Candidate Site 2 which is only approx. 3.1km from the Wicklow Reef SAC. Shallower depths in particular raise concerns regarding potential adverse impacts from sediment disposal associated with the dredged material. An Taisce believe that an AA Screening is required under the conditions of the Habitats Directive (92/43/EEC) to review all concerns to QI species of the SAC. They also recommend that a Sediment Transport Model is conducted as part of the AA to confirm the direction of the transported sediment plume. If the southward direction of the sediment is confirmed, Candidate Site 3 may be a more prudent site to select given its location approximately 6.1 km south of the Wicklow Reef.<br>Citations from a previous hydrodynamic modelling report of historical dredging operations (2012) were included with regards to the direction of current flow in the area (southwards towards the SAC) and potential that increased sediment may benefit tube-forming worms. Statements made in both citations are suggested to be explored further as part of the AA Screening process. |

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| Birdwatch Ireland. | No response received. | | | |
| Coast Watch Europe (CWE). | No response received. | | | |
| The Arklow Bank Wind Farm. | 07/07/2024 | Email | John O'Sullivan (Project Manager), via Deborah Coleman (External Affairs Manager) | Primary concern is with regards to Site 3, due to proximity to the MAC boundary of the SSE Renewables Arklow Bank Wind Park 2 Project. The Site is in close proximity (and may potentially intersect with) to planned inter array cable routes as well as the planned location of an offshore substation platform and several wind turbine generators. Maps were provided to indicate the location of this planned infrastructure, overlaying the proposed Candidate Site 3.<br>A number of safety and operational concerns are raised as a result of this proximity, including: 1. Increased collision and navigational risk as multiple vessels will be operating in the area conducting various surveys etc. and the introduction of a further vessel independently operated and managed by others is a concern, 2. Disposal of material may invalidate previous bathymetry and seabed morphology survey data collected in the area, 3. Disposal of material over the cables presents an unacceptable risk given potential for overheating and failure, 4. Disposal of material over the cables presents potential issues in deburial/repair/replacement of cables, if required during operation. Due to these reasons, SSE Renewables view Site 3 to be a 'wholly unsuitable location' and 'strongly cautions against its selection'. |
| The Codling Wind Farm. | No response received. | | | |
| Dublin Array Wind Farm. | No response received. | | | |
| Wicklow Harbour Master. | No response received. | | | |
| Wicklow Boat Charters. | 13/06/2024 | Email | Kit Dunne | Site 1: Advises that this area is widely used for recreational angling. It is an area where Smooth Hound and Tope pup, female hounds and Tope are seasonally found in the area. It is arguably the best area in Ireland for Irish Specimen Tope, and the current Irish record Tope came from a nearby mark. Stakeholder is of the opinion that it would be detrimental to the fish and angling to dump in this site.<br>Site 2: Advises that this area is a very popular area for recreational angling because of the abundance of different species and rare species in the area. The number of species found in this area is incredible and not common anywhere else on the East Coast. |

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| | | | | Species include some very rare fish for Irish waters, for example, Black Bream, and Red Mullet. A lot of Leinster Clubs would also fish in this area. It is also an area where Smooth Hound pup, it was the best ground for Irish Specimen Smooth Hound for a number of years, and the current Irish record Smooth Hound came from a mark within 1Nm of this site. Stakeholder is of the opinion that it would be detrimental to the fish and angling to dump in this site, especially given that the tidal movement is slower here than the other sites.<br>Site 3: Advises that this area is used for recreational angling, however not many Leinster clubs would fish it because of the strong tidal race. It is an area where Tope, Spurdog and Bull Huss are regularly found. Stakeholder is of the opinion that, given the strong tidal race in the area, the dumped materials would spread fast and far, and therefore site 3 is the best option for dumping operations. |
| Wicklow Bay Sea Anglers Club. | 13/06/2024 | Letter | Kit Dunne (Secretary Wicklow Bay Sea Angling Club) | Same response as above provided. |
| LPC Boat Committee | 14/06/2024 | Letter | Kit Dunne, Liam O'Callaghan, Pat Swan & Padraic Clear | Same response as above provided. |
| Private submission | 13/06/2024 | Email | David O'Leary (Recently retired from the Lifeboat as Senior Helm, & tug skipper for Dublin Port) | Stakeholder does not believe sites 1 or 2 are suitable locations, due to these grounds being heavily dependent on by the inshore fishing sector and the angling industry. The inshore sector depend on these grounds for lobster and crab, whelk fishing as they are unable to travel out to deeper water. Stakeholder believes if dumping occurs at site 1 or 2, that the sediment will disperse either north or south and will carpet the area, therefore effecting the gravelly weedy bottom. Stakeholder advises involvement in sustainable fishing both with the BIM v-notching lobster scheme and placing back over-sized and under-sized specimens. Stakeholder advises preference for site 3 as the tide is stronger and will disperse the sediment more effectively, and therefore will have a lesser environmental impact. |

# [6] Disposal Site Selection Recommendation

Based on the outcomes of the desk-top assessment review, and response from the stakeholder engagement exercise, Candidate Site 1 is recommended to be progressed to further study and investigation as a potential disposal at sea location. Key reasons being:

1. Whilst a strong opposition from local angling groups was received regarding the importance of Candidate Site 1 for angling and presence of important species (Smooth Hound and Irish Specimen Tope particularly), the frequency of disposal at sea operations does not give rise to significant concern for the sustainability of these fisheries. Further, whilst a site-specific hydrodynamic modelling exercise is yet to be completed, the area is characterised by strong currents throughout the tidal cycles and therefore bed shear under tidal flows are considered sufficient to mobilise and erode medium and coarse sand from the bed. Significant settlement or 'smothering' is therefore not anticipated in this area.

2. From both an environmental and commercial impact perspective, Candidate Site 1 is considered to give rise to the least amount of concern, when compared to Candidate Sites 2 and 3 (see below).

3. From the review conducted as part of this high-level investigation and exclusionary mapping exercise (see Chapter 3) and from responses received from An Taisce, IFI, and local angling groups (see Table 10), Candidate Site 2 is of greatest concern from an environmental perspective. This conclusion is made in respect of its location relative to the Wicklow Reef SAC, and principle tidal flow direction (from available high-level hydrodynamic information). Whilst significant deposition of sediments is not anticipated in the SAC itself (due to strong current flow), sediments are likely to disperse southwards in the direction of the SAC and potentially deposit in areas north of it, which are suspected to support the *Sabellaria alveolata* (honeycomb worm) and *Sabellaria spinulosa* (Ross Worm) reef systems. This reef habitat evidently further supports a variety of fisheries, as advised by the local angling groups. Seemingly, a significant abundance of species rare in Irish waters (Black Bream, Red Mullet and Smooth Hound) have been noted here, some of which are not commonly found elsewhere along the East Coast.

4. Concerns were received from the Arklow Bank Windfarm with regards to Candidate Site 3, and the potential for disposal operations to intersect with key infrastructure planned for the development. Safety and operational risks were highlighted.

5. BIM raised concern with regards to Candidate Site 3 due to its proximity to mussel seed habitat.

# [7] Further Investigation & Next Steps

The EPA's Dumping Site Selection Guidance Note (2012) has informed this section of the Report, whereby a review has been completed of the required studies/surveys/processes involved in the DaS permitting process, where these have been completed for this Project, and where additional studies and surveys are required to further the selection of the disposal at sea site and obtain a permit for use.

This review is outlined in Table 11 overleaf and recommendations for further studies and survey included in Section 7.1 thereafter.

**Table 11. EPA DaS Permitting Process Requirements & Status for this Project**

| EPA 2012 Guidance Section Reference | Description (paraphrased from EPA, 2012) | Status for this Project |
|---|---|---|
| 3 - Material Characteristics and Suitability for Disposal | The EPA requires information regarding the material to be dredged, including amount and composition, material form, physical properties, chemical and biochemical properties, biological properties, toxicity etc. | **Completed.** The amount and the physical, chemical and biological characteristics of dredge material is known. WCC have completed physical and chemical testing and benthic surveying within the dredge area. This is outlined further in Section 2.2.1 and 2.2.2 of this Report. |
| 4.1 – Consultation | Consultation regarding the selection of a new dump site is considered vital. A list of stakeholders is presented. | **Completed.** A consultation process has been undertaken, presenting three potential candidate sites for disposal at sea and requesting initial feedback. This process has been integral to the choice of the optimum disposal at sea site. The consultation process followed is outlined in Section 5 of this Report. |
| 4.2 – Alternatives to Marine Disposal | Prior to the selection of either a new or existing dumping site for disposal all alternative options for re-use of the material must be explored. | **Completed.** WCC have conducted a comprehensive review of alternatives to offshore disposal. This is outlined in Section 2.2.4 of this Report. |
| 4.3 – Assessment of the Need for a New Dump Site | An assessment of the need for a new dumping site should be undertaken and include an evaluation of 1. The short-and-long-term disposal needs of the likely users of the site; and 2. The suitability and capacity of any existing dumping sites that could possibly accommodate the material. | **Completed.** WCC have conducted a review of the short-and-long-term disposal needs, and the capacity of existing dumping sites. This is further outlined in Sections 2.1 and 2.2 of this Report. |
| 4.4 – Identification of Suitable Areas for a Dump Site | The first step is to determine an area within which the material can be reasonably transported and disposed of. Within this area, desktop information should be compiled on present and potential uses that may be incompatible with the disposal operation. his information is best presented through GIS, enabling the remaining areas potentially suitable for dumping sites to be identified. | **Completed.** A comprehensive desktop review and exclusionary mapping exercise has been undertaken for the Project, forming the basis of the decision of potential candidate site locations (x3 chosen). This is outlined in detail in Sections 3 and 4 of this Report. |

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| 4.5 – Determination of Dredge Material Characteristics Following Dumping | EPA outline the importance of having an understanding of the physical, chemical and biological characteristics of the dredge material as it is being released from the disposal vessel. Important considerations include dispersion direction and distance of associated plumes, erodibility and shoaling. An integral part of such a study is the use of mathematical models that predict the dispersion and settlement of disposed sediments. | **Not completed.**<br>Recommendations are included in Section 7.1 overleaf. |
| 4.6 – Selection of Candidate Dump Site(s) | From the area identified as potentially suitable (Section 4.3 above), where possible, at least 2 candidate dumping sites should be selected to allow comparison of effects from the disposal of dredged material.<br><br>In order to assess the capacity of a site(s), the following should be taken into consideration:<br><br>• The anticipated loading rates per day, week, month or year,<br>• The dispersive characteristics of the site, and<br>• The reduction in water depth over the site because of the mounding of material. | **Completed.**<br>Following completion of the desktop study and exclusionary mapping exercise, three candidate disposal sites were selected and presented to stakeholders. The sites selected are outlined in Section 4 of this Report.<br><br>The anticipated loading rates were reviewed in the selection of candidate sites, as outlined in Section 2.2 of this Report. A high-level assessment of hydrodynamic conditions was completed (see Section 4.4 of this Report), determining potential dispersive characteristics of each site. |
| 4.7 – Assessment of Potential Adverse Effects for Candidate Dumping Site(s) | Sites should be evaluated to determine the potential adverse effects of the disposal of dredge material, considering the near-and-far-field fates (spatial effects) of the material and its constituents and also the short-and-long-term effects (temporal effects) on marine resources in the marine environment. The assessment of potential effects should lead to a concise statement of the expected consequences of the disposal of the dredged material (i.e., Impact Hypothesis).<br><br>The Impact Hypothesis should integrate information on the type, characteristics and quantity of the dredge material involved, the dumping site conditions, the type of dredging and dumping operations being proposed and any associated mitigation measures. Information on the baseline conditions at the Candidate Dumping site(s) must be obtained.<br><br>Types of baseline information required for assessing areas for the disposal of dredge material, these include:<br><br>• Physical characteristics (bathymetry, current speed and direction, | **Not completed.**<br>Recommendations are included in Section 7.1 overleaf. |

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|---|---|---|
| | wave climate, sediment type and water).<br>• Chemical characteristics (sediment granulometry and water quality).<br>• Biological characteristics (benthic fauna, fisheries, birds and mammals).<br>• Other uses.<br><br>The oceanographic and bathymetric data are typically used to develop a hydrodynamic model to determine the water and sediment movements for the area(s) in question.<br><br>In addition to gathering all of the above baseline information, consideration must be given to the cumulative impacts arising from the selection of a disposal site i.e. interactions with other users / other plans or projects and the cumulative impacts of using the site over a prolonged period of time.<br><br>An Appropriate Assessment to at least Stage 1 Screening must be carried out if a proposed dump site is located within or close to a Natura 2000 site. Where it cannot be excluded, on the basis of objective scientific information, following screening for Appropriate Assessment, that an activity, either individually or in combination with other plans or projects, will have a significant effect on a European Site, the applicant shall provide a Natura Impact Statement (NIS). | |
| 4.8 – Site Selection | An initial evaluation of the acceptability of the potential adverse effects of the candidate site(s) must be undertaken by the applicant. Sites with unacceptable impacts can be eliminated at this stage.<br><br>If two or more candidate sites have been identified as acceptable then a comparison needs to be carried out to evaluate the differences between the sites (i.e. size, physical characteristics, dispersive qualities etc) in order to determine the relative potential adverse effects of dredge material disposal at each of the sites. These should include quantitative and qualitative evaluations of the perceived risks of disposal at each site. If a dumping site is found to be acceptable then the EPA may permit the site to be used. | **Partially completed.**<br>Three Candidate sites have been investigated as part of this study, with potential adverse effects advised on a high-level. Should WCC choose to proceed with investigating multiple sites, it is recommended that a further detailed comparison be completed, including quantitative and qualitative evaluations as recommended by EPA. |
| 5 – Monitoring | Following the selection of a dumping site, a comprehensive monitoring programme must be proposed in order to document the fate and effects of the disposed dredged material. | **Not completed.**<br>Recommendations are included in Section 7.1 overleaf. |

## [7.1] Further Investigation and Study Requirements

### [7.1.1] Impact Hypothesis / Site Suitability Report

In order for the EPA to assess a Dumping at Sea Permit application, applicants must provide information on the predicted impacts of the loading and dumping operations with reference to the following criteria, which are taken from the First Schedule to the Dumping at Sea Act 1996, as amended (EPA, 2020):

- Initial dilution to be achieved by proposed method of release,
- Methods of packaging and containment, if any,
- Dispersal, horizontal transport and vertical mixing characteristics,
- Existence and impact of current and/or previous dumping in the area (including accumulative effects),
- Sea bottom characteristics, including topography, geochemical and geological characteristics and benthic micro-fauna & macrofauna,
- Water characteristics (e.g., temperature, pH, salinity, oxygen indices of pollution-dissolved oxygen (DO), nitrate, nitrite, ammonia, phosphate and suspended matter),
- Interference with shipping, fishing, recreation, mineral extraction, desalination, fish spawning and nursery habitats, areas of special scientific importance, areas of natural or archaeological heritage importance, biological diversity (including diversity within species, between species, and of ecosystems) and other legitimate use of the sea.

Sites should be evaluated to determine the potential adverse effects of the disposal of dredge material, considering the near-and-far-field fates (spatial effects) of the material and its constituents and also the short-and-long-term effects (temporal effects) on marine resources in the marine environment. The assessment of potential effects should lead to a concise statement of the expected consequences of the disposal of the dredged material (i.e., Impact Hypothesis).

The Impact Hypothesis must be informed by baseline information collected at the site(s) and results of a hydrodynamic modelling exercise to determine sediment settlement patterns. These are outlined further below.

#### [7.1.1.1] Physical Baseline Surveys

To inform the Impact Hypothesis / Site Suitability Report, the following baseline surveys are required to be undertaken at the chosen disposal site prior to any disposal activities being undertaken. These recommendations have been informed by Appendix 1 ‘Guidance on Survey Methodologies’ as contained in the EPA’s Guidance Note (2012):

- Bathymetric survey to determine the bottom topography. This should involve an acoustic single beam survey with a line interval of ≤50m.
- If not already available, oceanography recording. This should include the deployment of a current meter at mid-depth for ≥15 days over spring and neap tides, monitoring in 20-minute intervals. A tide or pressure gauge should record tidal height for the duration of the current measurements.

- Water quality survey, including deployment of a turbidity meter, a temperature and salinity probe, an *insitu* water meter and collection of samples where required. The key parameters to be recorded include suspended solids (if there is a sensitivity to it in the locality), salinity, temperature and dissolved oxygen.
- Benthic macrofauna survey, undertaken by a specialist marine ecologist team. This should include grab sampling (≥3 replicate samples) within the site and at control sites. Prior to deployment of the grab, a Drop-Down Video (DDV) survey is recommended to review the habitat types in the grab area and inform suitable drop sites (to minimise damage to habitats and ensure a sufficient sediment sample can be obtained).
- Consultation should be undertaken with BIM, SFPA, IFI, the Marine Institute, NPWS, Birdwatch Ireland and IWDG with regards to the potential presence of sensitive fisheries, bird species, and mammals within the study area, and whether any specific specialist species surveys are required to be undertaken.
    - Note: These bodies were all consulted with as part of the initial site selection process, however no responses were received from the SFPA, the Marine Institute, NPWS, and Birdwatch Ireland. It is recommended to repeat consultation with these bodies when a candidate site is confirmed to discuss specific specialist species surveys potentially required.
- Consultation should be undertaken with the UAU of the NPWS to determine whether any particular archaeological sensitivities exist in the candidate disposal site and whether any specialist archaeological surveys are required to be undertaken (i.e., side scan survey, magnetometer survey).
    - Note: The UAU of the NPWS was consulted with as part of the initial site selection process, however no response was received. It is recommended to repeat when a candidate site is confirmed for further study.

#### [7.1.1.2] Hydrodynamic Modelling Study

As per the requirements outlined in Section 4.5 and 4.7 of the EPA Guidelines (2012), it is important to have an understanding of the physical, chemical and biological characteristics of the dredge material as it is being released from the disposal vessel. An integral part of such a study is the use of mathematical models that predict the dispersion and settlement of disposed sediments.

It is therefore a requirement of the Project that a comprehensive 3D Hydrodynamic Modelling and Sediment Dispersion Modelling exercise (i.e., COHERENS, TELEMAC or equivalent) be undertaken, taking into consideration the local oceanographic and bathymetric conditions of the candidate site area, the rate of disposal, the type of disposal vessel and the characteristics of the dredge material. The following should be reviewed as part of the study:

- Dispersion direction and distance of associated plumes: fine fractions of dredged material may remain in suspension in the water column and be transported and threaten sensitive areas or interfere with other users.
- Erodability: once the material reaches the sea floor depending on its physical characteristics, it may remain there or be eroded and moved by currents to affect sensitive areas.

- Shoaling: some material (e.g. consolidated clay) may not move from where it is deposited and shoaling may occur; therefore, it must be determined whether the site can accommodate this and future material without adverse effects, for example, on navigation.

As mentioned, oceanographic and bathymetric data are used to develop the basis of the hydrodynamic model. Recommendations for collection of this data is outlined further below.

### [7.1.2] Appropriate Assessment

As per the requirements outlined in Section 4.7 of the EPA Guidelines (2012), an Appropriate Assessment (AA) to at least Stage 1 Screening must be carried out if a proposed dump site is located within or close to a Natura 2000 site. This is the case for all candidate disposal sites advised in this study, whereby five SACs and two SPAs are located within the Study Area.

Where it cannot be excluded, on the basis of objective scientific information, following screening for AA, that an activity, either individually or in combination with other plans or projects, will have a significant effect on a European Site, the applicant shall provide a Natura Impact Statement (NIS). This is defined in Regulation 2(1) of the European Communities (Birds and Natural Habitats) Regulations (S.I. No. 477 of 2011).

### [7.1.3] Risk Assessment for Annex IV Species

Ireland has recorded 25 species of cetacean, all of which are recognised as protected species under the EU Habitats Directive and the Irish Wildlife Act 1976, as amended. Of these 25 species, nine - Common dolphin, Bottlenose dolphin, Harbour porpoise, Fin whale, Minke whale, Humpback whale, Killer whale, and Risso's dolphin - have been recorded off the east coast and may be present in the proposed survey area at least on a seasonal basis (Ireland's Marine Atlas, 2021). Leatherback turtles have been observed off the coast of Wicklow in recent years and with their range also reaching as far as the Dublin area on Ireland's east coast (NPWS, 2019).

Therefore, it is recommended that a Risk Assessment for Annex IV Species listed under Article 12 of the Habitats Directive (92/43/EEC) be undertaken for the disposal activities.

### [7.1.4] Assessment of Impact of the Maritime Usage (AIMU) Report

As per the requirements of a Maritime Usage Licence (MUL) application to the Maritime Area Regulatory Authority (MARA), it is recommended that an Assessment of Impact of the Maritime Usage (AIMU) Report is prepared for the Project.

This report should determine whether any of the proposed activities fall within a class of project listed in Part 2 of Schedule 5 of the Planning Regulations Section 13A, as amended. It should also describe the current state of the environment in the vicinity of the proposed disposal activities and evaluate the potential social, cultural and environmental effects.

### [7.1.5] Environmental Impact Assessment (EIA) Screening

The Planning and Development Regulations 2001 (as amended) identify under Schedule 5 certain types and scales of development/project, generally based on thresholds of scale, for which an EIA is mandatory. In addition, there can be a requirement to undertake an EIA for 'sub-threshold' developments/projects, as per criteria outlined in Schedule 7. In this respect, whilst the project

does not fall under any thresholds for mandatory EIA in Schedule 5, it is necessary to undertake a screening exercise to assess whether the proposed project requires a sub-threshold EIA based upon the nature and scale of potential adverse environmental impacts.

### [7.1.6] Monitoring

Following the selection of a dumping site, a comprehensive monitoring programme must be proposed in order to document the fate and effects of the disposed dredged material. This should be informed by the Impact Hypothesis / Site Suitability Report, ensuring that there are clearly defined objectives and that the monitoring is focussed appropriately.

As per the EPA Guidelines (2012), at a minimum, the monitoring should include pre- and post-dumping bathymetric surveys of the dumping site (plus the surrounding area) in order to evaluate the fate of the dumped material after e.g. 10 days, 6 months, 1 year etc. If necessary, sediment image profiling may be required (e.g. for capping projects). Grab samples for sediment chemistry / granulometry may be required and analysis of benthic fauna may be required in order to determine the rate of recolonisation and the long-term impacts on the resident infaunal communities and their ability to cope with disposal operations. In addition, the dredging vessel should be fitted with a marine recorder so that the start and end points of each dump can be determined.

