Attachment-F.1

Assessment of Impact on the Environment

DUMPING AT SEA PERMIT APPLICATION

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Fenit Harbour,

Tralee, Co. Kerry

Comhairle Contae Chiarraí

Kerry County Council

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Appendix 1: **Assessment of Risk to Marine Mammals from Proposed Dredging and Dumping at Sea Activity, Fenit Harbour, Co. Ke**rry

Appendix 2: **Underwater Archaeological Impact Assessment Report Fenit Harbour and Tralee Bay, Co. Kerry.**

Appendix 3: Natura Impact Statement

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1 INTRODUCTION

Kerry County Council is submitting a Dumping at Sea licence application to the EPA for the next phase of Maintenance Dredging at Fenit Harbour and Marina, Co. Kerry and subsequent dumping of the dredged material at sea in the Outer Tralee Harbour.

This Report contains an assessment of the potential impacts of the loading (dredging) and unloading (dumping) operations on the environment, as required in Section F.1 of the Application Form. It is informed by the following reports which are also included in the application documentation, namely;

- Natura Impact Statement (NIS) by Malachy Walsh & Partners.
- Sediment Characterisation Report (AQUAFACT, 2018)
- Dump site Selection Report (MWP 2015)
- Marine Benthic Study Fenit Harbour Dredging and Disposal Operations (Aquafact 2018)
- Bathymetry mapping by Hydrographic Surveys Ltd
- Underwater Archaeological Impact Assessment by Lar Dunne Archaeology
- Marine Mammal Risk Assessment (IWDG Consulting 2017)
- Fenit Harbour Maintenance Dredging 2016 Environmental Report (Malachy Walsh and Partners, 2016)
- Review of existing reports and records

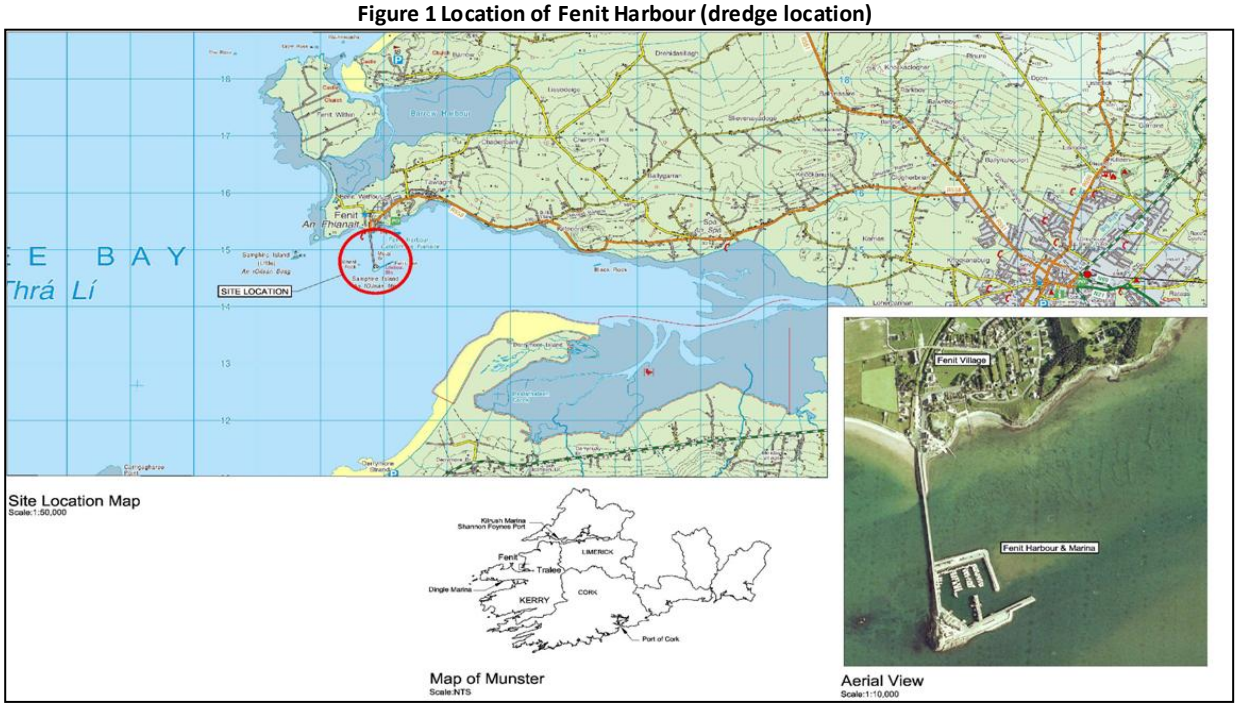
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2 DREDGING (LOADING) OPERATIONS

2.1 Location and Description

Fenit Harbour and Marina is located on the west coast of Ireland, in County Kerry about 10km west of Tralee Town. It lies on the northern side of Tralee Bay. A location map of the site is presented in Figure 1 below.