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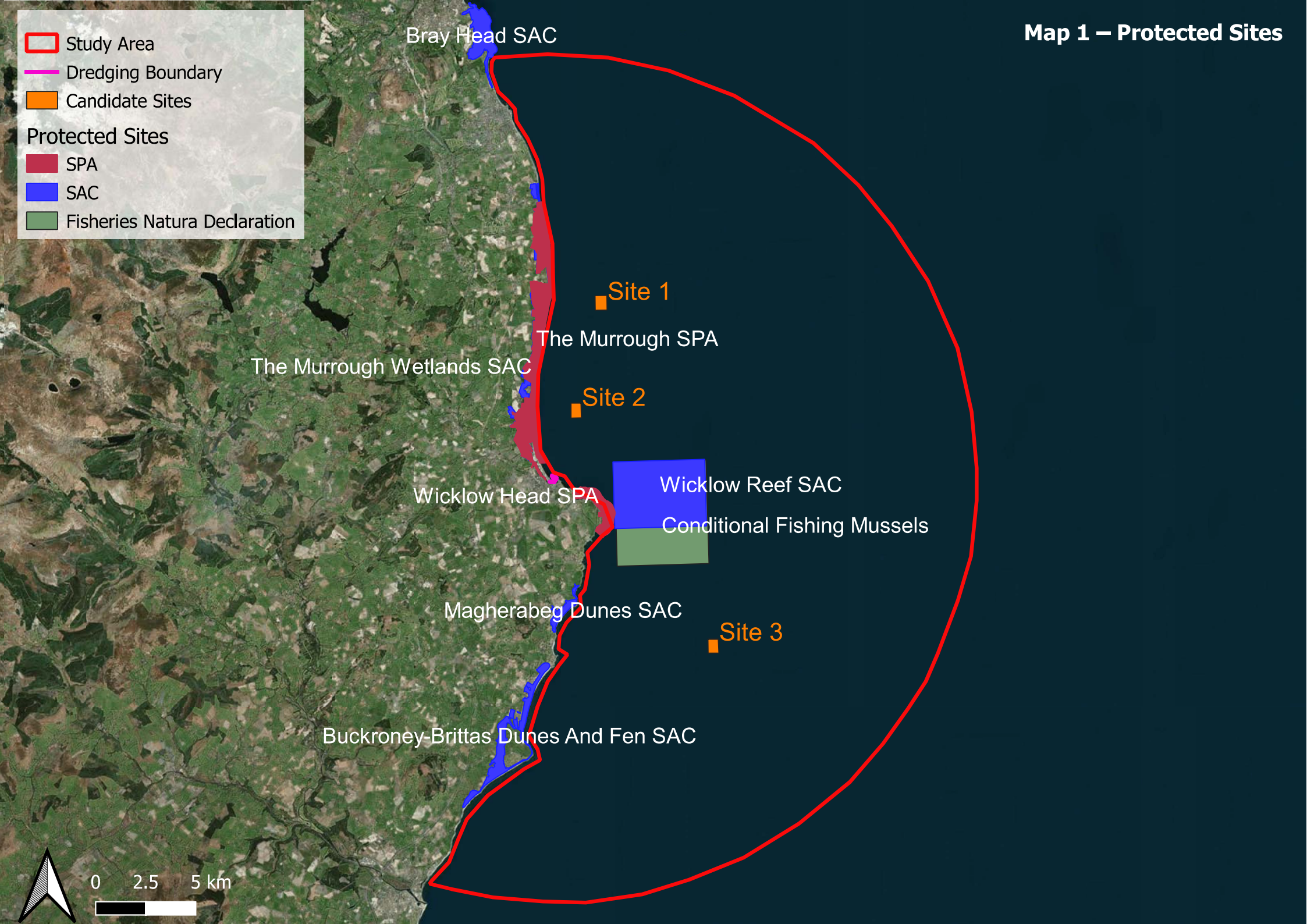
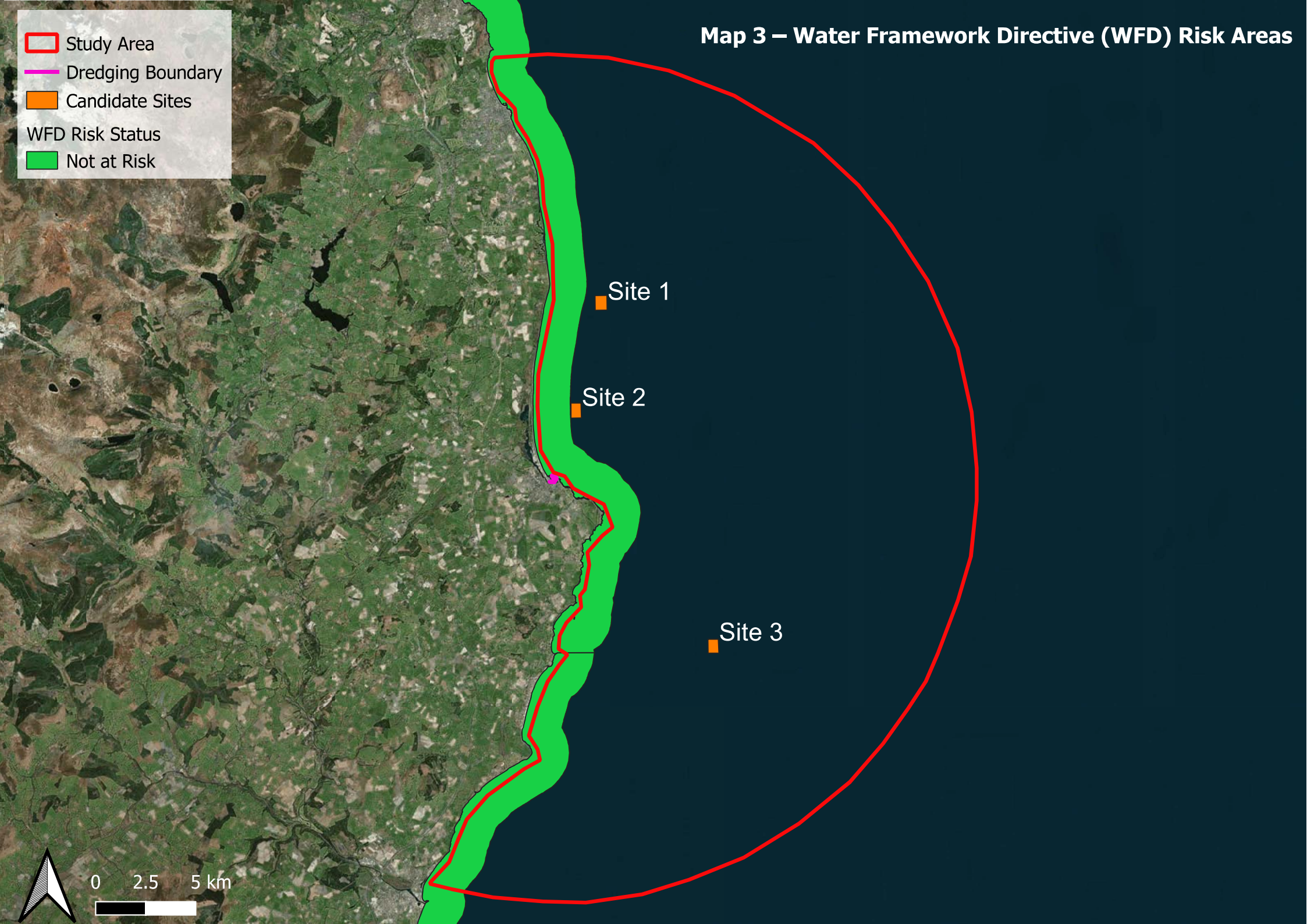
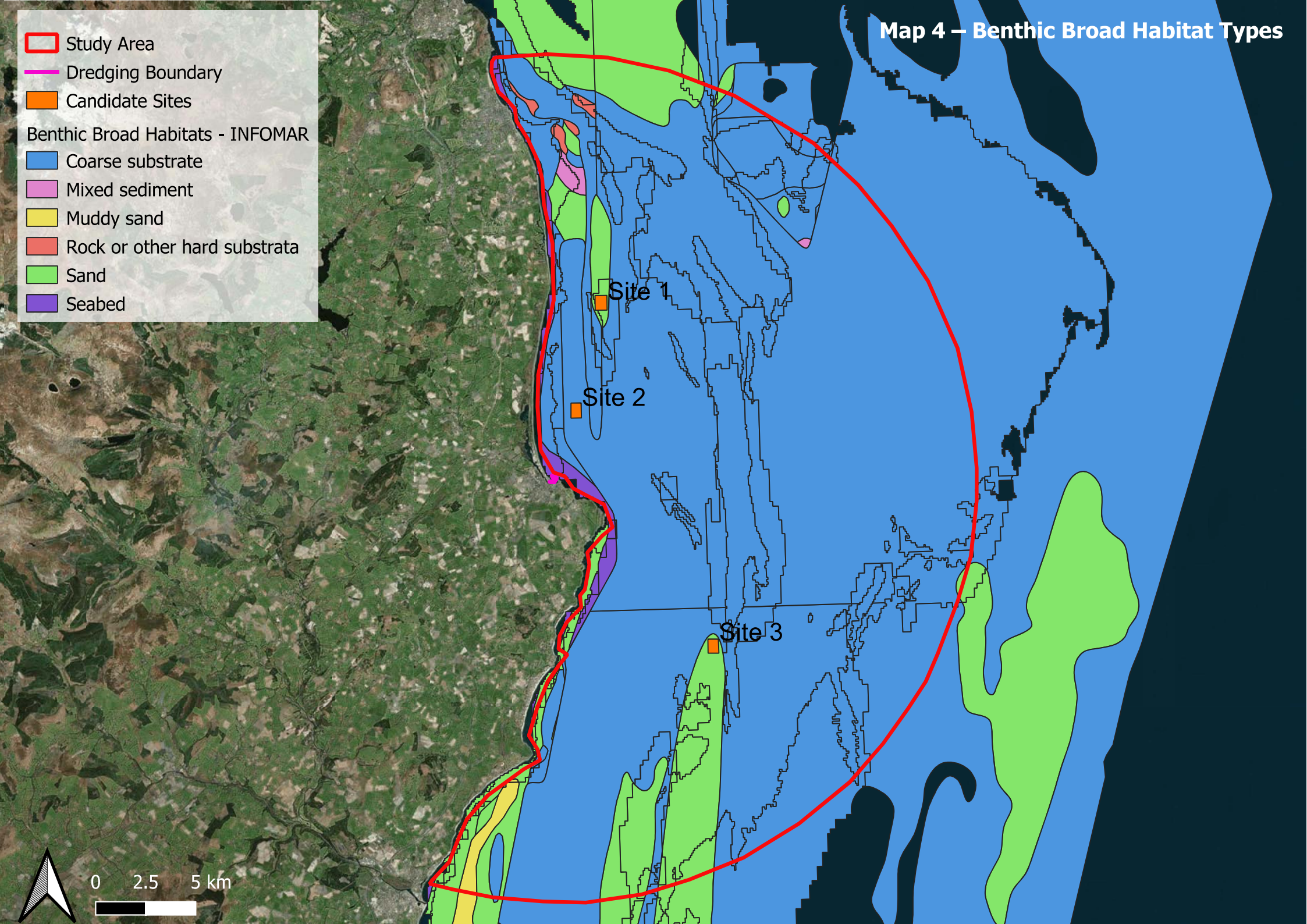
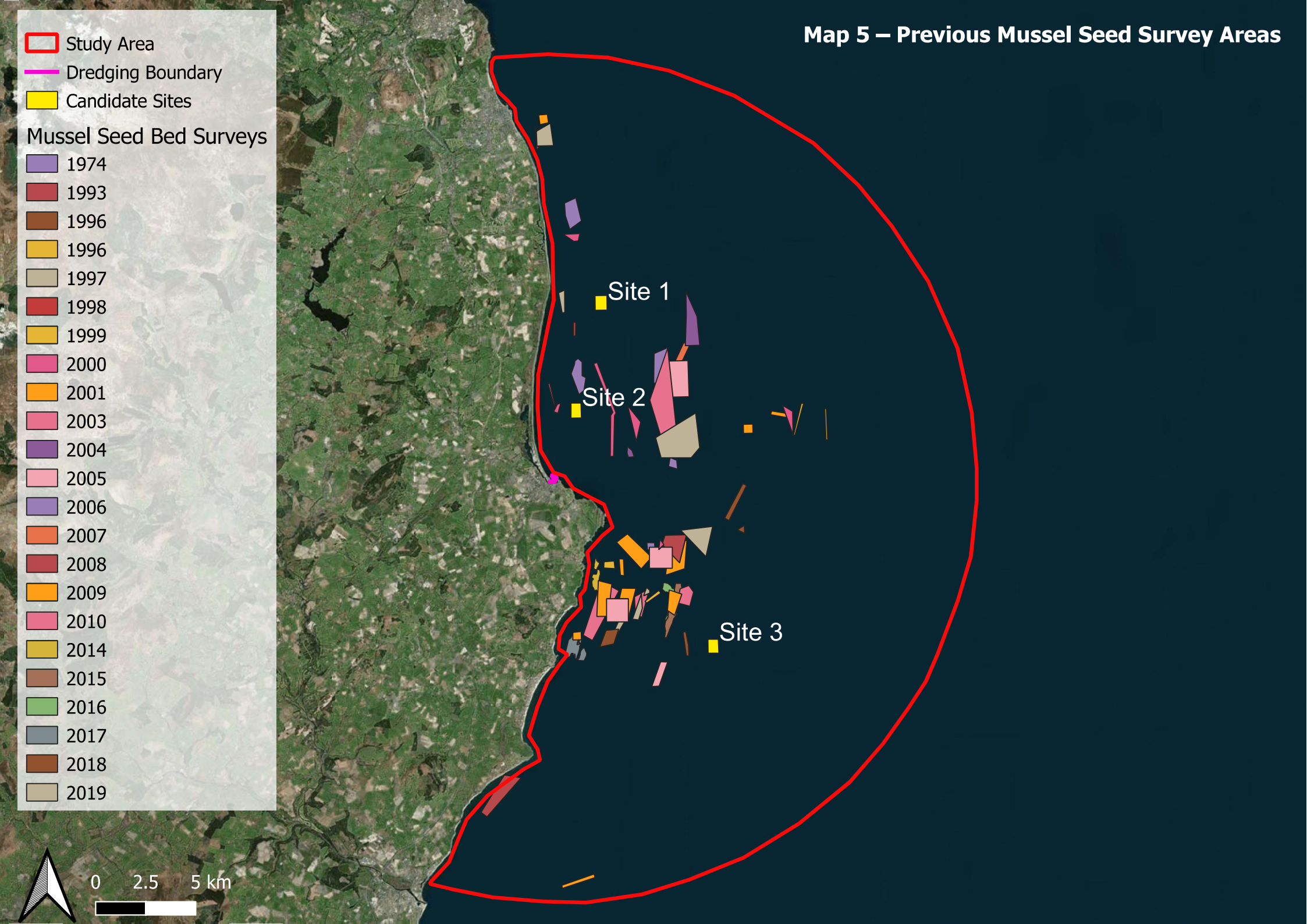
# Appendix 1 - Exclusionary Mapping

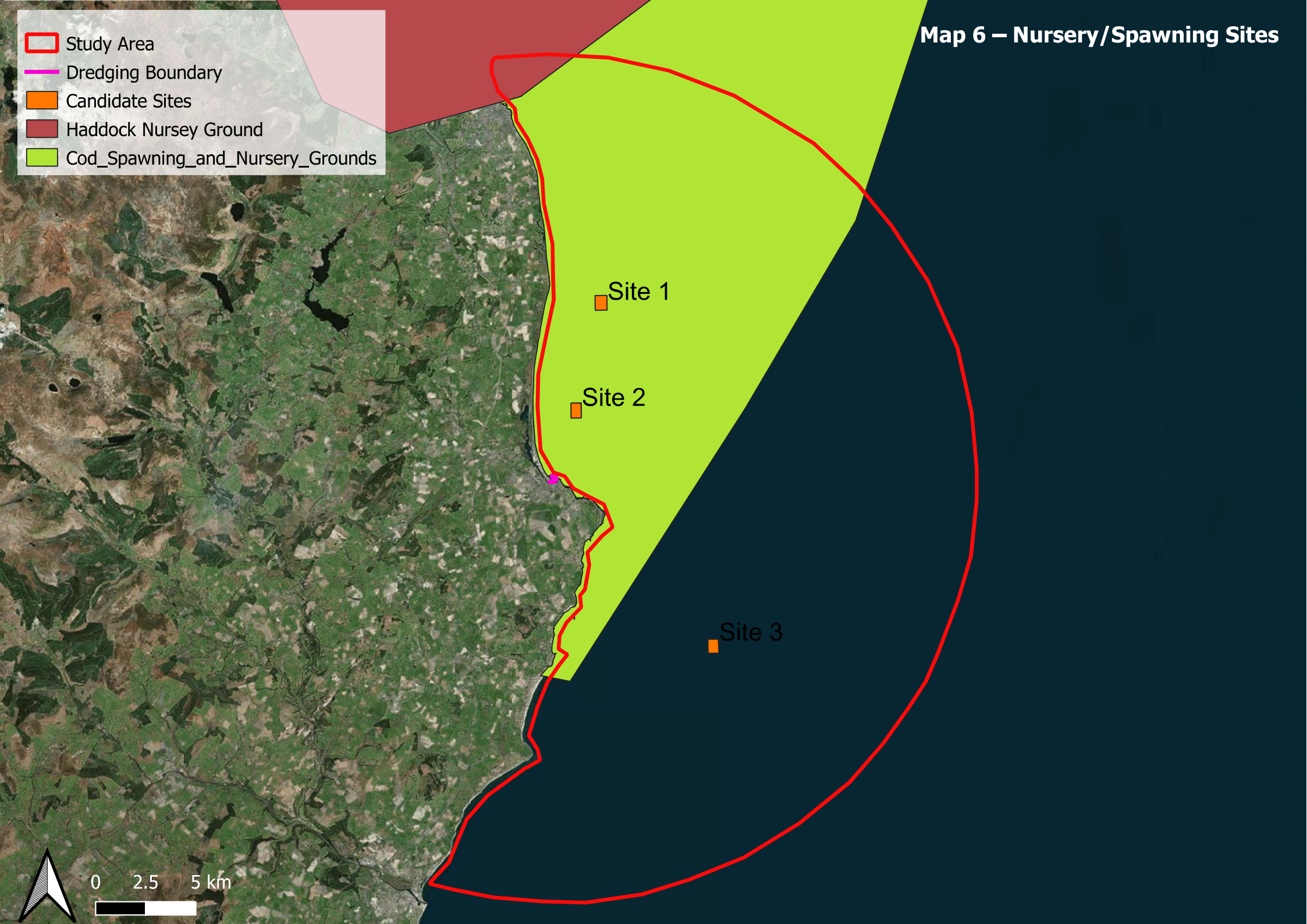

Study Area
Dredging Boundary
Candidate Sites
Protected Sites
SPA
SAC
Fisheries Natura Declaration
Map 1 – Protected Sites
Bray Head SAC
Site 1
The Murrough SPA
The Murrough Wetlands SAC
Site 2
Wicklow Reef SAC
Wicklow Head SPA
Conditional Fishing Mussels
Magherabeg Dunes SAC
Site 3
Buckroney-Brittas Dunes And Fen SAC
0
2.5
5 km

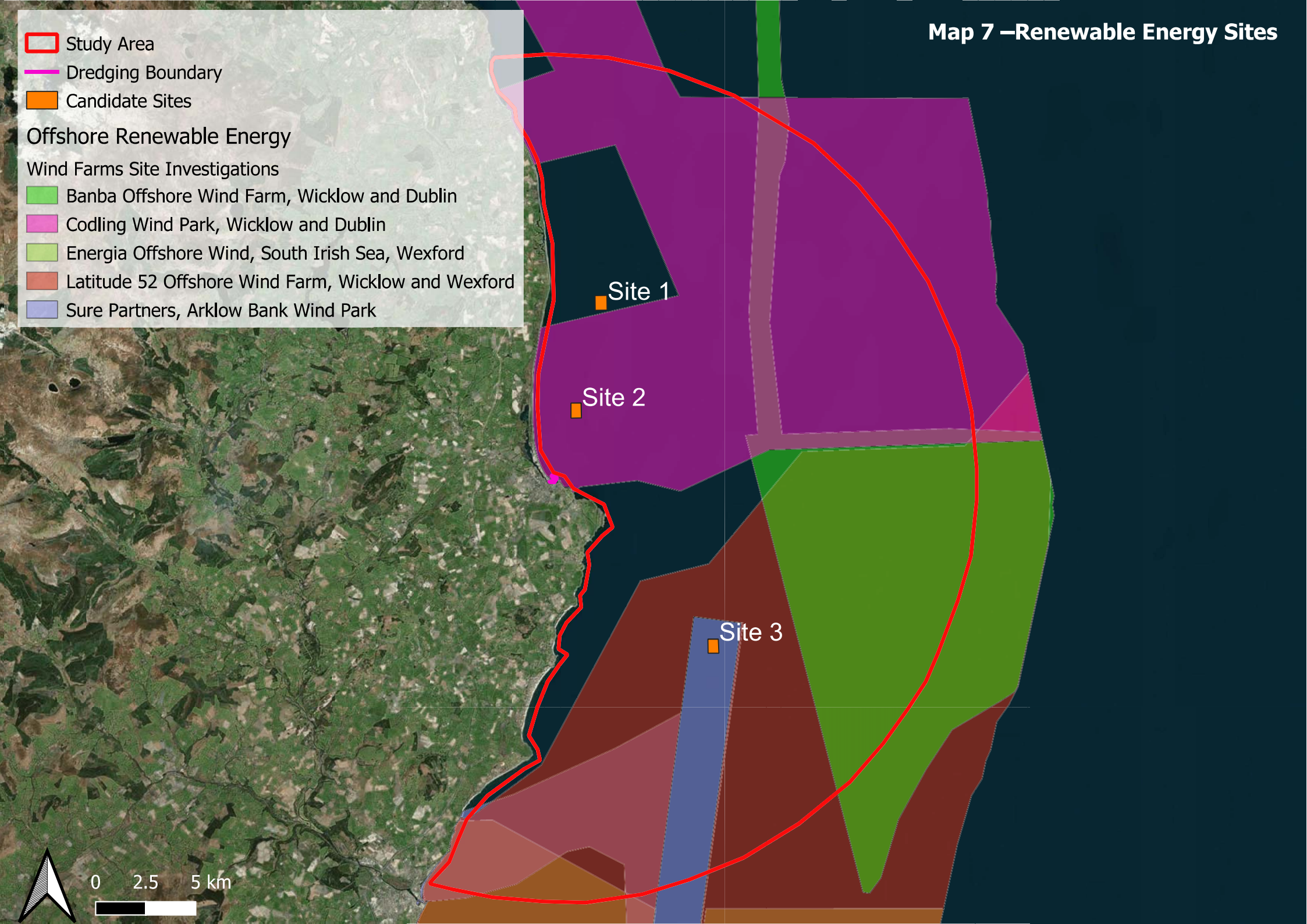

Map 2 – Water Framework Directive (WFD) Status Areas
Study Area
Dredging Boundary
Candidate Sites
WFD Status 2016-2021
High
Site 1
Site 2
Site 3
0
2.5
5 km


Map 3 – Water Framework Directive (WFD) Risk Areas
Study Area
Dredging Boundary
Candidate Sites
WFD Risk Status
Not at Risk
Site 1
Site 2
Site 3
0
2.5
5 km

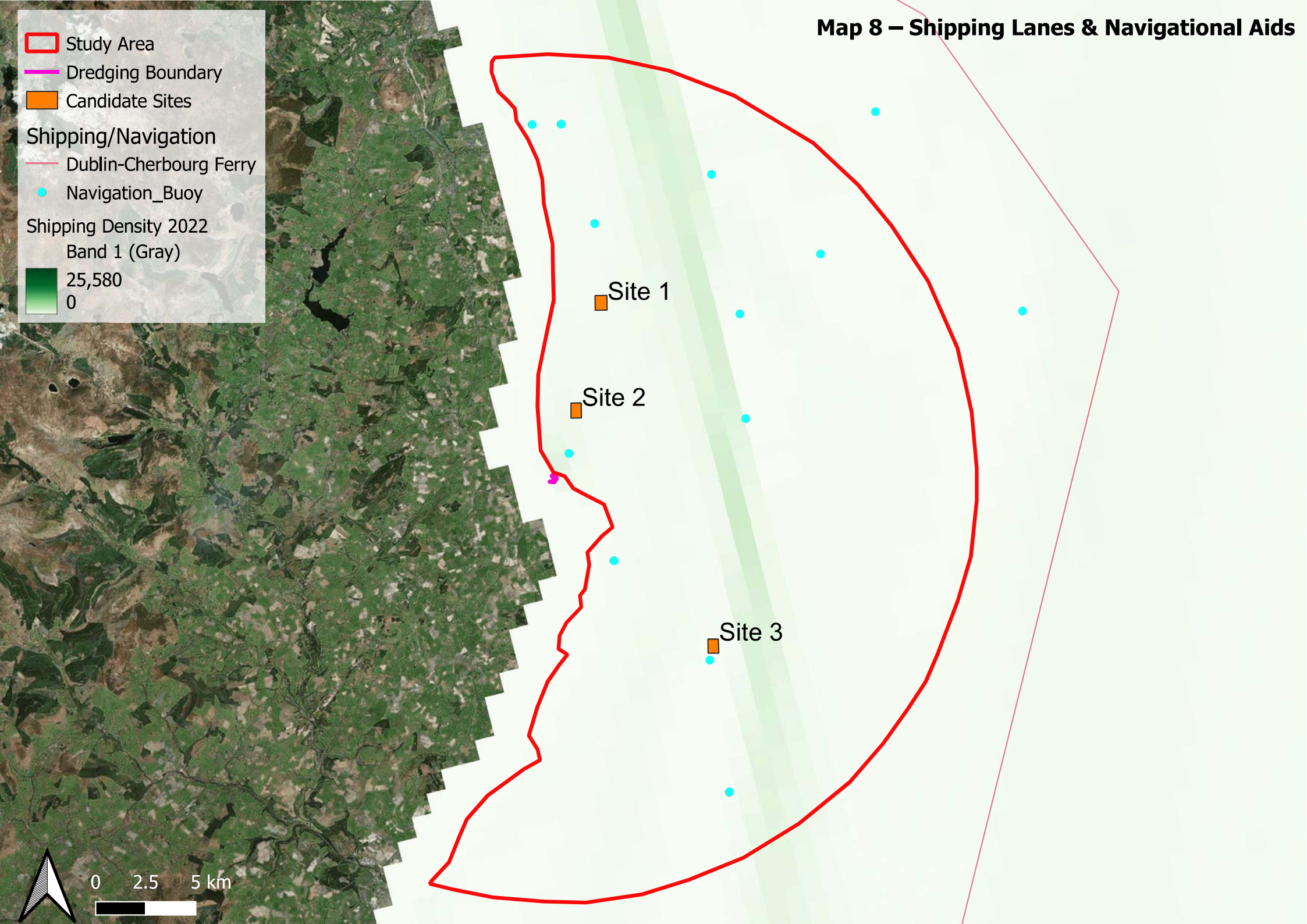

Map 4 – Benthic Broad Habitat Types
Study Area
Dredging Boundary
Candidate Sites
Benthic Broad Habitats - INFOMAR
Coarse substrate
Mixed sediment
Muddy sand
Rock or other hard substrata
Sand
Seabed
Site 1
Site 2
Site 3
0
2.5
5 km

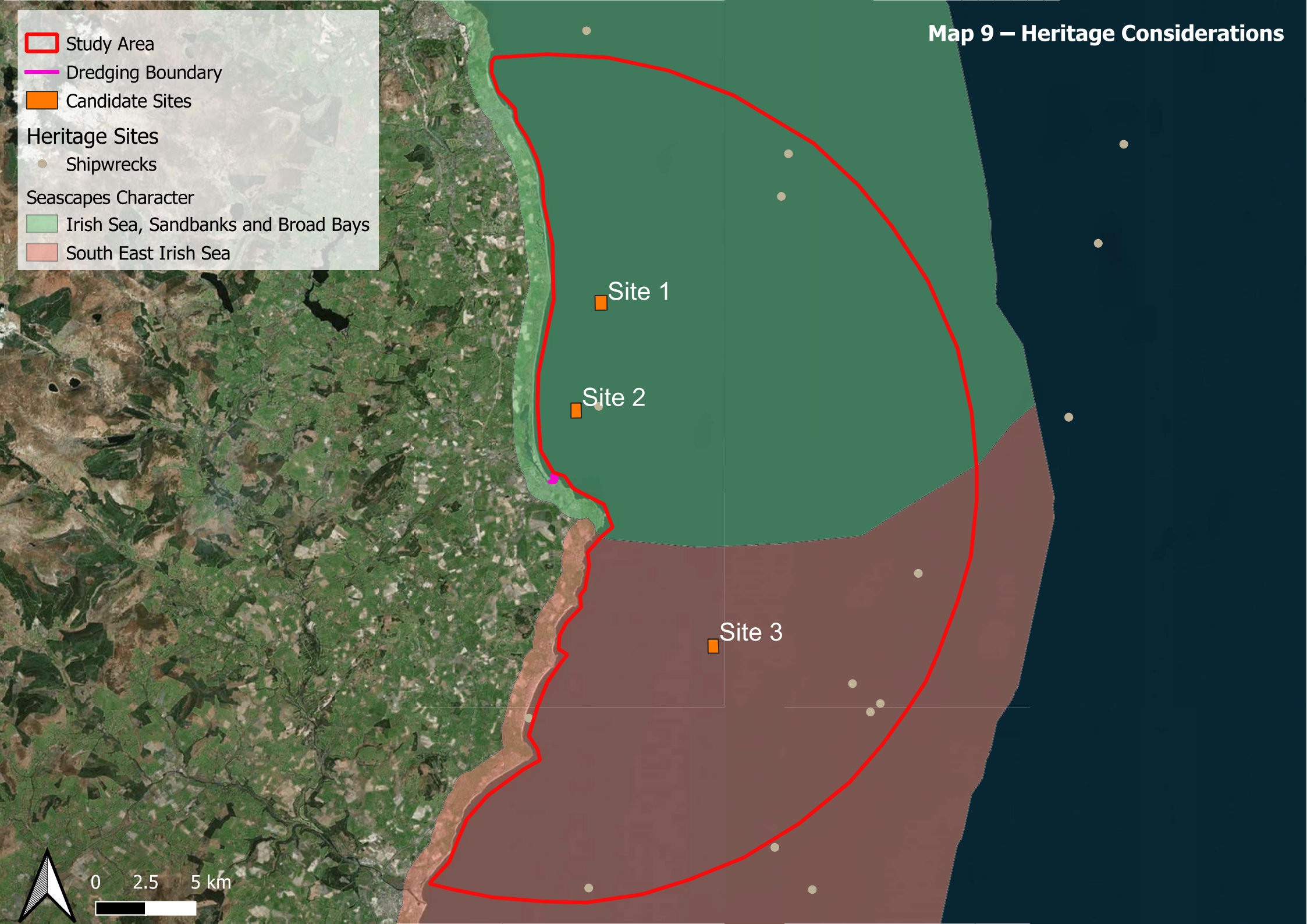

Map 5 – Previous Mussel Seed Survey Areas
Study Area
Dredging Boundary
Candidate Sites
Mussel Seed Bed Surveys
1974
1993
1996
1996
1997
1998
1999
2000
2001
2003
2004
2005
2006
2007
2008
2009
2010
2014
2015
2016
2017
2018
2019
Site 1
Site 2
Site 3
0
2.5
5 km


Map 6 – Nursery/Spawning Sites
Study Area
Dredging Boundary
Candidate Sites
Haddock Nursey Ground
Cod_Spawning_and_Nursery_Grounds
Site 1
Site 2
Site 3
0
2.5
5 km


Map 7 –Renewable Energy Sites
Study Area
Dredging Boundary
Candidate Sites
Offshore Renewable Energy
Wind Farms Site Investigations
Banba Offshore Wind Farm, Wicklow and Dublin
Codling Wind Park, Wicklow and Dublin
Energia Offshore Wind, South Irish Sea, Wexford
Latitude 52 Offshore Wind Farm, Wicklow and Wexford
Sure Partners, Arklow Bank Wind Park
Site 1
Site 2
Site 3
0
2.5
5 km

# Map 8 – Shipping Lanes & Navigational Aids




Map 9 – Heritage Considerations
Study Area
Dredging Boundary
Candidate Sites
Heritage Sites
Shipwrecks
Seascapes Character
Irish Sea, Sandbanks and Broad Bays
South East Irish Sea
Site 1
Site 2
Site 3
0
2.5
5 km

# Appendix 2 – Laboratory Data Sheets of Sediment Sampling in Wicklow Harbour (2021)

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

| | |
|---|---|
| **Test Report ID** | **MAR01198** |
| Issue Version | 1 |
| Customer | Priority Geotechnical, Unit 12, Owenacurra Business Park, Midleton, Co. Cork |
| Customer Reference | PH21037 Wicklow Harbour Sampling |
| Date Sampled | 02-Nov-21 |
| Date Received | 05-Nov-21 |
| Date Reported | 03-Dec-21 |
| Condition of samples | Ambient Satisfactory |

[redacted]

Authorised by: Marya Hubbard

Position: Laboratory Manager

Any additional opinions or interpretations found in this report, are outside the scope of UKAS accreditation.

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

| | |
|---|---|
| Test Report ID | MAR01198 |
| Issue Version | 1 |
| Customer Reference | PH21037 Wicklow Harbour Sampling |

| | | Method No | SOCOTEC Doncaster* |
|---|---|---|---|
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Visual Description** |
| S1 | MAR01198.001 | Sediment | Grey SILT |
| S2 | MAR01198.002 | Sediment | Grey SILT |
| S3 | MAR01198.003 | Sediment | Grey sandy SILT |
| S4 | MAR01198.004 | Sediment | Grey SILT |
| S5 | MAR01198.005 | Sediment | Grey SILT |
| S6 | MAR01198.006 | Sediment | Grey SILT |
| S7 | MAR01198.007 | Sediment | Grey silty SAND |

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

| | |
|---|---|
| Test Report ID | MAR01198 |
| Issue Version | 1 |
| Customer Reference | PH21037 Wicklow Harbour Sampling |

| | | Units | % | % | % | % | % | Mg/m3 |
|---|---|---|---|---|---|---|---|---|
| | | Method No | ASC/SOP/303 | ASC/SOP/303 | SUB_01* | SUB_01* | SUB_01* | SOCOTEC Doncaster* |
| | | Limit of Detection | 0.2 | 0.2 | N/A | N/A | N/A | N/A |
| | | Accreditation | UKAS | UKAS | N | N | N | N |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Total Moisture @ 120°C** | **Total Solids** | **Gravel (>2mm)** | **Sand (63-2000 µm)** | **Silt (<63 µm)** | **Particle Density** |
| S1 | MAR01198.001 | Sediment | 34.3 | 65.7 | 8.7 | 42.4 | 48.9 | 2.76 |
| S2 | MAR01198.002 | Sediment | 36.1 | 63.9 | 0.0 | 56.6 | 43.4 | 2.75 |
| S3 | MAR01198.003 | Sediment | 53.5 | 46.5 | 0.0 | 36.8 | 63.2 | 2.74 |
| S4 | MAR01198.004 | Sediment | 48.8 | 51.2 | 32.5 | 36.2 | 31.2 | 2.72 |
| S5 | MAR01198.005 | Sediment | 46.5 | 53.5 | 4.6 | 21.0 | 74.4 | 2.69 |
| S6 | MAR01198.006 | Sediment | 46.1 | 53.9 | 0.0 | 29.3 | 70.7 | 2.74 |
| S7 | MAR01198.007 | Sediment | 23.0 | 77.0 | 39.8 | 57.3 | 2.9 | 2.73 |
| | | Reference Material (% Recovery) | NA | NA | NA | NA | NA | NA |
| | | QC Blank | NA | NA | NA | NA | NA | NA |

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

| | |
|---|---|
| Test Report ID | MAR01198 |
| Issue Version | 1 |
| Customer Reference | PH21037 Wicklow Harbour Sampling |

| | | Units | % M/M | % M/M |
|---|---|---|---|---|
| | | Method No | SOCOTEC Env Chem* | SOCOTEC Env Chem* |
| | | Limit of Detection | 0.02 | 0.12 |
| | | Accreditation | UKAS | No |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **TOC** | **Carbonate Equivalent (%CO3)** |
| S1 | MAR01198.001 | Sediment | 0.36 | 6.48 |
| S2 | MAR01198.002 | Sediment | 0.57 | 7.20 |
| S3 | MAR01198.003 | Sediment | 1.04 | 10.20 |
| S4 | MAR01198.004 | Sediment | 1.18 | 9.36 |
| S5 | MAR01198.005 | Sediment | 1.47 | 8.88 |
| S6 | MAR01198.006 | Sediment | 1.78 | 10.6 |
| S7 | MAR01198.007 | Sediment | 0.54 | 6.36 |
| | | Reference Material (% Recovery) | 95 | 100 |
| | | QC Blank | <0.02 | <0.12 |

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01198
Issue Version 1
Customer Reference PH21037 Wicklow Harbour Sampling

| | | Units | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) |
|---|---|---|---|---|---|---|---|---|---|
| | | Method No | SOCOTEC Env Chem* | SOCOTEC Env Chem* | SOCOTEC Env Chem* | SOCOTEC Env Chem* | SOCOTEC Env Chem* | SOCOTEC Env Chem* | SOCOTEC Env Chem* |
| | | Limit of Detection | 0.5 | 0.2 | 2 | 2 | 1.2 | 2 | 3 |
| | | Accreditation | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Arsenic as As** | **Cadmium as Cd** | **Chromium as Cr** | **Copper as Cu** | **Lead as Pb** | **Nickel as Ni** | **Zinc as Zn** |
| S1 | MAR01198.001 | Sediment | 5.8 | <0.2 | 38.8 | 14.6 | 15.0 | 10.1 | 50 |
| S2 | MAR01198.002 | Sediment | 6.2 | <0.2 | 41.2 | 15.4 | 20.1 | 11.4 | 48.7 |
| S3 | MAR01198.003 | Sediment | 12 | <0.2 | 61 | 13.5 | 28.1 | 23.1 | 61 |
| S4 | MAR01198.004 | Sediment | 11.9 | 0.2 | 69.6 | 15.4 | 30.9 | 26.2 | 73 |
| S5 | MAR01198.005 | Sediment | 11.9 | <0.2 | 64.3 | 34.4 | 29.8 | 27.8 | 164 |
| S6 | MAR01198.006 | Sediment | 12.9 | 0.2 | 72.3 | 165 | 40.6 | 25.4 | 250.0 |
| S7 | MAR01198.007 | Sediment | 13.2 | <0.2 | 70.9 | 30.3 | 14.7 | 29.3 | 62.1 |
| Certified Reference Material 2702 (Measured Value) | | | 46.6 | 0.63 | 338 | 110 | 126 | 70.6 | 449 |
| Certified Reference Material 2702 (Certified Value) | | | 45.3 | 0.817 | 352 | 117.7 | 132.8 | 75.4 | 485.3 |
| Certified Reference Material 2702 (% Recovery) | | | 105 | 93 | 112 | 106 | 101 | 108 | 105 |
| QC Blank | | | <0.5 | <0.2 | <2 | <2 | <1.2 | <2 | <3 |

* See Report Notes
~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

| | |
|---|---|
| Test Report ID | MAR01198 |
| Issue Version | 1 |
| Customer Reference | PH21037 Wicklow Harbour Sampling |

| | | Units | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) |
|---|---|---|---|---|---|
| | | Method No | SOCOTEC Env Chem* | SOCOTEC Env Chem* | SOCOTEC Env Chem* |
| | | Limit of Detection | 0.01 | 10 | 2 |
| | | Accreditation | N | UKAS | N |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Mercury as Hg** | **Aluminium as Al** | **Lithium as Li** |
| S1 | MAR01198.001 | Sediment | 0.03 | 19400 | 21.3 |
| S2 | MAR01198.002 | Sediment | 0.02 | 22400 | 26.7 |
| S3 | MAR01198.003 | Sediment | 0.03 | 39800 | 39.2 |
| S4 | MAR01198.004 | Sediment | 0.03 | 42200 | 42.5 |
| S5 | MAR01198.005 | Sediment | 0.03 | 50700 | 49.6 |
| S6 | MAR01198.006 | Sediment | 0.05 | 42900 | 42.0 |
| S7 | MAR01198.007 | Sediment | 0.01 | 42500 | 39.7 |
| Certified Reference Material 2702 (Measured Value) | | | 0.01 | 64671 | 73.3 |
| Certified Reference Material 2702 (Certified Value) | | | 0.04 | 84000 | 78.2 |
| Certified Reference Material 2702 (% Recovery) | | | 100 | 85 | 107 |
| QC Blank | | | <0.01 | <10 | <2 |

* See Report Notes

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# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01198
Issue Version 1
Customer Reference PH21037 Wicklow Harbour Sampling

| | | Units | µg/Kg (Dry Weight) | |
|---|---|---|---|---|
| | | Method No | ASC/SOP/301 | |
| | | Limit of Detection | 1 | 1 |
| | | Accreditation | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Dibutyltin (DBT)** | **Tributyltin (TBT)** |
| S1 | MAR01198.001 | Sediment | <5 | <5 |
| S2 | MAR01198.002 | Sediment | <5 | <5 |
| S3 | MAR01198.003 | Sediment | <5 | <5 |
| S4 | MAR01198.004 | Sediment | <5 | <5 |
| S5 | MAR01198.005 | Sediment | <5 | <5 |
| S6 | MAR01198.006 | Sediment | 18.1 | 13.5 |
| S7 | MAR01198.007 | Sediment | <5 | <5 |
| Certified Reference Material BCR-646 (Measured Value) | | | 742 | 275 |
| Certified Reference Material BCR-646 (Certified Value) | | | 770 | 480 |
| Certified Reference Material BCR-646 (% Recovery) | | | 96 | 57 |
| QC Blank | | | <1 | <1 |

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01198
Issue Version 1
Customer Reference PH21037 Wicklow Harbour Sampling

| | | Units | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
|---|---|---|---|---|---|---|---|---|
| | | Method No | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 |
| | | Limit of Detection | 1 | 1 | 1 | 1 | 1 | 1 |
| | | Accreditation | UKAS | UKAS | N* | UKAS | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **ACENAPTH** | **ACENAPHY** | **ANTHRACN** | **BAA** | **BAP** | **BBF** |
| S1 | MAR01198.001 | Sediment | 1.63 | 1.20 | 4.27 | 10.9 | 12.9 | 13.2 |
| S2 | MAR01198.002 | Sediment | 1.89 | 1.42 | 3.86 | 8.62 | 10.8 | 10.3 |
| S3 | MAR01198.003 | Sediment | 5.31 | 6.49 | 14.4 | 37.6 | 43.7 | 59.9 |
| S4 | MAR01198.004 | Sediment | 2.25 | 3.81 | 10.5 | 29.8 | 32.8 | 49.5 |
| S5 | MAR01198.005 | Sediment | 3.31 | 4.54 | 9.87 | 26.7 | 30.1 | 41.6 |
| S6 | MAR01198.006 | Sediment | 4.92 | 4.62 | 11.1 | 41.5 | 41.7 | 56.6 |
| S7 | MAR01198.007 | Sediment | 1.87 | 4.60 | 30.0 | 82.4 | 85.0 | 65.1 |
| Certified Reference Material QPH103MS (Measured Value) | | | 2.59 | 2.06 | 7.70 | 21.0 | 26.1 | 70.7 |
| Certified Reference Material QPH103MS (Certified Value) | | | 2.28 | 2.02 | 4.32 | 22.1 | 26.2 | 98.4 |
| Certified Reference Material QPH103MS (% Recovery) | | | 113 | 102 | 178 | 95 | 100 | 72 |
| QC Blank | | | <1 | <1 | <1 | <1 | <1 | <1 |

For full analyte name see method summaries
~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.
As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.
* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01198
Issue Version 1
Customer Reference PH21037 Wicklow Harbour Sampling

| | | Units | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
|---|---|---|---|---|---|---|---|---|
| | | Method No | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 |
| | | Limit of Detection | 1 | 1 | 1 | 1 | 1 | 1 |
| | | Accreditation | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **BENZGHIP** | **BKF** | **CHRYSENE** | **DBENZAH** | **FLUORANT** | **FLUORENE** |
| S1 | MAR01198.001 | Sediment | 10.2 | 10.1 | 14.6 | 1.86 | 18.9 | 2.43 |
| S2 | MAR01198.002 | Sediment | 11.7 | 9.68 | 13.3 | 1.58 | 16.5 | 3.80 |
| S3 | MAR01198.003 | Sediment | 49.1 | 34.9 | 57.4 | 10.7 | 67.9 | 14.3 |
| S4 | MAR01198.004 | Sediment | 33.6 | 25.5 | 43.7 | 6.68 | 43.0 | 7.99 |
| S5 | MAR01198.005 | Sediment | 34.9 | 23.0 | 40.0 | 6.24 | 54.3 | 9.96 |
| S6 | MAR01198.006 | Sediment | 41.8 | 28.4 | 55.1 | 7.02 | 77.4 | 10.8 |
| S7 | MAR01198.007 | Sediment | 47.6 | 50.7 | 95.3 | 8.56 | 213 | 8.47 |
| Certified Reference Material QPH103MS (Measured Value) | | | 81.2 | 34.1 | 33.3 | 15.0 | 44.4 | 6.33 |
| Certified Reference Material QPH103MS (Certified Value) | | | 91.0 | 37.6 | 30.7 | 17.0 | 43.3 | 5.87 |
| Certified Reference Material QPH103MS (% Recovery) | | | 89 | 91 | 108 | 88 | 103 | 108 |
| QC Blank | | | <1 | <1 | <1 | <1 | <1 | <1 |

For full analyte name see method summaries
~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.
As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.
* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01198
Issue Version 1
Customer Reference PH21037 Wicklow Harbour Sampling

| | | Units | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
|---|---|---|---|---|---|---|---|
| | | Method No | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/306 |
| | | Limit of Detection | 1 | 1 | 1 | 1 | 100 |
| | | Accreditation | UKAS | UKAS | UKAS | UKAS | N |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **INDPYR** | **NAPTH** | **PHENANT** | **PYRENE** | **THC** |
| S1 | MAR01198.001 | Sediment | 10.5 | 6.05 | 14.3 | 18.8 | 43000 |
| S2 | MAR01198.002 | Sediment | 10.1 | 9.84 | 15.2 | 16.8 | 71100 |
| S3 | MAR01198.003 | Sediment | 49.9 | 29.1 | 60.4 | 70.1 | 108000 |
| S4 | MAR01198.004 | Sediment | 33.6 | 19.7 | 33.0 | 43.1 | 96900 |
| S5 | MAR01198.005 | Sediment | 35.2 | 19.0 | 48.0 | 48.9 | 101000 |
| S6 | MAR01198.006 | Sediment | 41.0 | 20.8 | 44.9 | 76.6 | 150000 |
| S7 | MAR01198.007 | Sediment | 50.6 | 3.49 | 135 | 173 | 44000 |
| Certified Reference Material QPH103MS (Measured Value) | | | 108 | 19.0 | 49.6 | 36.7 | NA |
| Certified Reference Material QPH103MS (Certified Value) | | | 115 | 20.1 | 45.4 | 34.0 | NA |
| Certified Reference Material QPH103MS (% Recovery) | | | 94 | 94 | 109 | 108 | 90~ |
| QC Blank | | | <1 | <1 | <1 | <1 | <1 |

For full analyte name see method summaries
~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.
As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.
* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01198
Issue Version 1
Customer Reference PH21037 Wicklow Harbour Sampling

| | | Units | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
|---|---|---|---|---|---|---|---|---|---|
| | | Method No | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 |
| | | Limit of Detection | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 |
| | | Accreditation | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **PCB28** | **PCB52** | **PCB101** | **PCB118** | **PCB138** | **PCB153** | **PCB180** |
| S1 | MAR01198.001 | Sediment | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 |
| S2 | MAR01198.002 | Sediment | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 |
| S3 | MAR01198.003 | Sediment | 0.14 | <0.08 | <0.08 | 0.08 | 0.09 | 0.10 | <0.08 |
| S4 | MAR01198.004 | Sediment | 0.23 | 0.12 | 0.14 | 0.16 | 0.15 | 0.15 | <0.08 |
| S5 | MAR01198.005 | Sediment | 0.58 | 0.25 | 0.16 | 0.15 | 0.18 | 0.19 | <0.08 |
| S6 | MAR01198.006 | Sediment | 3.15 | 1.26 | 0.52 | 0.61 | 0.59 | 0.66 | 0.18 |
| S7 | MAR01198.007 | Sediment | 0.12 | 0.11 | 0.19 | <0.08 | 0.14 | 0.24 | <0.08 |
| Certified Reference Material QOR147 MS (Measured Value) | | | 1.03 | 1.25 | 1.60 | 0.91 | 1.86 | 2.41 | 1.27 |
| Certified Reference Material QOR147 MS (Certified Value) | | | 1.37 | 1.38 | 1.72 | 1.04 | 1.89 | 2.47 | 1.26 |
| Certified Reference Material QOR147 MS (% Recovery) | | | 75 | 90 | 93 | 87 | 98 | 97 | 101 |
| QC Blank | | | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 |