Figure 1 Location of Fenit Harbour (dredge location)



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Fenit is the most westerly commercial port in Ireland and is the only commercial port between Foynes and Cork. It is used for commercial shipping, servicing a domestic fishing fleet, leisure and amenity and lifesaving. The main deep sea pier is 175m long with extensive storage facilities available. The landing quays have a design dredge depth of -7.5mCD. Fenit Harbour is an important logistical base for the Killarney based Liebherr cranes.

The commercial shipping quays facilitate 15,000 tonne ships of container cranes of a frequency of approximately 15 to 20 per annum. Currently, the fishing fleet operating out of Fenit include approximately 1 large trawler, 2 medium trawlers and 24 half decker trawlers in addition to a number of charter sea angling vessels. Fenit Marina was built in 1997 and has a 130 berth marina and caters to leisure craft from 6m to 15m in length. It has a plan area of approximately 1.5ha. The marina has a design dredge depth of -3.5mCD. The existing marina berths facilitate leisure craft during the peak summer months and a mixture of both fishing and leisure in the off-season.

2.2 Dredging (Loading) Activities

The proposed maintenance dredging will take place within the marina (Loading Area A), commercial shipping berth and navigational channel (Loading Area B) and at the outer manoeuvring area (Loading Area C) as shown in Figure 2 below and also in Drawing No. 18598-5006A

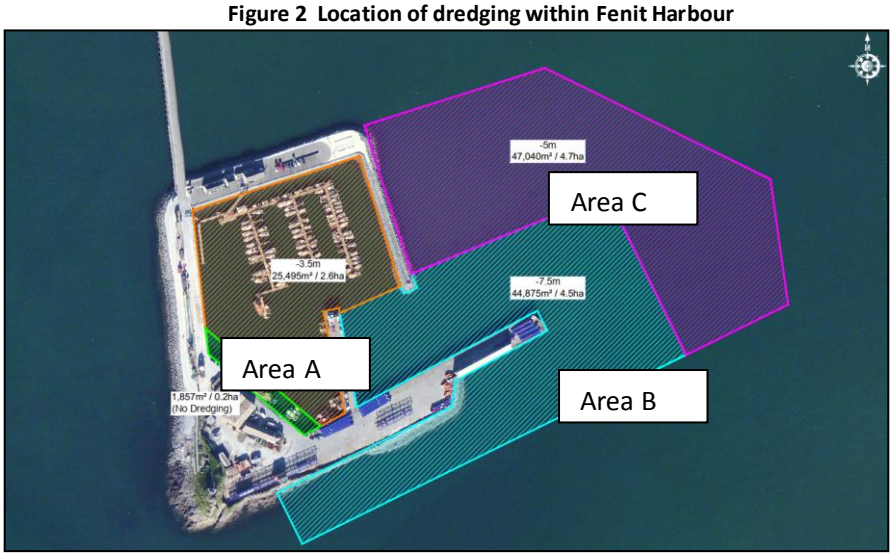
The aim of the dredging operation is to maintain the level of the sea bed at the design depth to ensure the minimum safe water depths are preserved within the navigational channel and the marina berths for the vessels currently using the Harbour and marina.

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The maintenance dredging footprint will take place within zones that have been subject to previous dredging and also in zones where dredging has not yet occurred. It is proposed that this dredging will be carried out over an eight (8) year period.

A Suction Hopper Dredger is the proposed primary dredging method to be used. In conjunction with the suction dredger, a plough dredger or a mechanical dredger such as a grab or backhoe may also be used where limited access for large dredging plant occurs. Further details are provided in the application at Attachment D –Loading Operations.

Figure 2 Location of dredging within Fenit Harbour



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A capital dredge was undertaken in 1996 for the existing harbour and some maintenance dredging since then. The volume of capital dredging in 1996 amounted to 200,000m^3 of material. Since 1996 maintenance dredging of the commercial berth was undertaken in 2000, 2003, 2008 and 2016. Material from these dredging campaigns was disposed of in the licensed site to the north of Tralee Bay.

The most recent dredge campaign in 2016 involved the removal of 130,000 tonnes at the main commercial pier and outer manoeuvring space at the head of the pier. Since the area was last dredged in 2016, the area has silted up and safe navigation and berthing of commercial ships is compromised based on recent bathymetry data.

2.3 Hydrodynamics and Sediment Regime

Tralee Bay is sheltered from Atlantic waves by the Dingle Peninsula to the south and the Maharees Peninsula to the west. Wave action and tidal currents enter the Bay from the north.

Tidal currents, filling the bay under flood tide, sweep past the harbour in a west to east direction. On the ebb, relatively strong currents approach the harbour from the east. The currents are strong enough to move considerable volumes of sediment in the vicinity of the harbour. These tidal currents and the nature of the seabed sediment means that volumes of sediment are moved around the bay.

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2.3.1 Bathymetry

A bathymetry survey of the proposed dredge site was conducted by Hydrographic Services Ltd in 2018. Refer to application drawings 18598-5003A and 18598-5007A. The bathymetry survey indicates that depths are variable throughout the dredge area and that there is an accumulation of sediment in all parts of the harbour including the navigational channel since the last maintenance dredge of this area in 2016.

The survey indicates depths within the Marina (Area A) range from -1.9mCD to-3.0mCD, which is up to 1.6mCD in places from the optimum design depth of -3.5mCD. Within the commercial shipping berth and navigational channel (Area B), water depths typically range between circa-4.5mCD and -7mCD which is between 0.5 and 3mCD from the optimum design depth of -7.5mCD. The survey shows areas in the outer manoeuvring area (Area C) drying out at 1.4mCD immediately east of the eastern breakwater and due north of the main shipping pier.

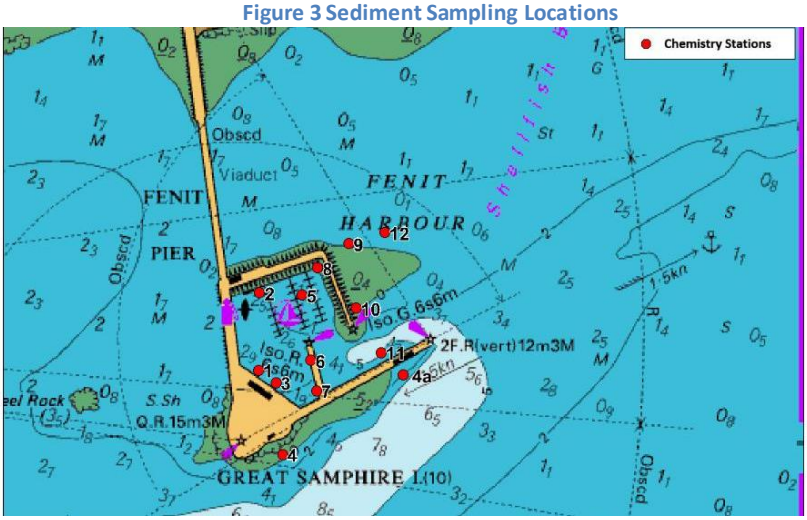
2.3.2 Marine Sediments

Previous reports and site investigations indicate that the composition of the material to be dredged is a clean sand silt gravel mix with no rock. Sediment sampling for quality analysis was again undertaken in 2017 at 12 locations across the harbour and marina area. See Figure 3. The sediments analysed were below the lower Irish action limits for organochlorines, PCBs, total extractable hydrocarbons, organotins and ∑16 PAH's. Arsenic was above the lower Irish action limit at 10 of the 12 stations sampled. Nickel was above the lower Irish action limit at 8 of the 12 stations sampled. Zinc was above the lower Irish action limit at one of the 12 stations sampled. Copper was above the upper Irish action limit at one station out of the twelve sample, but was below the lower action limit at all other stations.

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Cadmium, Chromium, Lead and Mercury were all below the lower Irish action limit at all stations. Refer to Sediment Characterisation Report (AQUAFACT, 2018) for further details.

Figure 3 Sediment Sampling Locations



2.4 Impact Assessment of Dredging (Loading) Operations

This section outlines the potential impacts that could arise from the dredging (loading) operations.

The potential impacts to Natura 2000 have been discussed in detail in Natura Impact Statement which is enclosed with the application. The following is a list of potential impacts that may arise due to dredging operations:

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- Loss and alteration of seabed habitat and associated species at the location of the dredge areas, which lie within an Natura 2000 site
- Water quality impacts from increased suspended sediment and turbidity levels in the water column at the dredge location
- Disturbance to species through smothering from the deposition of suspended solids
- Temporary noise disturbance from dredging plant
- Water quality impacts from accidental oil spill associated with fuelling activities of the suction hopper dredger

The following sections address each of the potential impacts outlined above.

2.4.1 Loss and alteration of seabed habitat

The loss of habitat relates to both the physical footprint on the sea bed and also relates to the communities/species that live within. The area that is being dredged is dynamic in that there is constant deposition of material within the area due to the natural coastal cycle. The dredging will remove material from the harbour and marina area and re-deposit it at the dumpsite location in the outer bay. Once dredging is complete the cycle of deposition will commence once more. So form a habitat perspective there will be a temporary loss of material from within the harbour and marina

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area. Within the dredge material there will be some loss of species due to smothering or physical impacts, but such loss is not deemed significant. The species are abundant within the seabed and the loss of some seabed species at this location is not significant.

2.4.2 Water quality impacts from increased suspended sediment and turbidity levels in the water column at the dredge site

Based on past models simulated, during the dredging operations there will be a localised increase in turbidity as there will be disturbance of silt/sand on the bed as it is removed and there will also be spill over from the hopper as it is filled. This in effect will generate a localised dredge plume in the immediate vicinity of the dredge vessel. This is a temporary impact as once each stage of dredging is completed some of the material will settle out and be deposited on the sea bed and some will remain in suspension within the water column.

At the dredging site the plough dredging activity will create the most suspended sediment. However due to the enclosed location of the Marina and low ebb and flood currents, and protection from waves the impact on the surround environment is not considered at risk.