For full analyte name see method summaries
~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

| | |
|---|---|
| Test Report ID | MAR01198 |
| Issue Version | 1 |
| Customer Reference | PH21037 Wicklow Harbour Sampling |

| | | Units | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Method No | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 |
| | | Limit of Detection | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | | Accreditation | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **AHCH** | **BHCH** | **GHCH** | **DIELDRIN** | **HCB** | **DDE** | **DDT** | **DDD** |
| S1 | MAR01198.001 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| S2 | MAR01198.002 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 0.14 | <0.1 |
| S3 | MAR01198.003 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 0.15 | <0.1 |
| S4 | MAR01198.004 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 0.14 | 0.50 | 0.12 |
| S5 | MAR01198.005 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 0.15 | 0.10 | 0.14 |
| S6 | MAR01198.006 | Sediment | <0.1 | <0.1 | <0.1 | 0.52 | 0.12 | 0.50 | 0.29 | 0.54 |
| S7 | MAR01198.007 | Sediment | <0.1 | <0.1 | <0.1 | 1.04 | <0.1 | <0.1 | <0.1 | 0.63 |
| Certified Reference Material QOR147 MS (Measured Value) | | | 0.01 | 0.03 | 0.03 | 0.75 | 1.14 | 0.39 | 0.07 | 0.19 |
| Certified Reference Material QOR147 MS (Certified Value) | | | NA | NA | NA | 0.69 | 1.29 | 0.42 | NA | 0.30 |
| Certified Reference Material QOR147 MS (% Recovery) | | | 117~ | 94~ | 113~ | 109 | 88 | 93 | 116~ | 62 |
| QC Blank | | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01198
Issue Version 1
Customer Reference PH21037 Wicklow Harbour Sampling

## REPORT NOTES

| Method Code | Sample ID | The following information should be taken into consideration when using the data contained within this report |
|---|---|---|
| SOCOTEC Env Chem* | MAR01198.001-007 | Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252. |
| SOCOTEC Doncaster* | MAR01198.001-007 | Analysis was conducted by an internal SOCOTEC laboratory. |
| SUB_01* | MAR01198.001-007 | Analysis was conducted by an approved subcontracted laboratory. |
| ASC/SOP/301 | MAR01198.001-005, .007 | The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted, but in doing so, the detection limit for this test has been elevated. |
| ASC/SOP/303/304 | MAR01198.001-007 | Chrysene is known to coelute with Triphenylene and these peaks can not be resolved. It is believed Triphenylene is present in these samples therefore it is suggested that the Chrysene results should be taken as a Chrysene (inc. Triphenylene).This should be taken into consideration when utilising the data. |
| ASC/SOP/303/304 | MAR01198.001-007 | The Primary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. The remaining data gives the Laboratory confidence that the test has performed satisfactorily and that the validity of the data may not have been significantly affected.However in line with our QMS policy we have removed accreditation, where applicable, from the affected analytes (ANTHRACN) . These circumstances should be taken into consideration when utilising the data. |

## DEVIATING SAMPLE STATEMENT

| Deviation Code | Deviation Definition | Sample ID | Deviation Details. The following information should be taken into consideration when using the data contained within this report |
|---|---|---|---|
| D1 | Holding Time Exceeded | N/A | N/A |
| D2 | Handling Time Exceeded | N/A | N/A |
| D3 | Sample Contaminated through Damaged Packaging | N/A | N/A |
| D4 | Sample Contaminated through Sampling | N/A | N/A |
| D5 | Inappropriate Container/Packaging | N/A | N/A |
| D6 | Damaged in Transit | N/A | N/A |
| D7 | Insufficient Quantity of Sample | N/A | N/A |
| D8 | Inappropriate Headspace | N/A | N/A |
| D9 | Retained at Incorrect Temperature | N/A | N/A |
| D10 | Lack of Date & Time of Sampling | N/A | N/A |
| D11 | Insufficient Sample Details | N/A | N/A |
| D12 | Sample integrity compromised or not suitable for analysis | N/A | N/A |

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

| | |
|---|---|
| Test Report ID | MAR01198 |
| Issue Version | 1 |
| Customer Reference | PH21037 Wicklow Harbour Sampling |

| Method | Sample and Fraction Size | Method Summary |
|---|---|---|
| Total Solids | Wet Sediment | Calculation (100%-Moisture Content).Moisture content determined by drying a portion of the sample at 120°C to constant weight. |
| Particle Size Analysis | Wet Sediment | Wet and dry sieving followed by laser diffraction analysis. |
| Total Organic Carbon (TOC) | Air dried and seived to <2mm | Carbonate removal and sulphurous acid/combustion at 1600°C/NDIR. |
| Carbonate | Air dried and seived to <2mm | Quantitative digestion with Hydrochloric Acid back titration with 1M Sodium Hydroxide to pH 7 |
| Metals | Air dried and seived to <2mm | HF/Boric extraction followed by ICP analysis. |
| Organotins | Wet Sediment | Solvent extraction and derivatisation followed by GC-MS analysis. |
| Polyaromatic Hydrocarbons (PAH) | Wet Sediment | Solvent extraction and clean up followed by GC-MS analysis. |
| Total Hydrocarbon Content (THC) | Wet Sediment | Solvent extraction and clean up followed by GC-FID analysis. |
| Polychlorinated Biphenyls (PCBs) | Air dried and seived to <2mm | Solvent extraction and clean up followed by GC-MS-MS analysis. |
| Organochlorine Pesticides (OCPs) | Air dried and seived to <2mm | Solvent extraction and clean up followed by GC-MS-MS analysis. |

| Analyte Definitions | | | | | |
|---|---|---|---|---|---|
| Analyte Abbreviation | Full Analyte name | Analyte Abbreviation | Full Analyte name | Analyte Abbreviation | Full Analyte name |
| ACENAPTH | Acenaphthene | C2N | C2-naphthalenes | THC | Total Hydrocarbon Content |
| ACENAPHY | Acenaphthylene | C3N | C3-naphthalenes | AHCH | alpha-Hexachlorcyclohexane |
| ANTHRACN | Anthracene | CHRYSENE | Chrysene | BHCH | beta-Hexachlorcyclohexane |
| BAA | Benzo[a]anthracene | DBENZAH | Dibenzo[ah]anthracene | GHCH | gamma-Hexachlorcyclohexane |
| BAP | Benzo[a]pyrene | FLUORANT | Fluoranthene | DIELDRIN | Dieldrin |
| BBF | Benzo[b]fluoranthene | FLUORENE | Fluorene | HCB | Hexachlorobenzene |
| BEP | Benzo[e]pyrene | INDPYR | Indeno[1,2,3-cd]pyrene | DDD | p,p'-Dichlorodiphenyldichloroethane |
| BENZGHIP | Benzo[ghi]perylene | NAPTH | Naphthalene | DDE | p,p'-Dichlorodiphenyldichloroethylene |
| BKF | Benzo[k]fluoranthene | PERYLENE | Perylene | DDT | p,p'-Dichlorodiphenyltrichloroethane |
| C1N | C1-naphthalenes | PHENANT | Phenanthrene | | |
| C1PHEN | C1-phenanthrene | PYRENE | Pyrene | | |

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

| | | |
|---|---|---|
| **Test Report ID** | **MAR01317** | |
| Issue Version | 1 | |
| Customer | Priority Geotechnical Ltd, Unit 12, Owenacurra Business Park, Midleton, Co. Cork | |
| Customer Reference | PH21037B Wicklow Harbour Sampling | |
| Date Sampled | 21-Feb-22 | |
| Date Received | 24-Feb-22 | |
| Date Reported | 17-Mar-22 | |
| Condition of samples | Cold | Satisfactory |

[redacted]

Authorised by: Marya Hubbard

Position: Laboratory Manager

Any additional opinions or interpretations found in this report, are outside the scope of UKAS accreditation.

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

| | |
|---|---|
| Test Report ID | MAR01317 |
| Issue Version | 1 |
| Customer Reference | PH21037B Wicklow Harbour Sampling |

| | | Units | % | % | % |
|---|---|---|---|---|---|
| | | Method No | SUB_01* | SUB_01* | SUB_01* |
| | | Limit of Detection | N/A | N/A | N/A |
| | | Accreditation | N | N | N |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Gravel (>2mm)** | **Sand (63-2000 µm)** | **Silt (<63 µm)** |
| S1B | MAR01317.001 | Sediment | 0.2 | 22.1 | 77.7 |
| S2B | MAR01317.002 | Sediment | 2.0 | 35.3 | 62.6 |
| S3B | MAR01317.003 | Sediment | 0.9 | 58.2 | 41.0 |

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

| | |
|---|---|
| Test Report ID | MAR01317 |
| Issue Version | 1 |
| Customer Reference | PH21037B Wicklow Harbour Sampling |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **Units** | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) |
| | | **Method No** | SEDMS* | SEDMS* | SEDMS* | SEDMS* | SEDMS* | SEDMS* | SEDMS* |
| | | **Limit of Detection** | 0.5 | 0.2 | 2 | 2 | 1.2 | 2 | 3 |
| | | **Accreditation** | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Arsenic as As** | **Cadmium as Cd** | **Chromium as Cr** | **Copper as Cu** | **Lead as Pb** | **Nickel as Ni** | **Zinc as Zn** |
| S1B | MAR01317.001 | Sediment | 12.0 | 0.5 | 52.3 | 20.9 | 39.6 | 22.4 | 103 |
| S2B | MAR01317.002 | Sediment | 11.6 | 0.2 | 57.1 | 15.6 | 34.7 | 23.4 | 115 |
| S3B | MAR01317.003 | Sediment | 7.0 | 0.3 | 71.5 | 27.8 | 32.2 | 13.3 | 129 |
| Certified Reference Material 2702 (Measured Value) | | | 42.9 | 0.65 | 294 | 100 | 121 | 65.4 | 410 |
| Certified Reference Material 2702 (Certified Value) | | | 45.3 | 0.817 | 352 | 117.7 | 132.8 | 75.4 | 485.3 |
| Certified Reference Material 2702 (% Recovery) | | | 97 | 95 | 97 | 96 | 97 | 100 | 96 |
| QC Blank | | | <0.5 | <0.2 | <2 | <2 | <1.2 | <2 | <3 |

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

| | |
|---|---|
| Test Report ID | MAR01317 |
| Issue Version | 1 |
| Customer Reference | PH21037B Wicklow Harbour Sampling |

| | | Units | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) |
|---|---|---|---|---|
| | | Method No | SEDOES* | SEDOES* |
| | | Limit of Detection | 10 | 2 |
| | | Accreditation | UKAS | N |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Aluminium as Al** | **Lithium as Li** |
| S1B | MAR01317.001 | Sediment | 45200 | 46.1 |
| S2B | MAR01317.002 | Sediment | 43500 | 46.1 |
| S3B | MAR01317.003 | Sediment | 27600 | 35.0 |
| Certified Reference Material 2702 (Measured Value) | | | 81151 | 80.5 |
| Certified Reference Material 2702 (Certified Value) | | | 84000 | 78.2 |
| Certified Reference Material 2702 (% Recovery) | | | 106 | 109 |
| QC Blank | | | <10 | <2 |

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01317
Issue Version 1
Customer Reference PH21037B Wicklow Harbour Sampling

## REPORT NOTES

| Method Code | Sample ID | The following information should be taken into consideration when using the data contained within this report |
|---|---|---|
| SEDMS* | MAR01317.001-003 | Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252. |
| SEDOES* | MAR01317.001-003 | Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252. |
| SUB_01* | MAR01317.001-003 | Analysis was conducted by an approved subcontracted laboratory. |

## DEVIATING SAMPLE STATEMENT

| Deviation Code | Deviation Definition | Sample ID | Deviation Details. The following information should be taken into consideration when using the data contained within this report |
|---|---|---|---|
| D1 | Holding Time Exceeded | N/A | N/A |
| D2 | Sample Contaminated through Damaged Packaging | N/A | N/A |
| D3 | Sample Contaminated through Sampling | N/A | N/A |
| D4 | Inappropriate Container/Packaging | N/A | N/A |
| D5 | Damaged in Transit | N/A | N/A |
| D6 | Insufficient Quantity of Sample | N/A | N/A |
| D7 | Inappropriate Headspace | N/A | N/A |
| D8 | Retained at Incorrect Temperature | N/A | N/A |
| D9 | Lack of Date & Time of Sampling | N/A | N/A |
| D10 | Insufficient Sample Details | N/A | N/A |
| D11 | Sample integrity compromised or not suitable for analysis | N/A | N/A |

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

| | |
|---|---|
| Test Report ID | MAR01317 |
| Issue Version | 1 |
| Customer Reference | PH21037B Wicklow Harbour Sampling |

| Method | Sample and Fraction Size | Method Summary |
|---|---|---|
| Particle Size Analysis | Wet Sediment | Wet and dry sieving followed by laser diffraction analysis. |
| Metals | Air dried and seived to <2mm | HF/Boric extraction followed by ICP analysis. |

| Analyte Definitions | | | | | |
|---|---|---|---|---|---|
| Analyte Abbreviation | Full Analyte name | Analyte Abbreviation | Full Analyte name | Analyte Abbreviation | Full Analyte name |
| ACENAPTH | Acenaphthene | C2N | C2-naphthalenes | THC | Total Hydrocarbon Content |
| ACENAPHY | Acenaphthylene | C3N | C3-naphthalenes | AHCH | alpha-Hexachlorcyclohexane |
| ANTHRACN | Anthracene | CHRYSENE | Chrysene | BHCH | beta-Hexachlorcyclohexane |
| BAA | Benzo[a]anthracene | DBENZAH | Dibenzo[ah]anthracene | GHCH | gamma-Hexachlorcyclohexane |
| BAP | Benzo[a]pyrene | FLUORANT | Fluoranthene | DIELDRIN | Dieldrin |
| BBF | Benzo[b]fluoranthene | FLUORENE | Fluorene | HCB | Hexachlorobenzene |
| BEP | Benzo[e]pyrene | INDPYR | Indeno[1,2,3-cd]pyrene | DDD | p,p'-Dichlorodiphenyldichloroethane |
| BENZGHIP | Benzo[ghi]perylene | NAPTH | Naphthalene | DDE | p,p'-Dichlorodiphenyldichloroethylene |
| BKF | Benzo[k]fluoranthene | PERYLENE | Perylene | DDT | p,p'-Dichlorodiphenyltrichloroethane |
| C1N | C1-naphthalenes | PHENANT | Phenanthrene | | |
| C1PHEN | C1-phenanthrene | PYRENE | Pyrene | | |

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

| | |
|---|---|
| **Test Report ID** | **MAR01199** |
| Issue Version | 1 |
| Customer | Priority Geotechnical, Unit 12, Owenacurra Business Park, Midleton, Co. Cork |
| Customer Reference | PH21037A Wicklow Harbour Sampling |
| Date Sampled | 02-Nov-21 |
| Date Received | 05-Nov-21 |
| Date Reported | 03-Dec-21 |
| Condition of samples | Ambient Satisfactory |

[redacted]

Authorised by: Marya Hubbard

Position: Laboratory Manager

Any additional opinions or interpretations found in this report, are outside the scope of UKAS accreditation.

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

| | |
|---|---|
| Test Report ID | MAR01199 |
| Issue Version | 1 |
| Customer Reference | PH21037A Wicklow Harbour Sampling |

| | | Method No | SOCOTEC Doncaster* |
|---|---|---|---|
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Visual Description** |
| S8 | MAR01199.001 | Sediment | Grey silty SAND |
| S9 | MAR01199.002 | Sediment | Grey SAND |
| S10 | MAR01199.003 | Sediment | Grey SAND |
| S11 | MAR01199.004 | Sediment | Grey silty SAND |

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01199
Issue Version 1
Customer Reference PH21037A Wicklow Harbour Sampling

| | | Units | % | % | % | % | % | Mg/m3 |
|---|---|---|---|---|---|---|---|---|
| | | Method No | ASC/SOP/303 | ASC/SOP/303 | SUB_01* | SUB_01* | SUB_01* | SOCOTEC Doncaster* |
| | | Limit of Detection | 0.2 | 0.2 | N/A | N/A | N/A | N/A |
| | | Accreditation | UKAS | UKAS | N | N | N | N |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Total Moisture @ 120°C** | **Total Solids** | **Gravel (>2mm)** | **Sand (63-2000 µm)** | **Silt (<63 µm)** | **Particle Density** |
| S8 | MAR01199.001 | Sediment | 27.4 | 72.6 | 1.9 | 91.7 | 6.4 | 2.72 |
| S9 | MAR01199.002 | Sediment | 29.2 | 70.8 | 0.0 | 94.8 | 5.2 | 2.70 |
| S10 | MAR01199.003 | Sediment | 32.5 | 67.5 | 0.0 | 72.9 | 27.1 | 2.70 |
| S11 | MAR01199.004 | Sediment | 32.6 | 67.4 | 0.0 | 49.7 | 50.3 | 2.76 |
| | | Reference Material (% Recovery) | NA | NA | NA | NA | NA | NA |
| | | QC Blank | NA | NA | NA | NA | NA | NA |

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01199
Issue Version 1
Customer Reference PH21037A Wicklow Harbour Sampling

| | | Units | % M/M | % M/M |
|---|---|---|---|---|
| | | Method No | SOCOTEC Env Chem* | SOCOTEC Env Chem* |
| | | Limit of Detection | 0.02 | 0.12 |
| | | Accreditation | UKAS | No |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **TOC** | **Carbonate Equivalent (%CO3)** |
| S8 | MAR01199.001 | Sediment | 0.56 | 3.84 |
| S9 | MAR01199.002 | Sediment | 0.37 | 4.56 |
| S10 | MAR01199.003 | Sediment | 0.21 | 5.28 |
| S11 | MAR01199.004 | Sediment | 1.21 | 8.88 |
| | | Reference Material (% Recovery) | 94 | 96 |
| | | QC Blank | <0.02 | <0.12 |

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01199
Issue Version 1
Customer Reference PH21037A Wicklow Harbour Sampling

| | | Units | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) |
|---|---|---|---|---|---|---|---|---|---|
| | | Method No | SOCOTEC Env Chem* | SOCOTEC Env Chem* | SOCOTEC Env Chem* | SOCOTEC Env Chem* | SOCOTEC Env Chem* | SOCOTEC Env Chem* | SOCOTEC Env Chem* |
| | | Limit of Detection | 0.5 | 0.2 | 2 | 2 | 1.2 | 2 | 3 |
| | | Accreditation | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Arsenic as As** | **Cadmium as Cd** | **Chromium as Cr** | **Copper as Cu** | **Lead as Pb** | **Nickel as Ni** | **Zinc as Zn** |
| S8 | MAR01199.001 | Sediment | 4.1 | 0.2 | 30.5 | 26.0 | 18.3 | 11.2 | 50.0 |
| S9 | MAR01199.002 | Sediment | 4.9 | 0.3 | 28.7 | 31.9 | 151 | 8.6 | 61.8 |
| S10 | MAR01199.003 | Sediment | 4.9 | <0.2 | 31.8 | 9.3 | 20.8 | 7.5 | 30.5 |
| S11 | MAR01199.004 | Sediment | 11.6 | <0.2 | 52.7 | 12.4 | 26.3 | 19.7 | 65.6 |
| Certified Reference Material 2702 (Measured Value) | | | 46.6 | 0.63 | 338 | 110 | 126 | 70.6 | 449 |
| Certified Reference Material 2702 (Certified Value) | | | 45.3 | 0.817 | 352 | 117.7 | 132.8 | 75.4 | 485.3 |
| Certified Reference Material 2702 (% Recovery) | | | 105 | 93 | 112 | 106 | 101 | 108 | 105 |
| QC Blank | | | <0.5 | <0.2 | <2 | <2 | <1.2 | <2 | <3 |

* See Report Notes
~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01199
Issue Version 1
Customer Reference PH21037A Wicklow Harbour Sampling

| | | Units | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) | mg/Kg (Dry Weight) |
|---|---|---|---|---|---|
| | | Method No | SOCOTEC Env Chem* | SOCOTEC Env Chem* | SOCOTEC Env Chem* |
| | | Limit of Detection | 0.01 | 10 | 2 |
| | | Accreditation | N | UKAS | N |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Mercury as Hg** | **Aluminium as Al** | **Lithium as Li** |
| S8 | MAR01199.001 | Sediment | 0.02 | 18100 | 22.1 |
| S9 | MAR01199.002 | Sediment | 0.03 | 19200 | 24.3 |
| S10 | MAR01199.003 | Sediment | <0.01 | 15800 | 17.9 |
| S11 | MAR01199.004 | Sediment | 0.03 | 39200 | 40.2 |
| Certified Reference Material 2702 (Measured Value) | | | 0.01 | 64671 | 73.3 |
| Certified Reference Material 2702 (Certified Value) | | | 0.04 | 84000 | 78.2 |
| Certified Reference Material 2702 (% Recovery) | | | 100 | 85 | 107 |
| QC Blank | | | <0.01 | <10 | <2 |

* See Report Notes
~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01199
Issue Version 1
Customer Reference PH21037A Wicklow Harbour Sampling

| | | Units | µg/Kg (Dry Weight) | |
|---|---|---|---|---|
| | | Method No | ASC/SOP/301 | |
| | | Limit of Detection | 1 | 1 |
| | | Accreditation | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **Dibutyltin (DBT)** | **Tributyltin (TBT)** |
| S8 | MAR01199.001 | Sediment | 12.8 | 33.9 |
| S9 | MAR01199.002 | Sediment | 18.5 | 89.1 |
| S10 | MAR01199.003 | Sediment | <5 | <5 |
| S11 | MAR01199.004 | Sediment | <5 | <5 |
| Certified Reference Material BCR-646 (Measured Value) | | | 742 | 275 |
| Certified Reference Material BCR-646 (Certified Value) | | | 770 | 480 |
| Certified Reference Material BCR-646 (% Recovery) | | | 96 | 57 |
| QC Blank | | | <1 | <1 |

* See Report Notes

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01199
Issue Version 1
Customer Reference PH21037A Wicklow Harbour Sampling

| | | Units | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
|---|---|---|---|---|---|---|---|---|
| | | Method No | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 |
| | | Limit of Detection | 1 | 1 | 1 | 1 | 1 | 1 |
| | | Accreditation | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **ACENAPTH** | **ACENAPHY** | **ANTHRACN** | **BAA** | **BAP** | **BBF** |
| S8 | MAR01199.001 | Sediment | <1 | 2.14 | 8.89 | 25.6 | 26.0 | 23.2 |
| S9 | MAR01199.002 | Sediment | 1.32 | 1.85 | 6.35 | 32.9 | 41.5 | 36.7 |
| S10 | MAR01199.003 | Sediment | <1 | <1 | 1.47 | 5.86 | 8.71 | 8.58 |
| S11 | MAR01199.004 | Sediment | <1 | <1 | 1.51 | 3.67 | 4.37 | 5.09 |
| Certified Reference Material QPH103MS (Measured Value) | | | 23.3 | 35.9 | 100 | 271 | 276 | 314 |
| Certified Reference Material QPH103MS (Certified Value) | | | 35.3 | 37.3 | 121 | 359 | 350 | 418 |
| Certified Reference Material QPH103MS (% Recovery) | | | 66 | 96 | 83 | 75 | 79 | 75 |
| QC Blank | | | <1 | <1 | <1 | <1 | <1 | <1 |