The typical re-suspension of sediment from a trailer suction ranges from 3 to 15 kg/m3, while a back hoe with an environmental bucked ranges from 5-10 kg/m3 and without environmental bucket 12-25 kg/m3 according to Kirby and Land (1991). A conservative estimate in previous studies assumes 3% (of 1800kg/m3) is lost to the water column with approximately 50% of that being re-suspended (the heavier granular particles sink to the bottom) which equates to 1.5% of 1800kg/m3 or 27kg/m3.

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The previous study modelling of the dredging location showed that the maximum tidal currents were quite low (below 0.05m/s) at max ebb (See Figure 4). Similarly wave disturbance within the harbour where dredging is proposed is negligible, with significant wave heights, Hs, below 0.1 of a meter, (Figure 5). The suspension of material at the dredge site due to dredging did not have a significant impact on the surrounding environment. The suspended sediment as a result of the dredging activity moves east out of the harbour but at very low quantities with sediment suspensions rates ranging from 0.006kg/m3 at high water (Figure 6) to 0.03kg/m3 at mid flood (Figure 7). The current dredging proposed a lower re-suspension rate and therefore should also be considered not to have a significant impact on the surrounding environment.

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Figure 4: Tidal Current Modelling within the Harbour at Max Ebb

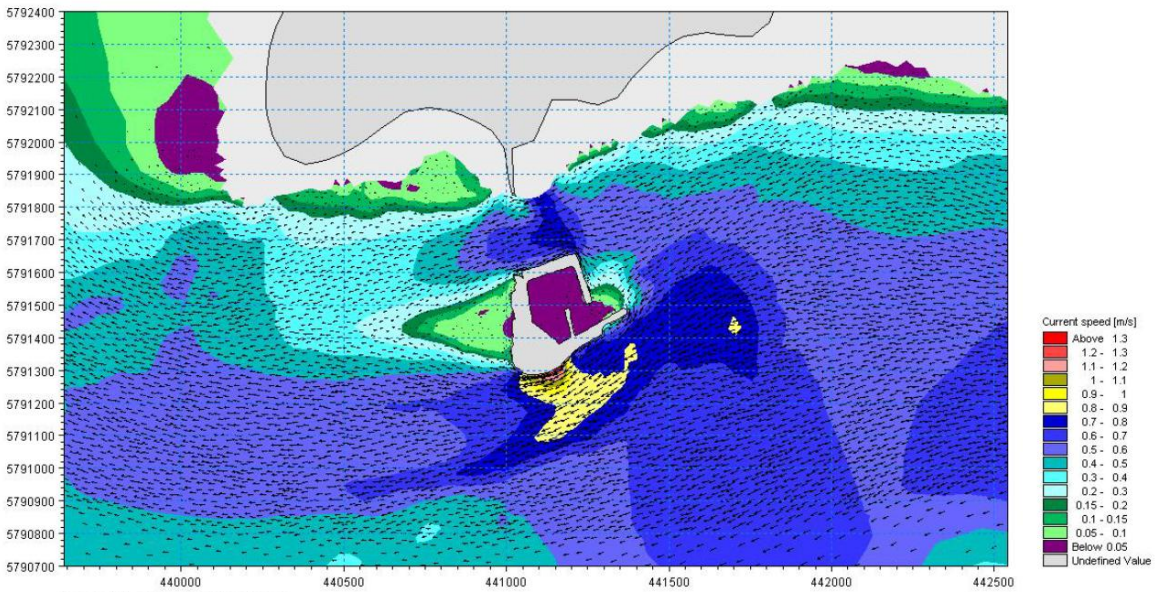
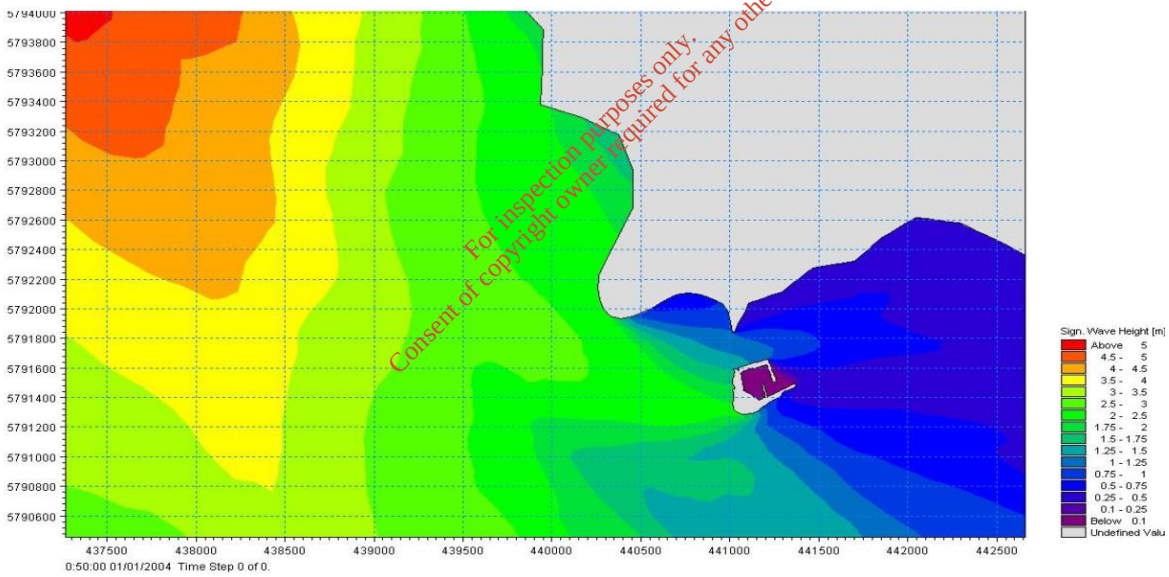
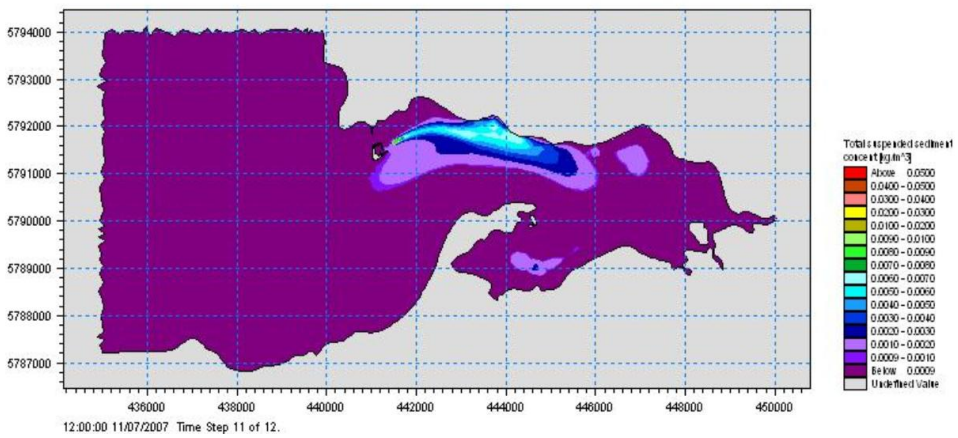