For full analyte name see method summaries
~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.
As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01199
Issue Version 1
Customer Reference PH21037A Wicklow Harbour Sampling

| | | Units | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
|---|---|---|---|---|---|---|---|---|
| | | Method No | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 |
| | | Limit of Detection | 1 | 1 | 1 | 1 | 1 | 1 |
| | | Accreditation | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **BENZGHIP** | **BKF** | **CHRYSENE** | **DBENZAH** | **FLUORANT** | **FLUORENE** |
| S8 | MAR01199.001 | Sediment | 16.0 | 14.5 | 26.8 | 3.03 | 46.6 | 1.91 |
| S9 | MAR01199.002 | Sediment | 27.9 | 18.5 | 36.3 | 5.91 | 52.7 | 2.46 |
| S10 | MAR01199.003 | Sediment | 6.49 | 4.77 | 7.21 | 1.70 | 7.16 | 1.13 |
| S11 | MAR01199.004 | Sediment | 4.27 | 3.06 | 5.00 | <1 | 6.98 | 1.12 |
| Certified Reference Material QPH103MS (Measured Value) | | | 246 | 147 | 360 | 40.3 | 681 | 55.9 |
| Certified Reference Material QPH103MS (Certified Value) | | | 267 | 193 | 447 | 54.4 | 933 | 71.7 |
| Certified Reference Material QPH103MS (% Recovery) | | | 92 | 76 | 81 | 74 | 73 | 78 |
| QC Blank | | | <1 | <1 | <1 | <1 | <1 | <1 |

For full analyte name see method summaries
~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.
As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01199
Issue Version 1
Customer Reference PH21037A Wicklow Harbour Sampling

| | | Units | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
|---|---|---|---|---|---|---|---|
| | | Method No | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/304 | ASC/SOP/303/306 |
| | | Limit of Detection | 1 | 1 | 1 | 1 | 100 |
| | | Accreditation | UKAS | UKAS | N* | UKAS | N |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **INDPYR** | **NAPTH** | **PHENANT** | **PYRENE** | **THC** |
| S8 | MAR01199.001 | Sediment | 17.8 | 2.83 | 15.2 | 46.6 | 24300 |
| S9 | MAR01199.002 | Sediment | 30.1 | 4.49 | 15.0 | 52.1 | 34800 |
| S10 | MAR01199.003 | Sediment | 7.68 | 1.97 | 4.61 | 6.90 | 12000 |
| S11 | MAR01199.004 | Sediment | 4.61 | 2.42 | 4.85 | 6.95 | 10100 |
| Certified Reference Material QPH103MS (Measured Value) | | | 234 | 103 | 338 | 593 | NA |
| Certified Reference Material QPH103MS (Certified Value) | | | 274 | 115 | 510 | 794 | NA |
| Certified Reference Material QPH103MS (% Recovery) | | | 85 | 90 | 66 | 75 | 95~ |
| QC Blank | | | <1 | <1 | <1 | <1 | <1 |

For full analyte name see method summaries
~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.
As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01199
Issue Version 1
Customer Reference PH21037A Wicklow Harbour Sampling

| | | Units | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
|---|---|---|---|---|---|---|---|---|---|
| | | Method No | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 |
| | | Limit of Detection | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 |
| | | Accreditation | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **PCB28** | **PCB52** | **PCB101** | **PCB118** | **PCB138** | **PCB153** | **PCB180** |
| S8 | MAR01199.001 | Sediment | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 |
| S9 | MAR01199.002 | Sediment | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 |
| S10 | MAR01199.003 | Sediment | 1.38 | 0.25 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 |
| S11 | MAR01199.004 | Sediment | 0.20 | <0.08 | <0.08 | 0.12 | 0.12 | 0.13 | <0.08 |
| Certified Reference Material QOR147 MS (Measured Value) | | | 1.03 | 1.25 | 1.60 | 0.91 | 1.86 | 2.41 | 1.27 |
| Certified Reference Material QOR147 MS (Certified Value) | | | 1.37 | 1.38 | 1.72 | 1.04 | 1.89 | 2.47 | 1.26 |
| Certified Reference Material QOR147 MS (% Recovery) | | | 75 | 90 | 93 | 87 | 98 | 97 | 101 |
| QC Blank | | | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 |

For full analyte name see method summaries
~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01199
Issue Version 1
Customer Reference PH21037A Wicklow Harbour Sampling

| | | Units | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) | µg/Kg (Dry Weight) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Method No | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 | ASC/SOP/302 |
| | | Limit of Detection | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | | Accreditation | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS | UKAS |
| **Client Reference:** | **SOCOTEC Ref:** | **Matrix** | **AHCH** | **BHCH** | **GHCH** | **DIELDRIN** | **HCB** | **DDE** | **DDT** | **DDD** |
| S8 | MAR01199.001 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 0.12 |
| S9 | MAR01199.002 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 0.10 | <0.1 |
| S10 | MAR01199.003 | Sediment | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 0.45 | <0.1 |
| S11 | MAR01199.004 | Sediment | <0.1 | <0.1 | <0.1 | 0.16 | <0.1 | 0.10 | <0.1 | 0.10 |
| Certified Reference Material QOR147 MS (Measured Value) | | | 0.01 | 0.03 | 0.03 | 0.75 | 1.14 | 0.39 | 0.07 | 0.19 |
| Certified Reference Material QOR147 MS (Certified Value) | | | NA | NA | NA | 0.69 | 1.29 | 0.42 | NA | 0.30 |
| Certified Reference Material QOR147 MS (% Recovery) | | | 117~ | 94~ | 113~ | 109 | 88 | 93 | 116~ | 62 |
| QC Blank | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |

For full analyte name see method summaries
~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01199
Issue Version 1
Customer Reference PH21037A Wicklow Harbour Sampling

## REPORT NOTES

| Method Code | Sample ID | The following information should be taken into consideration when using the data contained within this report |
|---|---|---|
| SOCOTEC Env Chem* | MAR01199.003-004 | Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252. |
| SOCOTEC Doncaster* | MAR01199.003-004 | Analysis was conducted by an internal SOCOTEC laboratory. |
| SUB_01* | MAR01199.003-004 | Analysis was conducted by an approved subcontracted laboratory. |
| ASC/SOP/301 | MAR01199.003-004 | The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted, but in doing so, the detection limit for this test has been elevated. |
| ASC/SOP/303/304 | MAR01199.001-004 | Chrysene is known to coelute with Triphenylene and these peaks can not be resolved. It is believed Triphenylene is present in these samples therefore it is suggested that the Chrysene results should be taken as a Chrysene (inc. Triphenylene).This should be taken into consideration when utilising the data. |
| ASC/SOP/303/304 | MAR01199.001-004 | The Primary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. The remaining data gives the Laboratory confidence that the test has performed satisfactorily and that the validity of the data may not have been significantly affected.However in line with our QMS policy we have removed accreditation, where applicable, from the affected analytes (PHENANT) . These circumstances should be taken into consideration when utilising the data. |

## DEVIATING SAMPLE STATEMENT

| Deviation Code | Deviation Definition | Sample ID | Deviation Details. The following information should be taken into consideration when using the data contained within this report |
|---|---|---|---|
| D1 | Holding Time Exceeded | N/A | N/A |
| D2 | Handling Time Exceeded | N/A | N/A |
| D3 | Sample Contaminated through Damaged Packaging | N/A | N/A |
| D4 | Sample Contaminated through Sampling | N/A | N/A |
| D5 | Inappropriate Container/Packaging | N/A | N/A |
| D6 | Damaged in Transit | N/A | N/A |
| D7 | Insufficient Quantity of Sample | N/A | N/A |
| D8 | Inappropriate Headspace | N/A | N/A |
| D9 | Retained at Incorrect Temperature | N/A | N/A |
| D10 | Lack of Date & Time of Sampling | N/A | N/A |
| D11 | Insufficient Sample Details | N/A | N/A |
| D12 | Sample integrity compromised or not suitable for analysis | N/A | N/A |

# Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Advanced Chemistry and Research, Etwall House, Bretby Business Park, Ashby Road, Burton-upon-Trent DE15 0YZ

Test Report ID MAR01199
Issue Version 1
Customer Reference PH21037A Wicklow Harbour Sampling

| Method | Sample and Fraction Size | Method Summary |
|---|---|---|
| Total Solids | Wet Sediment | Calculation (100%-Moisture Content).Moisture content determined by drying a portion of the sample at 120°C to constant weight. |
| Particle Size Analysis | Wet Sediment | Wet and dry sieving followed by laser diffraction analysis. |
| Total Organic Carbon (TOC) | Air dried and seived to <2mm | Carbonate removal and sulphurous acid/combustion at 1600°C/NDIR. |
| Carbonate | Air dried and seived to <2mm | Quantitative digestion with Hydrochloric Acid back titration with 1M Sodium Hydroxide to pH 7 |
| Metals | Air dried and seived to <2mm | HF/Boric extraction followed by ICP analysis. |
| Organotins | Wet Sediment | Solvent extraction and derivatisation followed by GC-MS analysis. |
| Polyaromatic Hydrocarbons (PAH) | Wet Sediment | Solvent extraction and clean up followed by GC-MS analysis. |
| Total Hydrocarbon Content (THC) | Wet Sediment | Solvent extraction and clean up followed by GC-FID analysis. |
| Polychlorinated Biphenyls (PCBs) | Air dried and seived to <2mm | Solvent extraction and clean up followed by GC-MS-MS analysis. |
| Organochlorine Pesticides (OCPs) | Air dried and seived to <2mm | Solvent extraction and clean up followed by GC-MS-MS analysis. |

| Analyte Definitions | | | | | |
|---|---|---|---|---|---|
| Analyte Abbreviation | Full Analyte name | Analyte Abbreviation | Full Analyte name | Analyte Abbreviation | Full Analyte name |
| ACENAPTH | Acenaphthene | C2N | C2-naphthalenes | THC | Total Hydrocarbon Content |
| ACENAPHY | Acenaphthylene | C3N | C3-naphthalenes | AHCH | alpha-Hexachlorcyclohexane |
| ANTHRACN | Anthracene | CHRYSENE | Chrysene | BHCH | beta-Hexachlorcyclohexane |
| BAA | Benzo[a]anthracene | DBENZAH | Dibenzo[ah]anthracene | GHCH | gamma-Hexachlorcyclohexane |
| BAP | Benzo[a]pyrene | FLUORANT | Fluoranthene | DIELDRIN | Dieldrin |
| BBF | Benzo[b]fluoranthene | FLUORENE | Fluorene | HCB | Hexachlorobenzene |
| BEP | Benzo[e]pyrene | INDPYR | Indeno[1,2,3-cd]pyrene | DDD | p,p'-Dichlorodiphenyldichloroethane |
| BENZGHIP | Benzo[ghi]perylene | NAPTH | Naphthalene | DDE | p,p'-Dichlorodiphenyldichloroethylene |
| BKF | Benzo[k]fluoranthene | PERYLENE | Perylene | DDT | p,p'-Dichlorodiphenyltrichloroethane |
| C1N | C1-naphthalenes | PHENANT | Phenanthrene | | |
| C1PHEN | C1-phenanthrene | PYRENE | Pyrene | | |

## Appendix 3 – Sample Stakeholder Consultation Letter

An Taisce
Co. Dublin
Ireland

*[Date]*
*[WCC Reference]:*

**Re: Investigation of Disposal at Sea Sites for Wicklow Harbour Maintenance Dredging Candidate Disposal Sites for Initial Stakeholder Feedback**

To Whom it May Concern,

Wicklow County Council (WCC) is required to undertake periodic maintenance dredging works within the Wicklow Harbour, which is subject to natural accretion of sandy and silty material, to maintain safe navigation. To facilitate this activity in the long term, WCC is investigating a suitable disposal at sea site located within a reasonable distance from Wicklow Harbour. WCC have reviewed a number of options for dredge material disposal, including beach nourishment or landfill cover, but has been found that the most practical environmental option is disposal at sea.

## Dredging and Disposal Requirements

The quantities of dredge material are presented below in dry tonnes, for the period 2025 to 2032. Two potential methods of dredging are proposed for offshore disposal, including Trailer Suction Hopper Dredger (TSHD) and mechnical dredging, Both methods would discharge vai bottom doors in the transport vessels. A maximum 2-week programme is anticipated for each offshore disposal occasion; however this period may be longer based on the volume to be dredged and the size of the plant available.

| Primary Year |
|---|
| Secondary Year |

| Method of Dredging | Unit | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| TSHD/ Mechanical | Dry tonnes | 80,850 | 23,100 | 23,100 | 46,200 | 23,100 | 23,100 | 46,200 | 23,100 | 288,750 |

All dredge site material has been chemically tested via sediment sampling, no threshold levels were exceeded for the parameters tested (heavy metals, Dibutyltin, Tributyltin, Polyaromatic Hydrocarbons, Total Hydrocarbons, Polychlorinated Biphenyls, and Organochlorinated pesticides) and therefore the material is not considered to be contaminated.

Based on the size of dredgers to be employed for the dredging operations at the Wicklow Harbour, an offshore disposal site of approximately 700m x 500m is considered suitable.

## Desk-top Review & Exclusionary Mapping

Ayesa, in partnership with AQUAFACT, were commissioned to undertake the initial and high-level desk-based investigation to identify potential offshore disposal sites, via a process of exclusion mapping and process of elimination. Four key areas of consideration with regards to exclusion/restriction areas were:

1. **Ecological considerations**, including Protected Sites, areas designated under the Water Framework Directive (WFD)areas of key commercial fishing efforts, spawning/nursery grounds and sensitive substrate/habitat types.
2. **Commercial and Infrastructure considerations**, including the presence of renewable energy sites along the east coast of Ireland, shipping/navigation concerns, and engineering uses of the seabed (i.e., cables, pipelines).
3. **Industrial considerations**, including intake and outfall systems.
4. **Social & cultural considerations,** including recorded shipwrecks, and areas of recreational use (i.e., beaches, swimming zones etc.).

The following were important datasets informing this process:

- Previous marine ecology survey data undertaken off the coast of Wicklow in assessing disposal sites previously, or for other offshore projects.
- EPA database information regarding areas of importance for ecological conservation, including Marine Protected Areas (MPAs), Natura 2000 Protected Sites and Natural Heritage Sites.
- Water Frame Work Directive information regarding areas designated under the WFD (2000/60/EC), the Shellfish Waters Directive (79/923/EEC) and the Bathing Waters Directive (76/160/EEC).
- Areas of commercial and recreational fishing (including aquaculture sites). Data/information was obtained from the Marine Atlas, the Sea Fisheries Protection Authority (SFRA), the Bord Iascaigh Mhara (BIM) and the Marine Institute (MI).
- Spawning, feeding and nursery grounds and migration routes of commercially important fisheries from the Marine Atlas.
- Areas of commercial, industrial and/or infrastructural importance, including renewable energy sites, engineering uses of the seafloor such as undersea cables and pipelines, seabed extraction areas, oil and gas Lease/Licence areas, shipping lanes and intake sites for industrial uses from data.gov, or through consultation.
- Underwater archaeology records through the Shipwreck Inventory and Heritage Maps.

**Key Constraints Identified**

On completion of the desktop review and exclusion mapping exercise, and as outlined in the previous section, three key constraints/ restrictions were identified that provided the greatest influence into the locations of the potential candidate sites. These include:

1. Sensitive substrate / habitat type: Presence of *Sabellaria alveolata* (honeycomb worm) reef, the reef-forming polychaete present in coarse/mixed sediment substrate. The Wicklow Reef may be the only known example of this substrate off the Irish and British coast. It is considered to support significant ecological biodiversity. Additionally, *Sabellaria spinulosa* (Ross Worm) reef is also known from the area.
2. Mussel seed dredging: SFPA note the importance of the coastline for seed mussel recruitment, with beds fished since 1970. The majority of beds are focused south and north of Wicklow Head (the centre of this investigations Study Area).
3. The association between whelk and brown crab fisheries in the Irish Sea is multi-faceted. Ecologically, both species are part of the benthic community, living at the bottom of the sea.

Their habitats often overlap, and the pots used in their fisheries can affect the same areas and species, making the management of these fisheries interdependent.

Where possible, whilst keeping in mind the practicalities of distance and the long-term sustainable use of the offshore site, the selected candidate sites avoid areas considered sensitive for the above key considerations.

The Exclusionary Mapping has been included in Attachment 2.

**Candidate Sites Identified**

Three candidate sites (see Attachment 1 for figure) were identified as being potentially suitable for placement of the dredged material.

| Site | ITM Coordinates | Depth Range | Approximate Distance from Dredge Site | Approximate Distance from Nearest Shoreline |
|---|---|---|---|---|
| **Site 1** | 734260,702845 | 11-28m | 9.0km | 2.5km |
| **Site 2** | 733039,697514 | 10-13m | 3.0km | 2.0km |
| **Site 3** | 739889,685683 | 13-23m | 12.0km | 7.5km |

Our evaluation of each candidate sites against the ecological, industrial and infrastructure considerations mentioned above is included in Attachment 3. Additionally included is a high-level review of local hydrodynamic conditions in each of the candidate site locations, with commentary on the likely direction of resulting sediment plumes.

**Closing Statement**

As is required of the Environment Protection Agency (EPA) in the process of identifying potential offshore sites, we are now at the stage where we'd like to seek feedback from key stakeholders regarding the candidate sites proposed above. Thereafter, appropriate detailed investigations and studies (i.e., bathymetric surveys, ecology surveys, hydrodynamic modelling), will be undertaken as part of the permitting process of the chosen site.

We appreciate any feedback you have on the candidate sites, as well as any data/information that would further inform our investigations into these sites. If you could return any comments by Friday 7th June 2024, that'll be appreciated.

Yours sincerely

Marc Devereux,
Senior Engineer
For Wicklow County Council

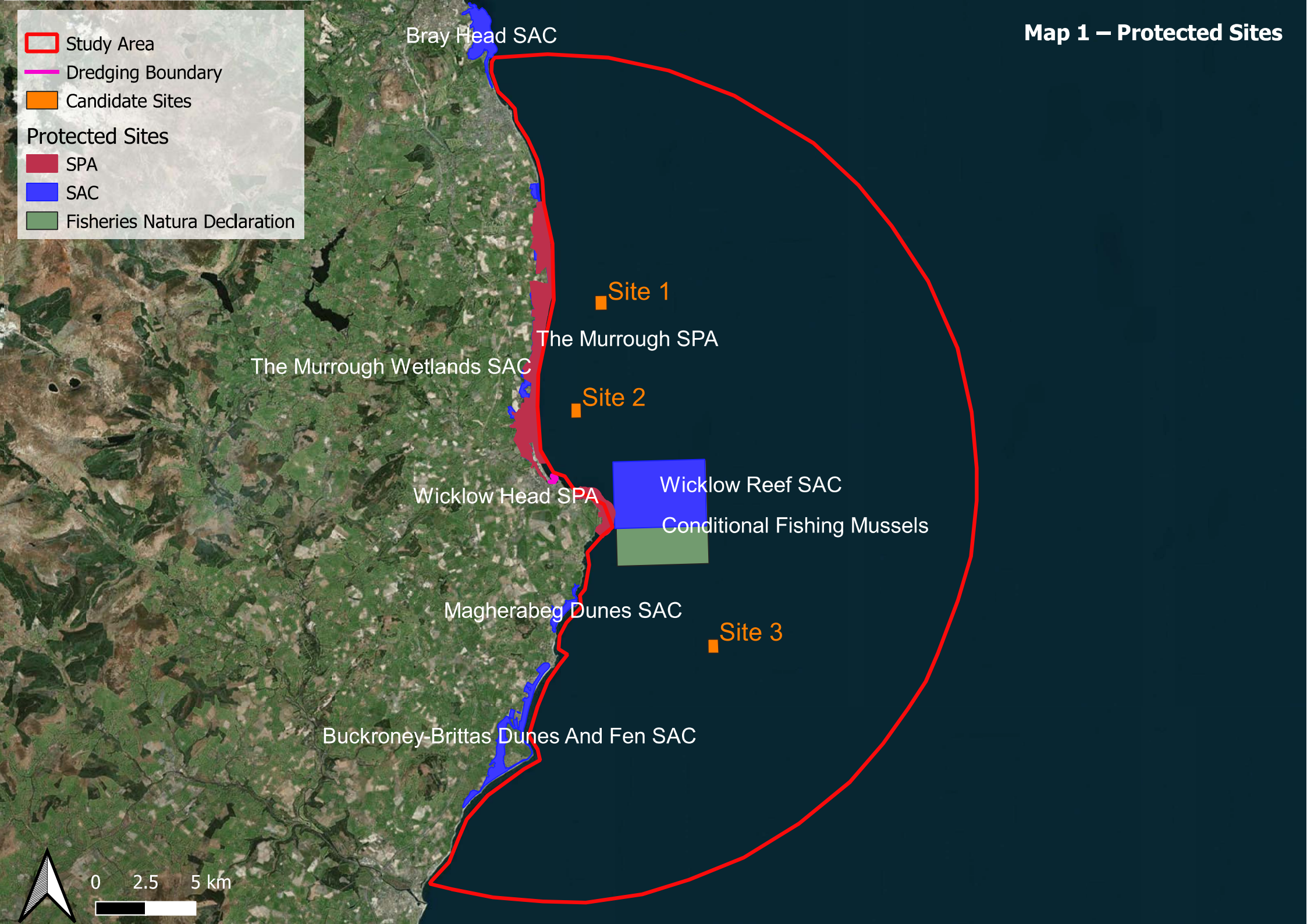
**Attachment 1:** Candidate Sites

**Attachment 2:** Exclusionary Mapping

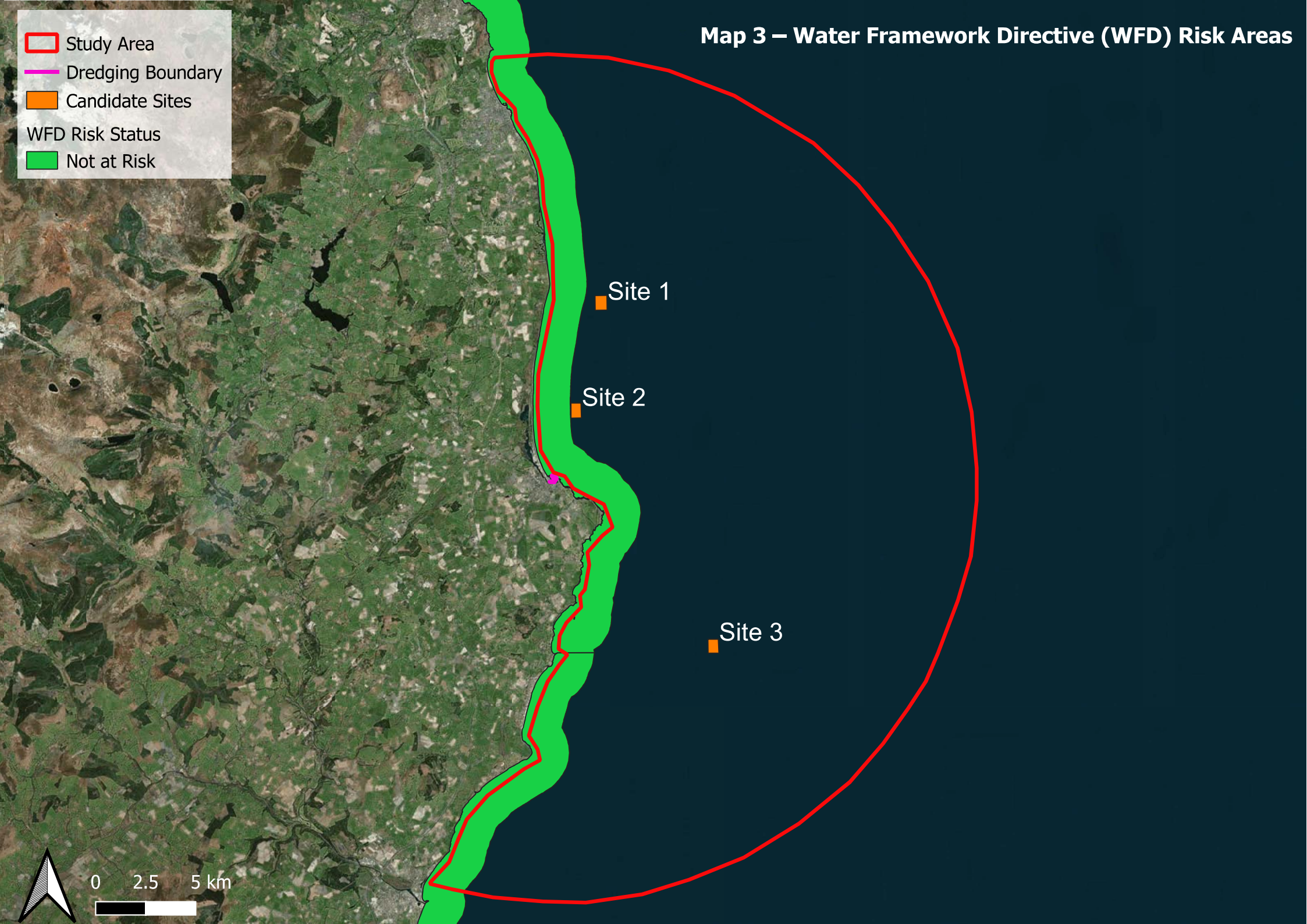
**Attachment 3:** Evaluation of Candidate Sites against ecological, industrial and infrastructure considerations.