Figure 5 Storm Wave Modelling within the Harbour



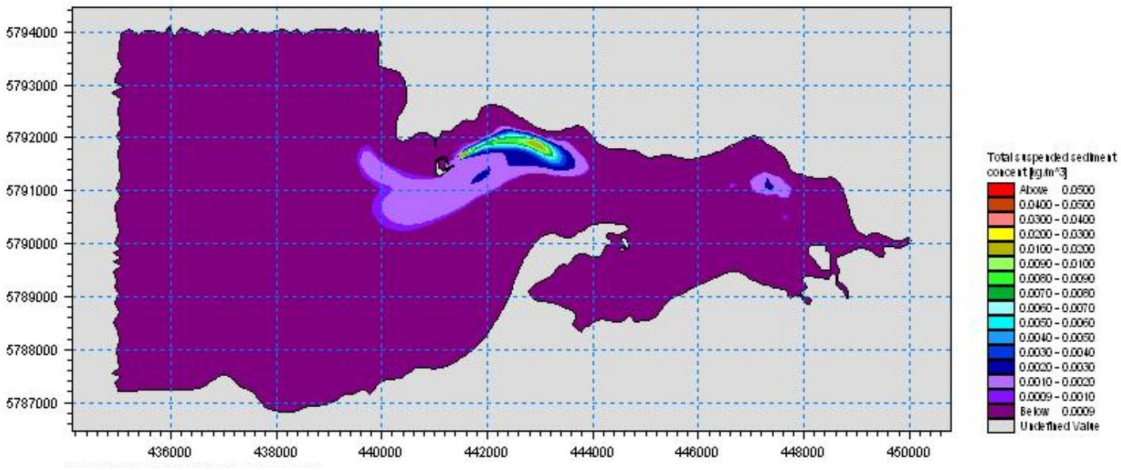
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Figure 6: Suspended sediment concentration at HW after 12 days dredging



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Figure 7: Suspended sediment concentration at mid flood tide after 13 days dredging



In order to monitor the plume and the effects of turbidity a series of alarmed monitors will be deployed during the dredging event and these will highlight any significant increase in the plume and any directional movement. In addition the supervising engineer and the dredge captain will visually monitor the plume and control dredging accordingly.

It should be noted that this type of dredging campaign has been undertaken on many occasions over the last 20 years and on each occasion control measures and adequate supervision have ensured that no negative effects on water quality were experienced. In addition the dredge material is relatively clean and reflects the general quality of the material that naturally occurs within the inner bay.

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Based on good dredge methods, tight controls and monitoring it is possible to effectively manage the dredge campaign. What is important to state is that turbidity within the water body is influenced by the natural daily tidal cycle and also by weather and storm events. The inner reaches of Tralee are shallow and have significant areas of mud, sand and silt. This material is regularly agitated by the tidal cycle and so there is naturally a level of turbidity in the water column due to coastal processes.

The proposed dredging is a temporary event and the increase in turbidity is manageable and is not deemed significant.

2.4.3 Disturbance to species through smothering from the deposition of suspended solids

This impact relates to the species that live within the sea bed at the dredge location but also to species that are located nearby in the seabed. This aspect has been discussed in the NIS and also in the report completed by Aquafact International which in included in the application.

The effects of the dredge campaign will be temporary and are deemed not significant. In addition the control measures outlined above will ensure that the impacts are minimal and temporary in nature.

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2.4.4 Temporary noise disturbance from dredging plant

There will be some localised noise impacts from the dredging vessel as it works within the harbour. The harbour itself is a busy port with large scale shipping traffic and so the natural background levels will not be dissimilar to what is experienced while the dredger is in place. The dredger will not be a constant either, in that it will be coming and going from the harbour to the dumpsite and so the noise impact is intermittent and temporary. Given the nature of the dredging vessel and the typical noise from such crafts it is well within the normal background levels experienced in the busy commercial shipping port. There is also a significant separation distance from the village and any surrounding residential homes. The noise levels experienced in the area are those that are typical of a busy port and the dredging operations won't adversely impact on residents or the wider locality.

2.4.5 Water quality impacts from accidental oil spill associated with fuelling activities of the suction hopper dredger

In the event that the dredger needs refuelling it will be undertaken by a specialised fuel delivery truck, which regularly visits the harbour to fuel the commercial ships that frequent the port along with local vessels. The harbour has a protocol for how fuelling is undertaken and best practice measures are in place to avoid fuel spills. A spill kit is available within the harbour and harbour staff are trained in dealing with fuel and fuel spills should they occur. In addition the dredger has its own protocols and procedures to manage fuelling operations in ports. The risk of spillage is low and the process is manageable within the context of the proposed works.

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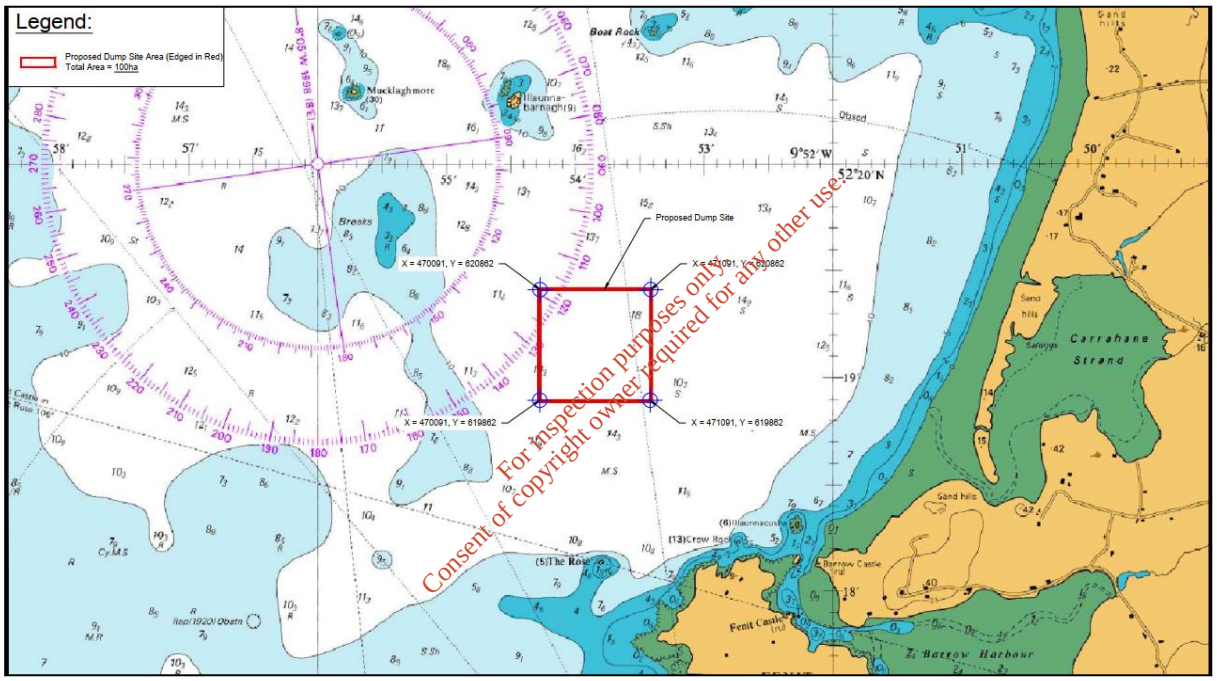
3 DUMPING (UNLOADING) OPERATIONS

3.1 Site location and description

The dumpsite is located approximately 3km west of the coast at Carrahane Lower townland and approximately 1.5km north-northwest of Fenit Island in the outer part of Tralee Bay. It lies between 1.5km to 2.5km south and southeast of Illaunnabarnagh and Mucklaghmore Islands, which are essentially small rocky outcrops. The seabed in the general surrounds is classified as sand and muddy sand with reefs located over 1km to the northwest. The location can also be seen in Figure 8 below.

The boundary extents of the dumpsite are square in shape with each side measuring 1km giving a total area of 100ha. Tidal currents are generally low at the dump site. The current largest velocities occur at mid ebb and mid flood with magnitudes ranging from 0.2 to 0.3 m/s.