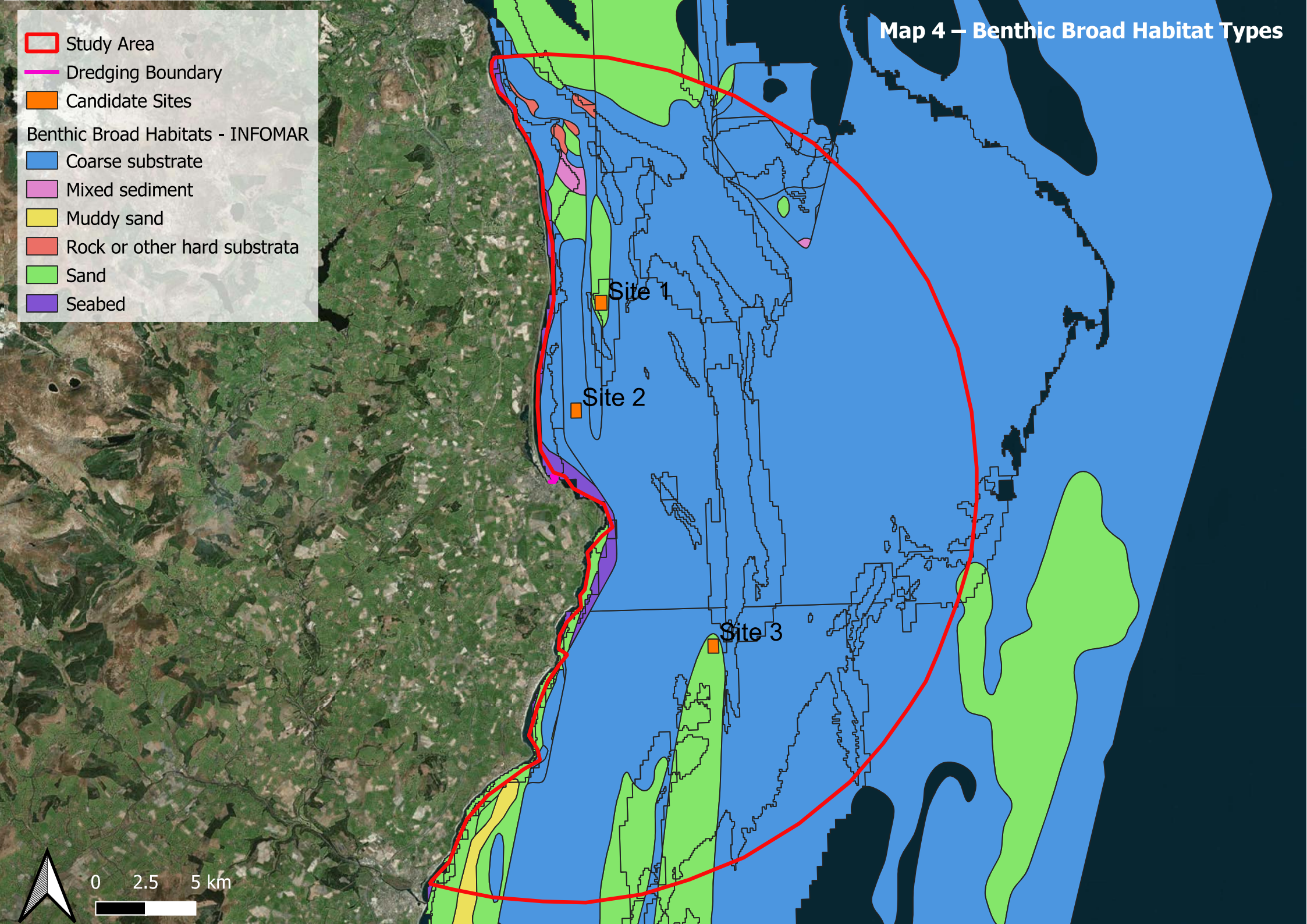
**Attachment 1: Candidate Disposal at Sea Sites**

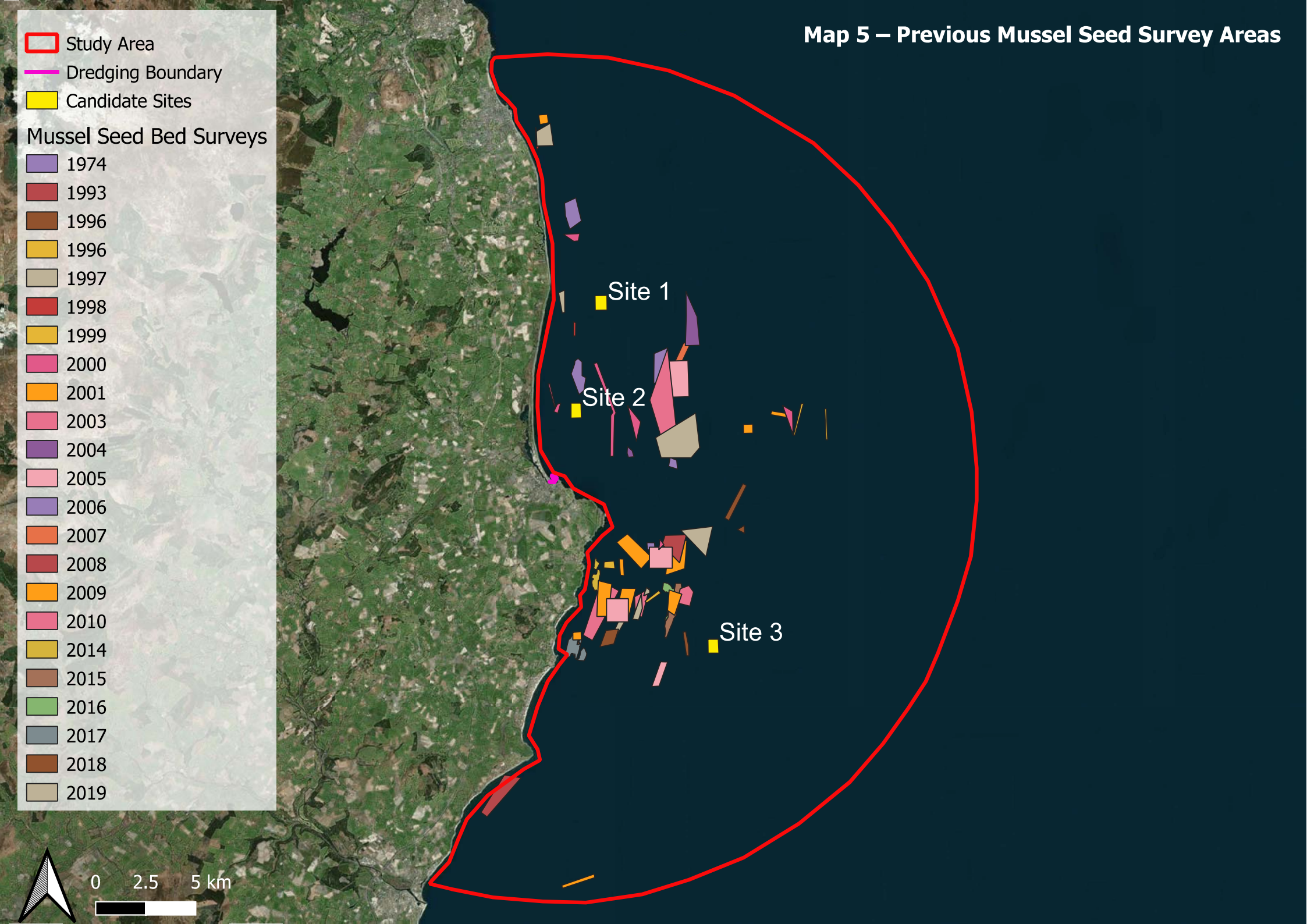
## Attachment 2: Exclusionary Mapping

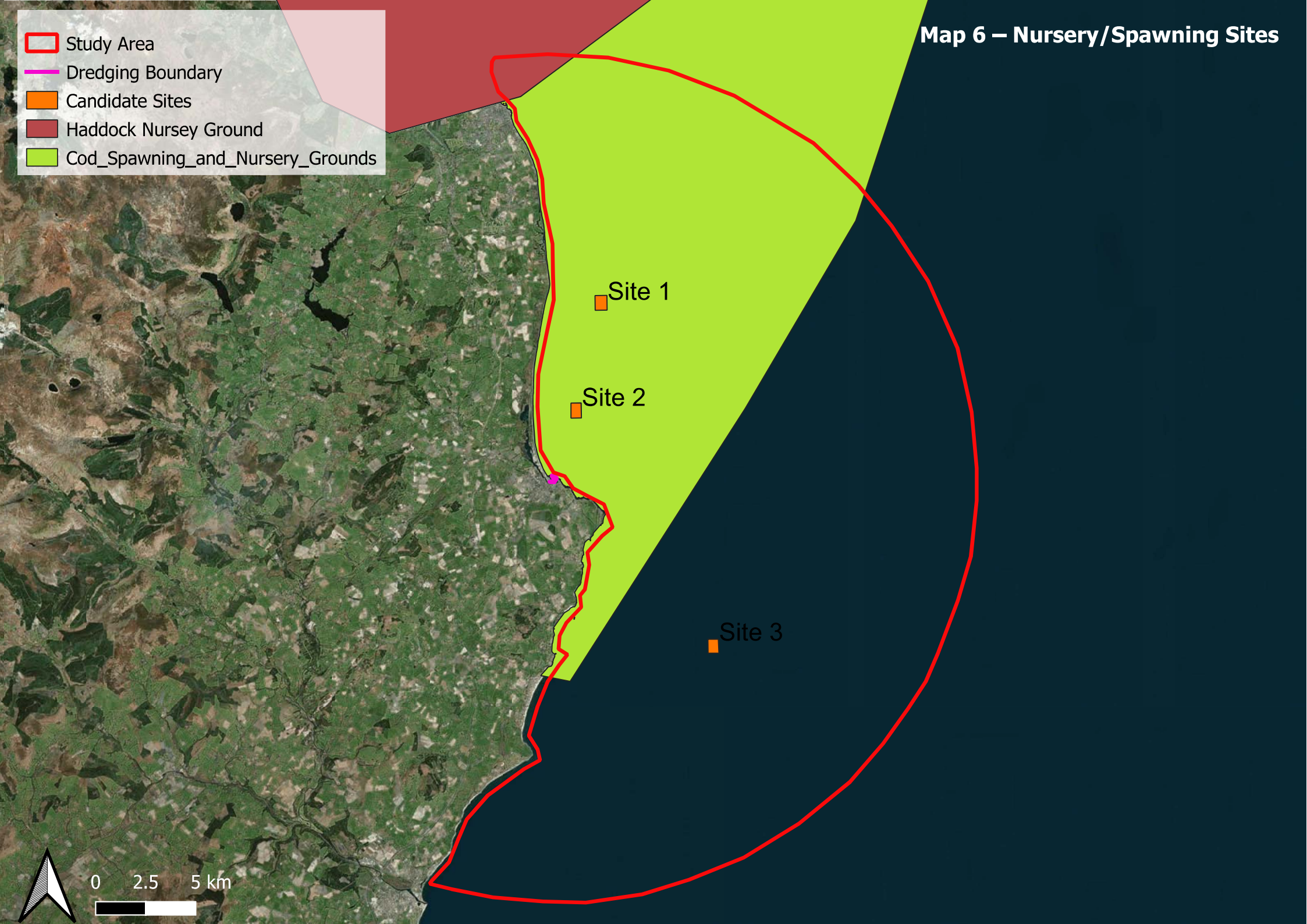

Study Area
Dredging Boundary
Candidate Sites
Protected Sites
SPA
SAC
Fisheries Natura Declaration
Map 1 – Protected Sites
Bray Head SAC
Site 1
The Murrough SPA
The Murrough Wetlands SAC
Site 2
Wicklow Reef SAC
Wicklow Head SPA
Conditional Fishing Mussels
Magherabeg Dunes SAC
Site 3
Buckroney-Brittas Dunes And Fen SAC
0
2.5
5 km

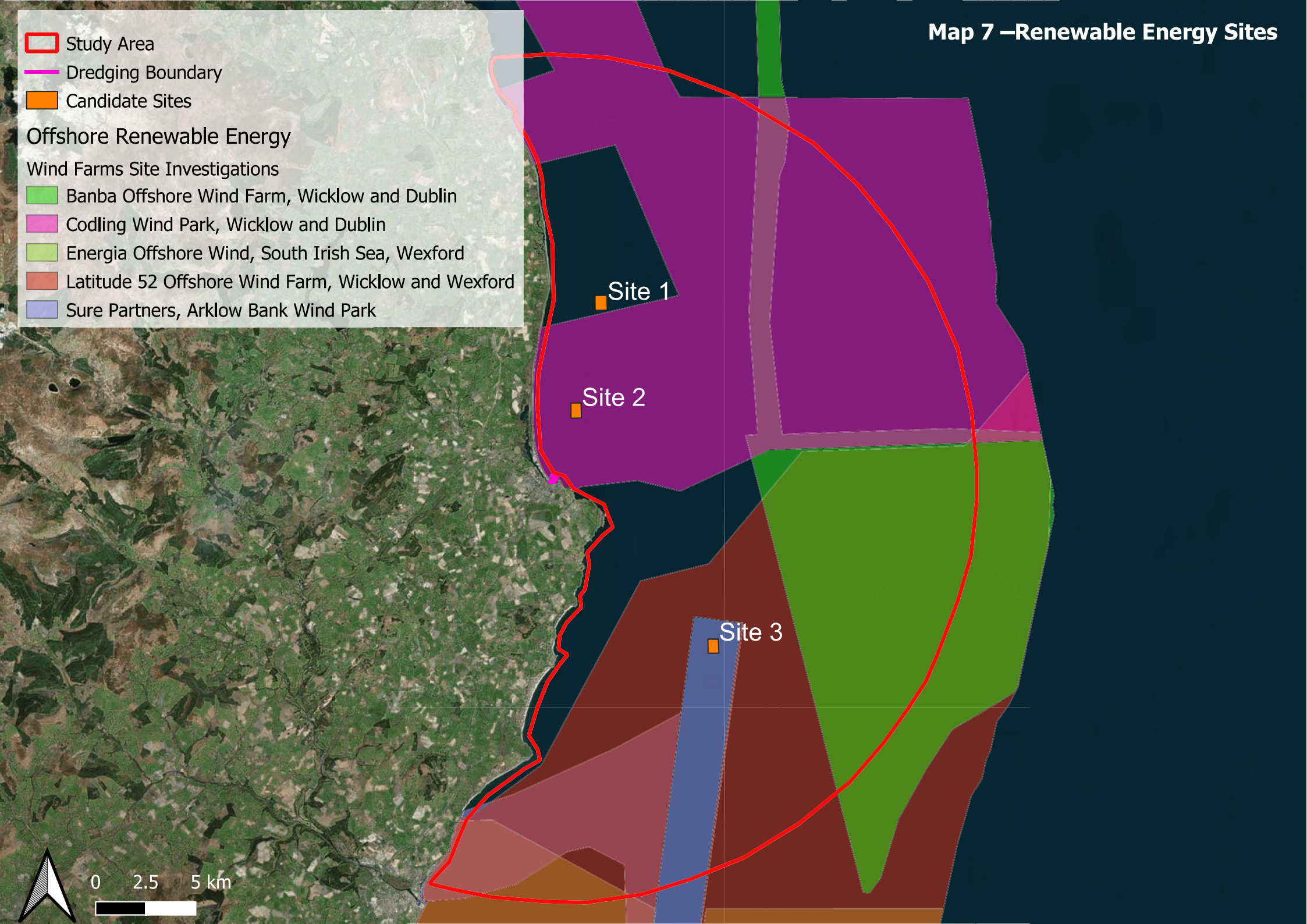

Map 2 – Water Framework Directive (WFD) Status Areas
Study Area
Dredging Boundary
Candidate Sites
WFD Status 2016-2021
High
Site 1
Site 2
Site 3
0
2.5
5 km


Map 3 – Water Framework Directive (WFD) Risk Areas
Study Area
Dredging Boundary
Candidate Sites
WFD Risk Status
Not at Risk
Site 1
Site 2
Site 3
0
2.5
5 km

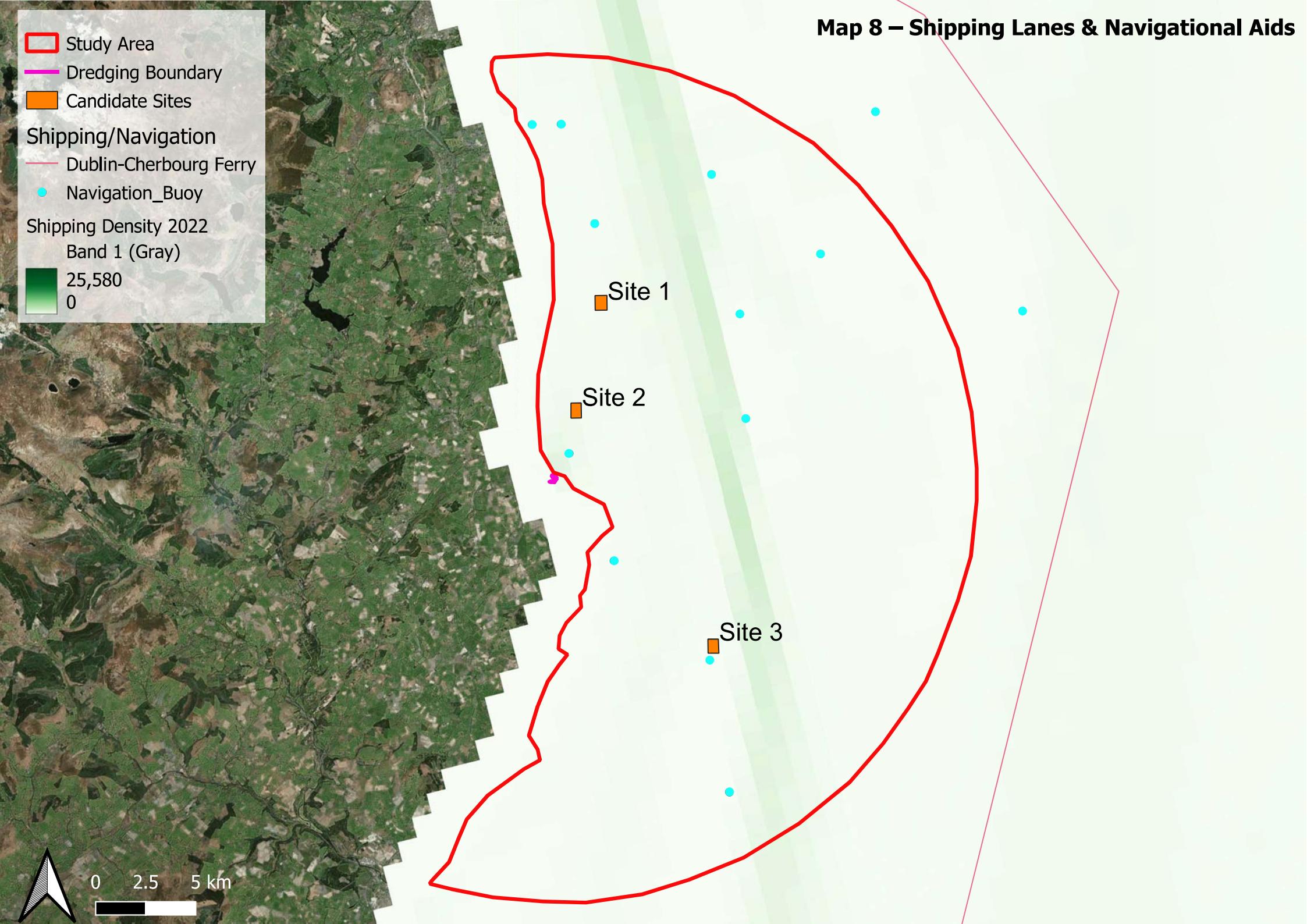

Map 4 – Benthic Broad Habitat Types
Study Area
Dredging Boundary
Candidate Sites
Benthic Broad Habitats - INFOMAR
Coarse substrate
Mixed sediment
Muddy sand
Rock or other hard substrata
Sand
Seabed
Site 1
Site 2
Site 3
0
2.5
5 km

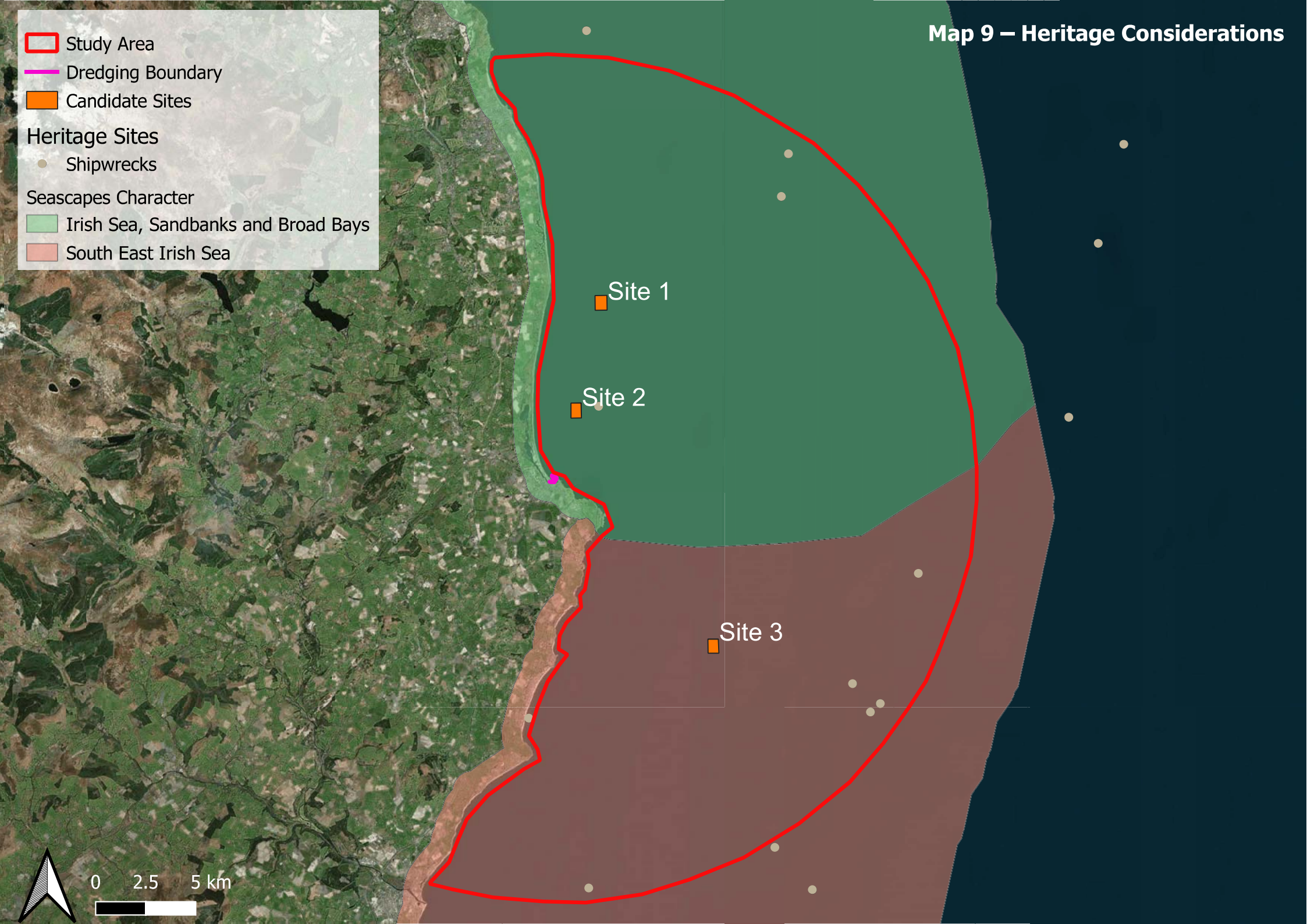

Map 5 – Previous Mussel Seed Survey Areas
Study Area
Dredging Boundary
Candidate Sites
Mussel Seed Bed Surveys
1974
1993
1996
1996
1997
1998
1999
2000
2001
2003
2004
2005
2006
2007
2008
2009
2010
2014
2015
2016
2017
2018
2019
Site 1
Site 2
Site 3
0
2.5
5 km


Map 6 – Nursery/Spawning Sites
Study Area
Dredging Boundary
Candidate Sites
Haddock Nursey Ground
Cod_Spawning_and_Nursery_Grounds
Site 1
Site 2
Site 3
0
2.5
5 km


Map 7 –Renewable Energy Sites
Study Area
Dredging Boundary
Candidate Sites
Offshore Renewable Energy
Wind Farms Site Investigations
Banba Offshore Wind Farm, Wicklow and Dublin
Codling Wind Park, Wicklow and Dublin
Energia Offshore Wind, South Irish Sea, Wexford
Latitude 52 Offshore Wind Farm, Wicklow and Wexford
Sure Partners, Arklow Bank Wind Park
Site 1
Site 2
Site 3
0
2.5
5 km

# Map 8 – Shipping Lanes & Navigational Aids




Map 9 – Heritage Considerations
Study Area
Dredging Boundary
Candidate Sites
Heritage Sites
Shipwrecks
Seascapes Character
Irish Sea, Sandbanks and Broad Bays
South East Irish Sea
Site 1
Site 2
Site 3
0
2.5
5 km

**Attachment 3: Evaluation of Candidate Sites against ecological, industrial and infrastructure considerations.**

| Considerations | Site 1 | Site 2 | Site 3 |
|---|---|---|---|
| **Protected Sites**<br><br>**See Map 1 in Attachment 2.** | Located ca. 2.2 km from the closest SAC and SPA (The Murrough Wetlands SAC and The Murrough SPA). | Located ca. 1.7 km from the closest SAC and SPA (The Murrough Wetlands SAC and The Murrough SPA). | Located ca. 7.0 km from the closest SACs (The Wicklow Reef SAC and Magherabeg Dunes SAC). |
| | With respect to the hydrodynamics of this part of the Irish Sea, both proposed Sites 1 and 3 are likely to have strong currents. Site 2 will have relatively weaker currents and as a result will have longer period of time for deposition. The sediment plume throughout the study area is likely to extend southward, so it is unlikely that the plume from Site 3 will reach the Wicklow Reef SAC site, or the reef areas located to the north of this SAC. Similarly, the plume from Site 1 is unlikely reach the SAC or reef areas, considering the distances involved. The plume from Site 2 may partially pass through the Wicklow Reef SAC and reef areas, however considering that the current speed at the reef site and SAC will be relatively strong, heavy deposition at the SAC site will be unlikely. | | |
| **Ecologically Significant Sites**<br><br>**See Map 1 in Attachment 2.** | All of the abovementioned match boundaries with the corresponding SACs or SPAs above, and therefore the same conclusions apply. | | |
| **Water Framework Directive (WFD) Status and Risk**<br><br>**See Maps 2 and 3 in Attachment 2.** | Located 470m from the eastern boundary of the Coastal Waterbody Southwestern Irish Sea – Killiney Bay (Code IE_EA_100_0000). Therefore, the disposal operations pose some risk to its ability to meet the required ecological thresholds. | Located 20m from the eastern boundary of the Coastal Waterbody Southwestern Irish Sea – Killiney Bay (Code IE_EA_100_0000). Therefore, the disposal operations pose some risk to its ability to meet the required ecological thresholds. | Located ca. 5.3 km from the eastern boundary of the Coastal Waterbody Southwestern Irish Sea – Killiney Bay (Code IE_EA_100_0000). Therefore, the disposal provides minimal risk to its ability to meet the required ecological thresholds. |
| | As outlined further in Section **Error! Reference source not found.** regarding hydrodynamic conditions in the study area depositional conditions are anticipated to only occur for a very limited period over the tidal cycle given the strong tidal currents at Site 1 and 3. With regards to Site 2, weaker currents exist and therefore the plume will have a longer period for deposition. However, plumes from each of the candidate sites are anticipated to extend southward and therefore cause minimal effect to the WFD zone. | | |
| **Sensitive Substrate/Habitat Types**<br><br>**See Map 4 in Attachment 2.** | The priority habitat for *Sabellaria* reef (SS.SBR.PoR.SspiMx -*Sabellaria spinulosa* on stable circalittoral mixed sediment) has been identified in areas to the north of the Wicklow Reef SAC and extending over the location of the discontinued Wicklow dredge disposal site.<br><br>The tube-building polychaete *Sabellaria spinulosa* occurs in this biotope at high abundances on mixed sediment. These species typically forms loose agglomerations of tubes forming a low-lying matrix of sand, gravel, mud and tubes on the seabed. The infauna comprises typical sublittoral polychaete species such as *Protodorvillea kefersteini*, *Pholoe* spp., *Harmothoe* spp, *Scoloplos armiger, Mediomastus fragilis, Lanice conchilega* and cirratulids, together with the bivalve *Abra alba*, and tube building amphipods such as *Ampelisca* spp. The epifauna comprise a variety of bryozoans including *Flustra foliacea, Alcyonidium diaphanum* and *Cellepora pumicosa*, in addition to | | |

| | | | |
|---|---|---|---|
| | calcareous tubeworms, pycnogonids, hermit crabs and amphipods. The reefs formed by *Sabellaria* consolidate the sediment and allow the settlement of other species not found in adjacent habitats leading to a diverse community of epifaunal and infauna species. The development of such reefs is assisted by the settlement behaviour of larval *Sabellaria* which are known to selectively settle in areas of suitable sediment and particularly on existing *Sabellaria* tubes.These reefs are particularly affected by dredging or trawling and in heavily dredged or disturbed areas an impoverished community may be left (e.g. SS.SCS.CCS.Pkef) particularly if the activity or disturbance is prolonged. However, it is likely that reefs of *Sabellaria spinulosa* can recover quite quickly from short-term or intermediate levels of disturbance as found by Vorberg (2000) in the case of disturbance from shrimp fisheries and recovery will be accelerated if some of the reef is left intact following disturbance as this will assist larval settlement of the species. (Information from Tillin *et al.,* 2018).<br><br>As this biotope is typically found in areas with strong currents and high water movement, they tend to occur in areas with mixed and coarse sediment. As such they are not typically found in locations were fine sand is deposited. This aided in the selection of sites where it is unlikely to be disposing of dredged material over *Sabellaria* reef, and Sites 1 and 3 are in these broad substrate types. Site 2 is located in an area where the biotope SS.SCS.CCS.SpiB – *Spirobranchus triqueter* with barnacles and bryozoans on unstable circalittoral cobbles and pebbles has been recorded. However, as it is a location with coarse or mixed sediment substrate, it is potentially suitable for *Sabellaria* reef and therefore drop-down video surveys would be required prior to any benthic grabbing surveys to confirm presence or absence.<br><br>Sites 1 and 3 are sufficient distance from the areas of *Sabellaria* reef for any sedimentation to be classified as heavy siltation over the reef habitat. Site 2 is located to the north of the *Sabellaria spinulosa* reef area of the original dredge disposal site which may experience light siltation from the sediment plume. Benthic surveys would be required to determine the extent of this reef area and its proximity to or presence in Site 2 before it became the final selection. | | |
| **Mussel Seed**<br><br>**See Map 5 in Attachment 2.** | Site does not occur in proximity to any mussel seed fishery. | Mussel seed harvesting sites (dated 1972 and 2000) are located within 450m from this Site. | Site does not occur in proximity to any mussel seed fishery. |
| **Whelk Fisheries** | Whelk is fished extensively in a 21 km zone along the east coast of Ireland, and all sites fall within this zone. | | |
| **Pot Fishing (Brown Crab)** | None of the candidate sites appear to occur within areas of offshore pot fishing efforts. | | |
| **Inshore and Offshore Fishing** | See table overleaf for a review of the candidate sites in relation to inshore and offshore fishing areas. | | |
| **Nursery / Spawning Sites**<br><br>**See Map 6 in Attachment 2.** | The Atlantic cod (Gadus morhua) is a primarily demersal fish that can exhibit pelagic behaviours under certain conditions, such as feeding or spawning. It inhabits a wide range from shallow shorelines to depths of up to 600 m. Notably, the Irish Sea cod population spawns at two main sites in the western and eastern Irish Sea between February and April. This stock has historically been vital for commercial fisheries, but recent decades have seen a decline in spawning stock biomass (SSB) and productivity, leading to decreased fish landings. Spawning occurs from December to June.<br>The cod spawning areas are not considered a significant constraint to the choice of disposal site, as cod eggs float within the water column and lie suspended at the halocline. | | |

| | | | |
|---|---|---|---|
| **Renewable Energy**<br><br>**See Map 7 in Attachment 2.** | Not located within an area designated for renewable energy development. | Not located within an area designated for renewable energy development. | Proposed on the edge of the sandy bank designated for the Arklow Wind Farm. Whilst the proposed dump at sea operations are not anticipated to cause any impact to the operation of the Farm, determining any access and/or constraints that the Farm may have is important. The Arklow Bank Wind Farm will be consulted with. |
| **Shipping**<br><br>**See Map 8 in Attachment 2.** | The Dublin-Cherbourg Ferry, operated by Irish Ferries, utilises a route located outside of the Study Area and therefore is not anticipated to be impacted by any dump at sea operations proposed under this investigation. A review of Shipping Vessel Densities on Ireland's Marine Atlas reveals a high density of activity around the Wicklow and Arklow Harbours and a key shipping route north to the Dublin Port, but a medium to low density of activity throughout the rest of the Study Area.<br>There are eleven navigation buoys within the Study Area. These are operated by the Commissioners of Irish Light.<br>Shipping routes and requirements of navigation has been ruled out as a significant constraint for the Project. This is on account of the infrequency of disposal at sea activities proposed for the Wicklow Harbour. The dredging vessel will be operated cognisant of navigational safety requirements during its operations. | | |
| **Engineering Uses of Seabed (i.e., Cables / Pipelines)** | There is currently no known publicly available data for subsea cables and pipelines off the east coast of Ireland. Any information that can be provided would be greatly appreciated. | | |
| **Intakes and Outfalls** | There are a number of stormwater outfalls, primary and secondary discharge points near the towns of Arklow, Wicklow and Greystones in the Study Area. These discharge points are 1.5km or less from the coastline and thus will not be impacted by a disposal site which are better suited further distance from the coastline. | | |
| **Recorded Shipwrecks**<br><br>**See Map 9 in Attachment 2.** | Located >6 km from shipwreck sites. | Located within 890m of the aforementioned record. It is not anticipated that the dumping operations will cause any ill effect to the integrity of this shipwreck site given the anticipated direction of plume flow southwards. | Located >6 km from shipwreck sites. |
| **Recreational Zones** | Located approx. 2.5 km from the beach spanning from Greystones to Wicklow. | Located approx. 2.0km from the beach spanning from Greystones to Wicklow. | Located approx. 7.0 km from the Magherabeg Beach. |
| | No impact from the dump at sea operations are predicted to these locations, or the recreational activities associated to them (i.e., swimming, marine sports). | | |

The following table shows an analysis of where different fishing activities are found in relation to the three candidate sites being assessed. From this table the key fishing activities found at the candidate sites appear to be whelk (all sites) and pelagic trawling (low to medium fishing activity in Sites 1 and 2). Mussel seed harvesting sites (dated 1972 and 2000) are located within 450m from Site 2.

| Sites | Site 1 | Site 2 | Site 3 | Observations from Ireland Marine Atlas |
|---|---|---|---|---|
| **Substrate** | Sand | Coarse Substrate | Sand | INFOMAR |
| **Depth Range** | 11-28m | 10-13m | 13-23m | INFOMAR |
| **Inshore Fishing** | **Observation** | **Observation** | **Observation** | **Irelands Marine Atlas** |
| Periwinkle Harvesting | None | None | None | This is a shoreline harvesting activity. |
| Dredge Fishing Effort | None | None | None | None shown |
| Line Fishing | None | None | None | None shown |
| Midwater Trawl Fishing | None | None | None | None shown |
| Nets Fishing | None | None | None | None shown |
| Beam trawl Effort | None | None | None | None shown |
| Bottom Trawl Fishing Effort | None | None | None | None shown |
| Seed mussel | None | Historically nearby but no current sites | None | Mussel seed harvesting has occurred close (450m) to Site 2 historically (most recent in year 2000) however. |
| Pot Fishing | Whelk | Whelk | Whelk | Whelk is fished extensively in 21 km zone. All candidate sites fall within this zone. |
| **Offshore – Fisheries Effort (2014-2018)** | **Observation** | **Observation** | **Observation** | **Irelands Marine Atlas** |
| Irish Beam Trawls Effort | None | None | None | None shown |
| Irish Bottom Otter Trawls Effort | None | None | None | None shown |
| Irish Dredges Effort | None | None | None | None shown |
| Irish Gill Nets Effort | None | None | None | None shown |
| Irish Longlines Effort | None | None | None | None shown |
| Irish Pelagic Trawls Effort | Yes | Yes | None | Low to medium fishing activity at Sites 1 and 2. |
| Irish Pots Effort | Whelk | Whelk | Whelk | Whelk fishing occurs at all three sites. |
| Irish Seines Effort | None | None | None | None shown |

| | | | | |
|---|---|---|---|---|
| International Beam Trawls Effort | None | None | None | Trawling occurs 800m east of Site 2, >1.5km southeast from Site 1 and 1km north and east from Site 3. |
| International Longlines Effort | None | None | None | None shown |
| International Bottom Otter Trawls Effort | None | None | None | None shown |
| International Dredges Effort | None | None | None | None shown |
| International Gill Nets Effort | None | None | None | None shown |
| International Pelagic Trawls Effort | None | None | None | Trawling occurs <1.5km and west east of Site 1, <1km east, south and west of Site 2, 1 and <1.7km northwest and west from Site 3. |
| International Pots Effort | None | None | None | None shown |
| International Seines Effort | None | None | None | None shown |

**High-Level Hydrodynamic Review of Candidate Sites:**

The tidal currents in Irish sea are generally strong due to the high tidal range. Both Site 1 and 3 are likely to have strong currents, throughout the tidal cycles. Bed shear under tidal flows will be sufficient to mobilise and erode medium and coarse sand from the bed and thus depositional conditions will only occur for a very limited period over the tidal cycle. This suggests that the proposed sandy sediments to be deposited within the dredge disposal site will not remain and will be easily mobilised by the ambient tidal flows.

Site 2, which has relatively weaker currents will have a longer period for deposition. Local deposition is likely to occur north of the harbour. The sediment plume throughout the study area is likely to extend southward, so it is unlikely that the plume from Site 3 will reach the Wicklow Reef SAC site, or the reef areas located to the north of this SAC. Similarly, the plume from Site 1 is unlikely reach the SAC or reef areas, considering the distances involved. The plume from Site 2 may partially pass through the Wicklow Reef SAC and reef areas, however considering that the current speed at the reef site and SAC will be relatively strong, heavy deposition at the SAC site will be unlikely.

# Appendix 4 – Stakeholder Responses

**From:** Simon Berrow [mailto:simon.berrow@iwdg.ie]
**Sent:** Wednesday 12 June 2024 10:54
**To:** Joanne O'Dowd; Environment - Wicklow and Arklow Harbour; Graham Cullen; Marc Devereux
**Subject:** Investigation of Disposal at Sea Sites for Wicklow Harbour Maintenance Dredging- Stakeholder Feedback

Dear Joanne

The IWDG have no preferences for either disposal at sea site as all will have harbour porpoise present year round and dolphins more infrequently (including bottlenose and common dolphin). Minke whales would be present during summer months.

we recommend the client implements NPWS (2014) Guidelines which requires an MMO to ensure no marine mammal is within the agreeds mitigation zone on disposal

Simon

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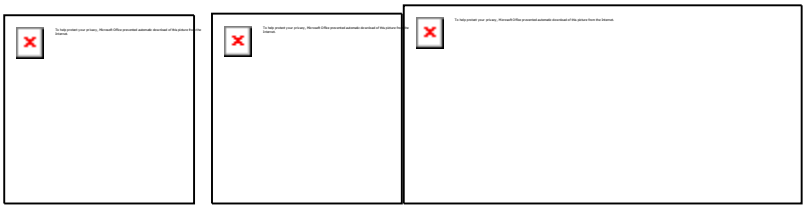
---
Dr Simon Berrow
Chief Executive Officer
Irish Whale and Dolphin Group
Merchants Quay, Kilrush, Co Clare, Ireland, V15 E762

www.iwdg.ie / http://consulting.iwdg.ie
Office; 065 9051763 / Mobile: 086 8545450



Charity Number: CHY 11163
Charity Regulatory Authority No. 20029913

An Taisce
The National Trust for Ireland
5 Foster Place
Dublin 2, Ireland
D02 V0P9

20240606-27

Wicklow County Council,
Environment Section,
County Buildings,
Wicklow Town,
Co. Wicklow.

Sent by email to: jodowd@wicklowcoco.ie

6th June 2024

Re: Investigation of Disposal at Sea Sites for Wicklow Harbour Maintenance Dredging Candidate Disposal Sites for Initial Stakeholder Feedback.

A Chara,

We thank you for referring the above Disposal at Sea site selection consultation to An Taisce for comment.

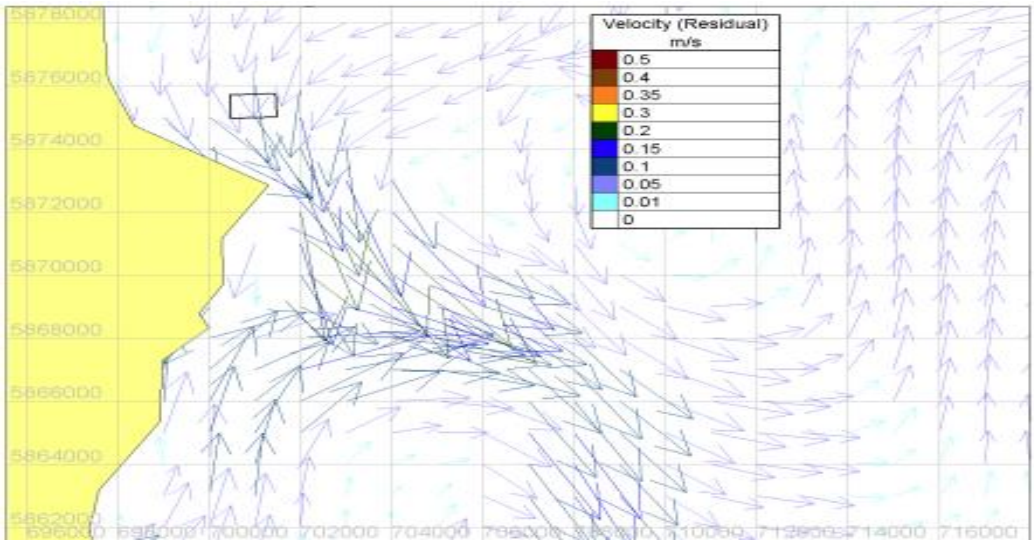
Our primary concern regards the location of Site 2 which is only approximately 3.1km from the Wicklow Reef SAC (site code: 002274). We note that the depths of this reef site range from 6m to 40m, with the shallower depths in particular raising concerns regarding potential adverse impacts from sediment disposal associated with the dredged material. Therefore, we believe that an AA Screening is required under the conditions of the Habitats Directive (92/43/EEC) to ensure that the requirements of Article 6(3) of the Directive are satisfied with regard to the direct, indirect and cumulative impacts of the proposed activity. In this way, it can be determined whether the proposal is likely to have a significant effect, either individually or in-combination with other plans or projects, on the European site in view of the site's conservation objectives:

Article 6(3) Habitats Directive

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

Ensuring that no reasonable scientific doubt remains as to the absence of effects upon the Wicklow Reef SAC for all three sites, but Site 2 in particular, is crucial given the sensitivity of this site to disturbance. We note from a previous dredging operation in Wicklow Harbour that the consultant's report displays a southward direction of the tidal currents. With regard to Site 2, this would indicate that disposed dredging sedimentation has a high likelihood of diffusing in the direction of the Wicklow Reef SAC. Consequently, such anthropogenic disturbance may induce changes in biotic and abiotic variables in excess of what could

be reasonably envisaged under natural processes which would be detrimental to this highly sensitive and biodiverse reef system.




***Southward Direction of Current (Consultant's Report from Previous Dredging Operation)***

Therefore, we submit that an Appropriate Assessment Screening and if necessary, a full Natura Impact Statement is required to determine the likely significant impacts of the three disposal sites on the Wicklow Reef SAC, in the context of its conservation objectives and with close consideration given to the unique habitat and species contained therein. The novelty and rarity of this habitat type exemplifies the necessity for a robust impact assessment to ensure that the precautionary principle prevails in this instance.

We also recommend that a Sediment Transport Model is conducted as part of the AA to confirm the direction of the transported sediment plume. If the southward direction of the sediment is confirmed, then we submit that site 3 may be a more prudent site to select given its location approximately 6.1 km south of the Wicklow Reef.

We also bring the Council's attention to a statement from the prior dredging operation's consultancy report which claims that the reef-forming worms may benefit from additional sedimentation:

*"An increase in suspended sediments may facilitate tube building and the fine fraction of the suspended sediments will have higher levels of organic matter associated with them compared to coarser sediments and may act as an additional food source for the reef-forming worms. Sabellaria alveolata has been classified as having a very low sensitivity and a very high recoverability to an increase in suspended sediments."* [An Taisce emphasis added].

These claims need to be scrutinised and confirmed to alleviate scientific uncertainty and with regard given to the annual tonnages of sediment proposed to be disposed of. If these claims cannot be confirmed, then we submit that precaution should prevail and site 3 be selected.

We note that scientific uncertainty is displayed in subsequent statements regarding the possibility of adverse impacts of sedimentation upon worm feeding apparatus:

*"An increase in suspended sediments may however clog up the feeding apparatus of the worms. The model predicts that the transported sediments will only settle temporarily at slack periods of the tidal cycle (and slightly longer during neap tides)."* [An Taisce emphasis added].

This uncertainty solidifies the necessity of conducting a scientifically robust AA Screening exercise and potentially a full NIS to alleviate doubts as to the response of this species to excess sedimentation.

Please acknowledge our submission and advise us of any decision made.