Figure 8 Dumpsite Location



3.2 Bathymetry

The bathymetry survey conducted by Hydrographic Services Ltd indicate that depths within the dumpsite range between 16.4 and 19.6m and outside the dumpsite they ranged from 13.7 to 19.1m.

3.3 Marine Sediments

The sediment type in the disposal site consists of fine/medium sand, coarse/medium sand and gravelly coarse sand and sandy gravel. Areas of hard ground occur in the western half. Very fine sand dominate just over 1km south of the dumpsite. Fine/very fine sand dominate to the east of the dumpsite and a gravelly coarse/very coarse sand dominate to the north. All sediments were classified as sand, gravelly sand or sandy gravel by Folk (1954). Silt-clay fractions were low throughout (<10%). Further details are provided in the Marine Benthic Study of the dumpsite undertaken by Aquafact. (See Attachment E.2 (I)).

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3.4 Benthic Ecology

The faunal assemblage of the dumpsite and surrounding areas can be classified by Fossitt (2000) as SS1 *Infralittoral gravels and sands*. Variations in the community type and dominating species between the stations was evident. These local variations are common in the natural environment. All species observed are typically of the gravelly/sandy habitat in the area. Some of the main dominants of the assemblage include the bivalve *Spisula subtruncata* and the polychaetes *Magelona johnstoni, Nephtys* sp. and *Syllis pontxioi.* Further details are provided in the Marine Benthic Study of the dumpsite undertaken by Aquafact. (See Attachment E.2 (I)).

It is worth noting that one of the reasons the site was selected was not a favoured fishing grounds for local fishermen and they had no fishery related concerns here.

3.5 Impact Assessment

This section outlines the potential impacts that could arise when the dredged material is deposited at the dumpsite.

The potential impacts to Natura 2000 have been discussed in detail in Natura Impact Statement which is enclosed with the application. The following is a list of potential impacts that may arise due to deposition of dredge spoil at the proposed dump site:

- Loss and alteration of seabed habitat and associated species at the location of the dump site
- Water quality impacts from increased suspended sediment and turbidity levels in the water column at the dumpsite
- Disturbance to species through smothering from the deposition of suspended solids
- Temporary noise disturbance from dredging plant
- Archaeology

The following sections address each of the potential impacts outlined above.

3.5.1 Loss and alteration of seabed habitat

The loss of habitat relates to both the physical footprint on the sea bed and also relates to the communities/species that live within. The area that has been selected is dynamic in that there is constant change within the area of seabed due to tidal currents and storms over the year.
The natural hydrodynamics of the bay and the dump site area means that there is always movement of material in the bay, some is moved at bed level and some is in suspension and moved with tides and currents.

The deposition of the material in the bed will have the effect of covering the sea bed with material and this process will have some impacts on local fauna on the surface of the bed and on species contained within.

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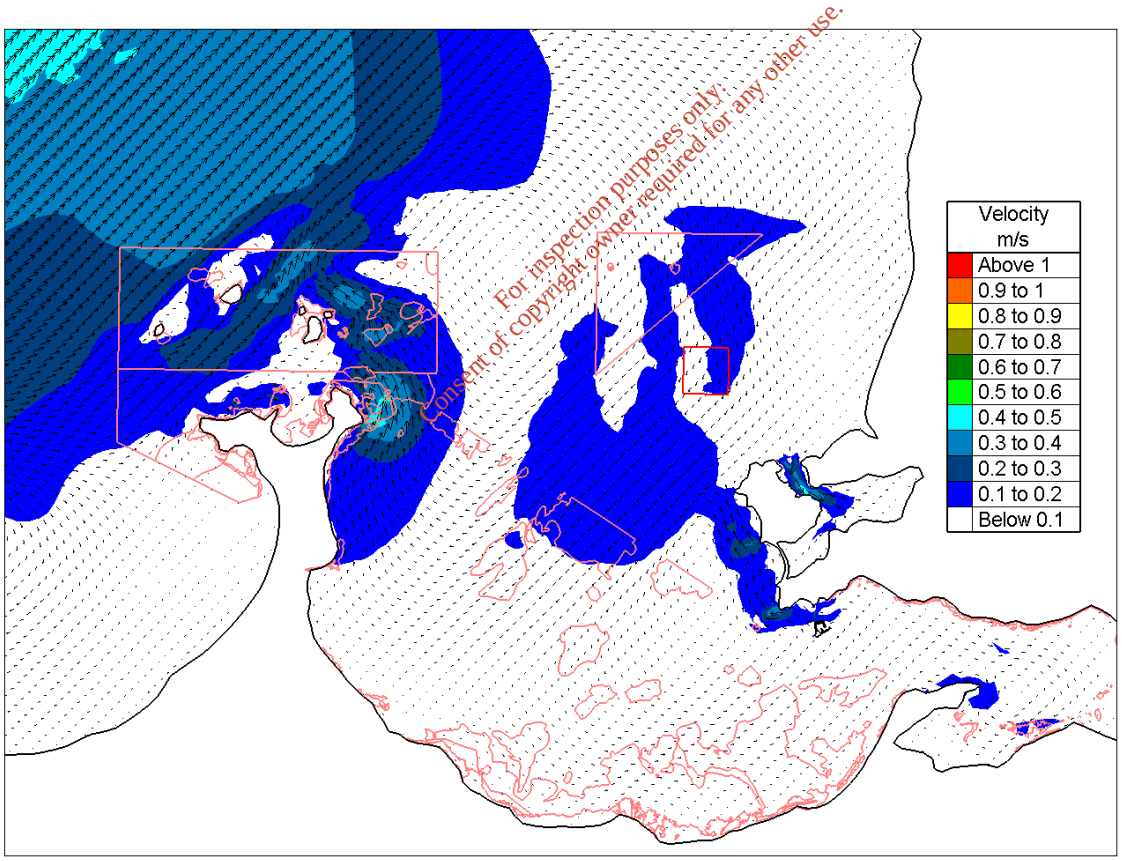
The recent assessment undertaken by Aquafact of the faunal assemblage at the dumpsite however suggest that past dumping operations has not resulted in a significant impact on benthic ecology.