Is mise le meas,

Seán O'Callaghan
*Planning Officer*

**From:** Denise Maloney [mailto:denise.maloney@bim.ie]
**Sent:** Friday 7 June 2024 16:04
**To:** Marc Devereux; Joanne O'Dowd
**Cc:** Nicolas Chopin; Brian O'Loan; John Hickey; Joanne Gaffney; Vera O'Donovan; Ian Lawler
**Subject:** FW: Investigation of Disposal at Sea Sites for Wicklow Harbour Maintenance Dredging- Stakeholder Feedback

Dear Mr Devereux,

Thank you for the opportunity to provide feedback on the three candidate disposal sites for Wicklow Harbour Maintenance Dredging.

I have consulted with my colleagues here in BIM and although there is no overlap between the proposed dump sites and known seed mussel beds we would be concerned by site number 3 at the edge of Arklow Bank (see map attached) because of its proximity to suitable seed mussel habitat. There has been regular settlement south of Wicklow Head since 2010 as of BIM records. There is also a possibility of matured mussels aggregation following the cleaning of wind turbines in the area. Those mussels could potentially provide larvae for future beds in the area as larvae don't travel very far from where they have been emitted (see The Geography of Marine Larval Dispersal: Coupling Genetics with Fine-Scale Physical Oceanography by Gilig Hybish, 2003)

We hope you will give due consideration to our concerns when choosing the maintenance dredging disposal sites.

Regards,

Denise Maloney

**Denise Maloney**
Fisheries Inshore Support Officer
**BIM**

**T** +353 1 2144209
**M** +353 87 2897634
**E** denise.maloney@bim.ie

Ireland's Seafood Development Agency
**bim.ie**

**From:** Joanne O'Dowd <jodowd@wicklowcoco.ie>
**Sent:** Tuesday, May 14, 2024 3:36 PM

**To:** Environment - Wicklow and Arklow Harbour <wicklowandarklowharbour@wicklowcoco.ie>
**Cc:** Graham Cullen <GCullen@wicklowcoco.ie>; Marc Devereux <mdevereux@wicklowcoco.ie>
**Subject:** Investigation of Disposal at Sea Sites for Wicklow Harbour Maintenance Dredging- Stakeholder Feedback

> You don't often get email from jodowd@wicklowcoco.ie. Learn why this is important

Please find attached letter requesting initial stakeholder feedback on the investigation of potential offshore Disposal at Sea Sites for Wicklow Harbour Maintenance Dredging.

Please return any comments by 7th June 2024

Regards
Joanne

Joanne O'Dowd, BE CEng | Senior Executive Engineer | Environment Section | Wicklow County Council
T: 0404 20100

**From:** Dave O' Leary [redacted]
**Sent:** Thursday 13 June 2024 20:54
**To:** Joanne O'Dowd
**Subject:** Proposed dredging sites

To whom it may concern .
I have being made aware of the proposal for the dredging dumping grounds with 3 proposed sites .Two of which are in wicklow Bay and 1 east in deeper water.

I don't believe site one or site 2 are suitable locations due to these grounds being heavily dependent on by the inshore fishing sector and the angling industry.The inshore sector depend on these grounds for lobster and crab ,whelk fishing as they are unable to travel out to deeper water.

I believe regardless if you dump on site 1 or 2 the sediment will just disperse along this area either north or south and with the type of sediment it will carpet that area effecting the gravelly weedy bottom .For years we have taken part in sustainable fishing both with the Bim v notching lobster scheme and placing back over size and undersized to ensure a sustainable future for us and others to come along after us .The tide in this area is north or south and possibly will not be strong enough to shift heavy black mud .

I believe site 3 would be a better option as the tide is stronger and will disperse the sediment more effectively and have a lesser environmental impact than the option of site 1 or site 2 .

Regards
David o leary

Begin forwarded message:

**From:** Licensing Staff <licensing@epa.ie>
**Date:** 24 May 2024 at 16:46:07 IST
**To:** Joanne O'Dowd <jodowd@wicklowcoco.ie>
**Cc:** Environment - Wicklow and Arklow Harbour <wicklowandarklowharbour@wicklowcoco.ie>
**Subject: Investigation of Disposal at Sea Sites for Wicklow Harbour Maintenance Dredging- Stakeholder Feedback**

Dear Ms O'Dowd

We refer to your email dated 14 May 2024. We note that you are seeking comments from the EPA in relation to the potential offshore disposal sites you investigated. We acknowledge receipt of the Interim Report, outlining the results of your investigation.

Given the EPA's role as the regulatory authority for Dumping at Sea, it would not be appropriate for the EPA to make specific comments on something we may in turn be considering an application for.

Regards

Dumping at Sea and Water Regulation
**Water, Energy and Business Support Programme**
Office of Environmental Sustainability, Wexford
Rialáil Uisce agus Dumpáil ar Farraige
An Clár Tacaíochta maidir le hUisce, Fuinneamh agus Gnó
An Oifig um Inbhunaitheacht i Ieith Cúrsaí Comhshaoil, Loch Garman

053-9160600 (Reception)
licensing@epa.ie
www.epa.ie

**From:** Matthew Carroll [mailto:Matthew.Carroll@fisheriesireland.ie]
**Sent:** Friday 14 June 2024 09:47
**To:** Joanne O'Dowd
**Subject:** Investigation of Disposal at Sea Sites for Wicklow Harbour Maintenance Dredging- Stakeholder Feedback

Dear Joanne,

Thank you for the notification and the opportunity to comment of the proposed disposal Sea Sites for Wicklow Harbour Maintenance Dredging.
All three sites identified have their advantages and disadvantages and it would appear from the various constraints identified in the scoping document, that the historic disposal site for dredging spoil from Wicklow Harbor can no longer be considered.
Based on the information presented and considering IFI's interests in the candidate areas, sites 1 or 3 would be preferential.
IFI's concerns would be far more focused on the actual dredging operations within the confines of the harbour when they commence and would welcome the opportunity to comment on this aspect of operations in advance of them commencing.
As advised in previous correspondence with the local Authority, Wicklow Harbour is the entry point for significant salmonid populations migrating into the River Vartry Catchment and it is important that minimum impediment or disturbance to their migratory pattern results from dredging operations.
Simple and practical measures employed during dredging operations such as timing and tidal conditions during dredging periods can minimise the disturbance to migratory fish.

Kind Regards
Matt
**Matthew Carroll**
**Fisheries Environmental Officer**
Matthew.Carroll@fisheriesireland.ie • +353 (0)1 8842 600 • www.fisheriesireland.ie • D24 CK66

# LPC BOAT COMMITTEE

Leinster Provincial Council
of
Irish Federation of Sea Anglers

Dear Joanne,

RE ; Investigation of Disposal at Sea Sites for Wicklow Harbour Maintenance Dredging Candidate Disposal Sites for Initial Stakeholder Feedback.

On behalf of the LPC Boat Committee we wish to comment on the proposed dumpsites, please find our comments below ;

Site 1.
This area is widely used for recreational angling, a lot of Leinster Clubs frequently fish the area. It is an area where Smooth Hound and Tope pup, female hounds and Tope are seasonally found in the area. It is arguably the best area in Ireland for Irish Specimen Tope, and the current Irish record Tope came from a nearby mark.
It would be detrimental to the fish and angling in Leinster to dump in this site.

Site 2.
This area is a very popular area for recreational angling, Leinster anglers use it regularly and rely on it a lot for species competitions. The number of species found in this area is incredible and not common anywhere else on the East Coast. Species include some very rare fish for Irish waters, for example, Black Bream, and Red Mullet. It is also an area where Smooth Hound pup, it was the best ground for Irish Specimen Smooth Hound for a number of years, and the current Irish record Smooth Hound came from a mark within 1Nm of this site.
It would be detrimental to the fish and Leinster angling to dump in this site, especially given that the tidal movement is slower here than the other sites. The materials would just drown out the rough ground features common to these areas.

Site 3.
This area is also used for recreational angling, although not as much as the other sites because of the strong tidal race. It is an area where Tope, Spurdog and BullHuss are regularly found. Given the strong tidal race in the area the dumped materials would at least spread fast and far, it is the best of the 3 Sites in our opinion.

Regards,

[redacted]

LPC Boat Committee

**SSE Renewables**
Red Oak South
South County Business Park
Leopardstown
Dublin 18
Ireland

Joanne O'Dowd,
Senior Executive Engineer,
Wicklow County Council

7 June, 2024

Re: Investigation of Disposal at Sea Sites for
Wicklow Harbour Maintenance Dredging-
Stakeholder Feedback

**Dear Ms. O'Dowd,**

I write to you on behalf of SSE Renewables in my capacity as Project Manager for the Arklow Bank Wind Park 2 project in acknowledgement of your call for stakeholder feedback in relation to proposed disposal at sea sites for maintenance dredging at Wicklow Harbour.

SSE Renewables welcomes the opportunity to make the following observation on the proposal as shared on 14 May, 2024.

As you are aware, SSE Renewables is currently developing the 800MW proposed Arklow Bank Wind Park 2 offshore wind project on and around the Arklow Bank at a distance of between 6 and 15km from shore. The total area of the Array Area is approximately 63.4 $km^2$ (a rectangular block approximately 27 km long and 2.5 km wide).

A Maritime Area Consent (MAC) (Ref:2022-MAC-002) was granted for the proposed development in December 2022 and the project's offshore infrastructure planning application is currently under adjudication by An Bord Pleanála and full information and Environmental Impact Assessment Report are available to view at www.arklowbank2offshoreplanning.ie.

As you have identified in Attachment 3 of your letter, Candidate Site 3 is located within the MAC boundary referenced above and the area in which SSE Renewables are planning to develop the Arklow Bank Wind Park 2 project.

While the final positions of the project infrastructure are subject to consent approval, Candidate Site 3 is in very close proximity to planned inter array cable routes (c.75m) as well as being close to the planned location of an offshore substation platform and several wind turbine generators (c. 350m). The approximate distances above are from the point coordinate given. The boundaries of the proposed 700m x 500m disposal site have not been provided but will be closer to the surface infrastructure than noted above and will likely intersect planned subsea cable routes, and potentially a planned turbine location. Attached to this letter please find each of the proposed site layouts for the project (subject to consent approval) with

Candidate Site 3 overlaid to demonstrate the close proximity and potential impact on the project infrastructure.

Disposal of dredged materials in this location over multiple years, contemporaneously with ABWP survey/preparatory works, installation works, and operation presents significant safety and technical risks.

A review of the information provided has identified the following concerns:

1. **Planned survey and construction campaigns**

   During the period 2025-2032 ABWP will be undertaking multiple offshore vessel campaigns on site. These will involve vessels operating under restricted manoeuvrability and will include vessels towing survey equipment as well as vessels connected to equipment on the seabed. The timing and sequencing of vessel operations will be carefully managed by SSE Renewables to reduce safety and technical risks as low as reasonably practicable. Introducing vessels independently operated and managed by others to the site at the same time presents an unnecessary additional collision and navigation risk.

2. **Impact on existing survey data**

   Significant investment has been made to characterize the bathymetry and seabed morphology across the site with further survey work planned to supplement this over the coming years. Disposing of dredged material within the site may invalidate previous work. Given it is proposed to dispose of materials over multiple years, it's not considered practical to re-survey, re-analyse survey results and potentially make adjustments to the project plans after each disposal season.

3. **Safety risk to buried cables**

   Burial depth and its effect on thermal utilization is one of the principal considerations in the design the ABWP cables. Disposal of dredge material in proximity to or directly over cables presents an unacceptable risk to the cables that could result in overheating and failure of the cables.

4. **Access to cables for maintenance and repair**

   Cable maintenance and repair – if a fault or failure occurs in the cable, deburial and repair or replacement will be required. Disposal of dredge material in proximity to or directly over the cables will significantly complicate deburial and cable/repair process. If disposed material adjacent to the cable route renders the seabed unusable, it may not be possible to repair the cable in the standard way.

Considering these concerns, it is the view of SSE Renewables that the Candidate Site 3 is a wholly unsuitable location for the proposed activity and therefore is opposed and strongly cautions against its selection.

Our project team is available to meet with you to and elaborate on the points outlined above, and collaborate to find a mutually acceptable solution.

Yours sincerely,

**John O'Sullivan**
Project Manager
Arklow Bank Wind Park 2

730000 735000 740000

690000 685000 680000 675000 670000 665000 660000 655000


## Legend

- Arklow Bank Wind Park 2 - Array Area
- Arklow Bank Wind Park 2 - Cable Corridor And Working Area
- Arklow Bank Wind Park 1
- Arklow Bank Wind Park 1 - Met Mast
- Arklow Bank Wind Park 1 - Export Cable
- Arklow Bank Wind Park 2 - Wind Turbine Generator Locations (With 100m Limit of Deviation)
- Arklow Bank Wind Park 2 - Offshore Substation Platform Locations (With 100m Limit of Deviation)
- Arklow Bank Wind Park 2 - Export Cable
- Arklow Bank Wind Park 2 - Interconnector Cable
- Arklow Bank Wind Park 2 - Inter-Array Cable
- 700m x 500m Disposal Site - Orientation Assumed
- Disposal Site Location

Notes
1. This drawing is issued for planning application purposes only.
2. Arklow Bank Wind Park 1, identified on this drawing in blue, does not form part of the Proposed Development site
3. The cable routes shown on this drawing are indicative only.
4. All line weights indicating cable routes are not to scale.



| Rev | Date | Status | Drwn | Chkd | Appd |
|---|---|---|---|---|---|
| 01 | 28/03/2024 | Issue for Planning | BB | MW | JOH |

sse Renewables

**Sure Partners Limited**

Project

**ARKLOW BANK WIND PARK 2**

Title

**PROJECT DESIGN OPTION 1 - CABLES LAYOUT**

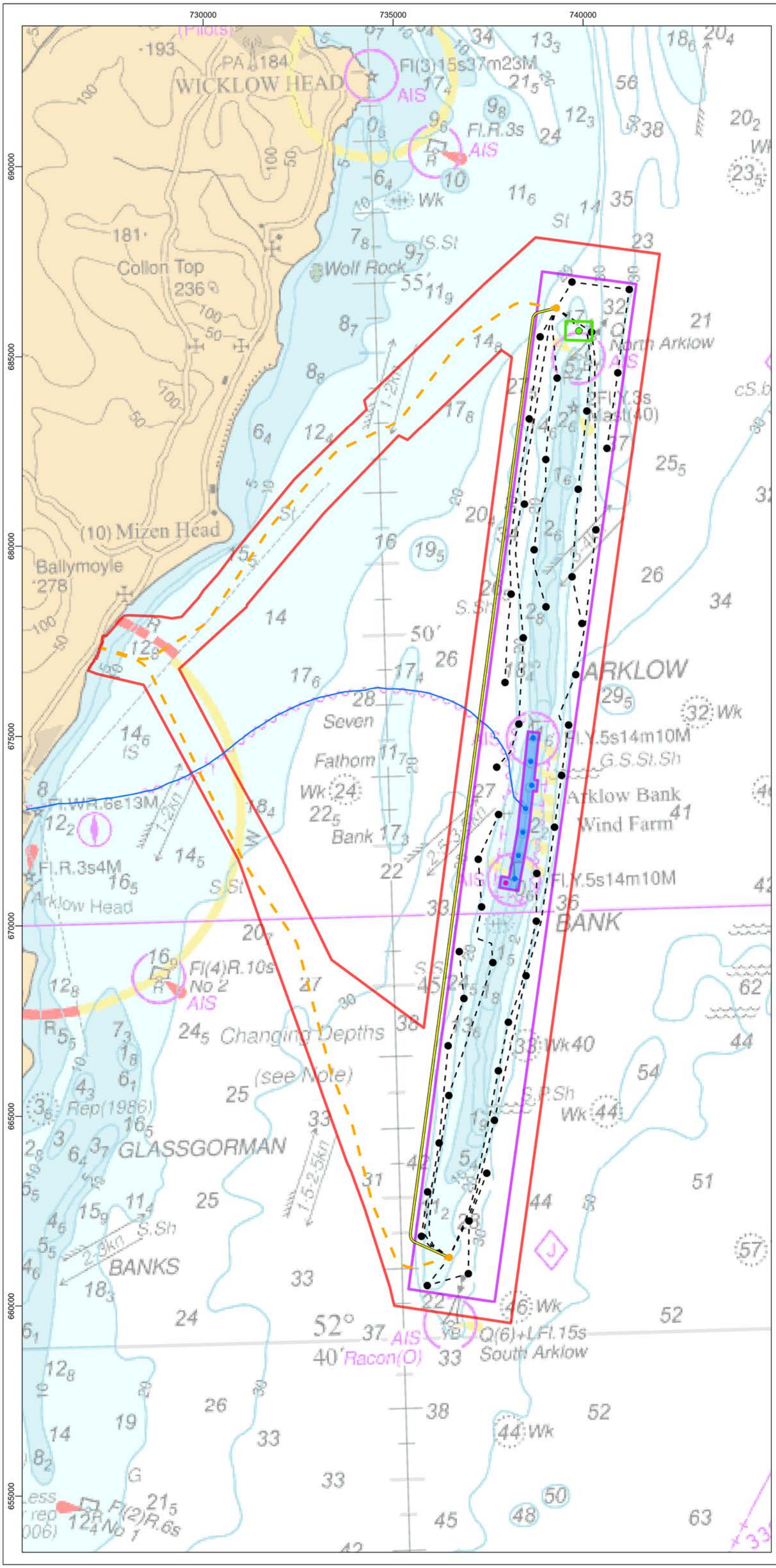
0 0.75 1.5 3 nm
0 1.5 3 6 km

N

| Scale | Plot Size | Datum | Projection |
|---|---|---|---|
| 1:100,000 | A3 | IRENET95 | ITM |

Drawing Number: LF100034-M-DES-0090-16

Sheet No.: Sheet 1 of 1




## Legend

- Arklow Bank Wind Park 2 - Array Area
- Arklow Bank Wind Park 2 - Cable Corridor And Working Area
- Arklow Bank Wind Park 1
- Arklow Bank Wind Park 1 - Met Mast
- Arklow Bank Wind Park 1 - Export Cable
- Arklow Bank Wind Park 2 - Wind Turbine Generator Locations (With 100m Limit of Deviation)
- Arklow Bank Wind Park 2 - Offshore Substation Platform Locations (With 100m Limit of Deviation)
- Arklow Bank Wind Park 2 - Export Cable
- Arklow Bank Wind Park 2 - Interconnector Cable
- Arklow Bank Wind Park 2 - Inter-Array Cable
- 700m x 500m Disposal Site - Orientation Assumed
- Disposal Site Location

Notes
1. This drawing is issued for planning application purposes only.
2. Arklow Bank Wind Park 1, identified on this drawing in blue, does not form part of the Proposed Development site
3. The cable routes shown on this drawing are indicative only.
4. All line weights indicating cable routes are not to scale.



| Rev | Date | Status | Drwn | Chkd | Appd |
|---|---|---|---|---|---|
| 01 | 28/03/2024 | Issue for Planning | BB | MW | JOH |

sse Renewables

**Sure Partners Limited**

Project

**ARKLOW BANK WIND PARK 2**

Title

**PROJECT DESIGN OPTION 2 - CABLES LAYOUT**

0 0.75 1.5 3 nm

0 1.5 3 6 km

N

| Scale | Plot Size | Datum | Projection |
|---|---|---|---|
| 1:100,000 | A3 | IRENET95 | ITM |

Drawing Number: LF100034-M-DES-0090-17

Sheet No.: Sheet 1 of 1

Dear Joanne,

RE ; Investigation of Disposal at Sea Sites for Wicklow Harbour Maintenance Dredging Candidate Disposal Sites for Initial Stakeholder Feedback.

On behalf of Wicklow Bay Sea Angling Club thank you for the opportunity to comment, please find our comments below ;

Site 1.
This area is widely used for recreational angling, as a Club Iwe use it regularly and a lot of Leinster Clubs frequently fish the area. It is an area where Smooth Hound and Tope pup, female hounds and Tope are seasonally found in the area. It is arguably the best area in Ireland for Irish Specimen Tope, and the current Irish record Tope came from a nearby mark.
It would be detrimental to the fish and angling to dump in this site.

Site 2.
This area is a very popular area for recreational angling, as a Club we use it regularly and rely on it a lot for species competitions. The number of species found in this area is incredible and not common anywhere else on the East Coast. Species include some very rare fish for Irish waters, for example, Black Bream, and Red Mullet. A lot of Leinster Clubs would also fish in this area. It is also an area where Smooth Hound pup, it was the best ground for Irish Specimen Smooth Hound for a number of years, and the current Irish record Smooth Hound came from a mark within 1Nm of this site.
It would be detrimental to the fish and angling to dump in this site, especially given that the tidal movement is slower here than the other sites.

Site 3.
This area is also used for recreational angling, although not as much as the other sites because of the strong tidal race. It is an area where Tope, Spurdog and BullHuss are regularly found. Given the strong tidal race in the area the dumped materials would at least spread fast and far, it is the best of the 3 Sites.

Regards,
Kit Dunne

Secretary Wicklow Bay Sea Angling Club
[redacted]

[redacted]

**From:** Kit Dunne [redacted]
**Sent:** Thursday 13 June 2024 16:44
**To:** Joanne O'Dowd
**Cc:** Environment - Wicklow and Arklow Harbour; Graham Cullen; Marc Devereux
**Subject:** Re: Investigation of Disposal at Sea Sites for Wicklow Harbour Maintenance Dredging- Stakeholder Feedback

Dear Joanne,

Thank you for the opportunity to comment, please find my thoughts below ;

Site 1.
This area is widely used for recreational angling, as a charter skipper I use it regularly and a lot of Leinster Clubs are frequently fishing the area. It is an area where Smooth Hound and Tope pup, female hounds and Tope are seasonally found in the area. It is arguably the best area in Ireland for Irish Specimen Tope, and the current Irish record Tope came from a nearby mark.
It would be detrimental to the fish and angling to dump in this site.

Site 2.
This area is a very popular area for recreational angling, as a charter skipper I use it regularly and rely on it a lot because of the abundance of different species and rare species in the area. The number of species found in this area is incredible and not common anywhere else on the East Coast. Species include some very rare fish for Irish waters, for example, Black Bream, and Red Mullet. A lot of Leinster Clubs would also fish in this area. It is also an area where Smooth Hound pup, it was the best ground for Irish Specimen Smooth Hound for a number of years, and the current Irish record Smooth Hound came from a mark within 1Nm of this site.
It would be detrimental to the fish and angling to dump in this site, especially given that the tidal movement is slower here than the other sites.

Site 3.
This area is used for recreational angling, as a charter skipper I use it regularly however not many Leinster clubs would fish it because of the strong tidal race. It is an area where Tope, Spurdog and BullHuss are regularly found. Given the strong tidal race in the area the dumped materials would spread fast and far, it is the best of the 3 Sites.

Regards,
Kit Dunne

Wicklow Boat Charters

On Mon, Jun 10, 2024 at 12:41 PM Joanne O'Dowd <jodowd@wicklowcoco.ie> wrote:

Please note the attached consultation has been extended until Friday 14th June 2024. We would appreciate your feedback (if not already provided) to assist in determination of the most suitable offshore Disposal at Sea Site for Wicklow Harbour Maintenance Dredging and to ensure that all stakeholders views are taken into account at an early stage.

Regards

Joanne

---

**From:** Joanne O'Dowd
**Sent:** Tuesday 14 May 2024 15:36
**To:** Environment - Wicklow and Arklow Harbour
**Cc:** Graham Cullen; Marc Devereux
**Subject:** Investigation of Disposal at Sea Sites for Wicklow Harbour Maintenance Dredging- Stakeholder Feedback

Please find attached letter requesting initial stakeholder feedback on the investigation of potential offshore Disposal at Sea Sites for Wicklow Harbour Maintenance Dredging.

Please return any comments by 7th June 2024

Regards

Joanne

Joanne O'Dowd, BE CEng | Senior Executive Engineer | Environment Section | Wicklow County Council

T: 0404 20100

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ENDLESS OPPORTUNITIES

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Best Regards,
Kit

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http://www.wicklowboatcharters.ie
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