Therefore while some loss of fauna will occur it is not deemed significant. It will be a temporary impact in that they will recover and replenish numbers in due course.

3.5.2 Water quality impacts from increased suspended sediment and turbidity levels in the water column at the dredge site

The dump site was also previously subject to extensive tidal and sediment transport modelling. Tidal currents are generally low at the dump site, which is shown as a red box in the Figures 9 to 12. There is no appreciable current velocity at high and low water (Figures 9 and 10). The current largest velocities are visible at mid ebb and mid flood with magnitudes ranging from 0.2 to 0.3 m/s, (Figure 11 and 12 respectively).

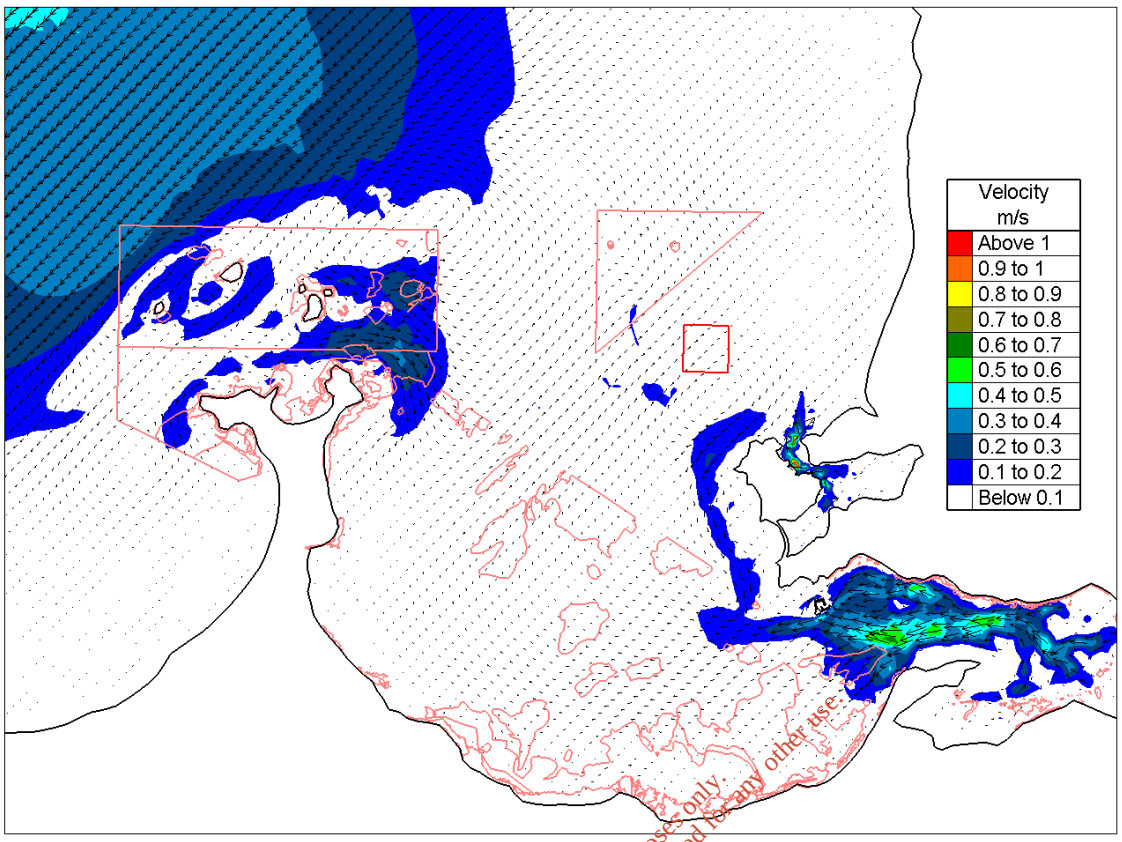
Figure 9: Computed depth averaged velocities at High water Spring Tide (Aquafact)



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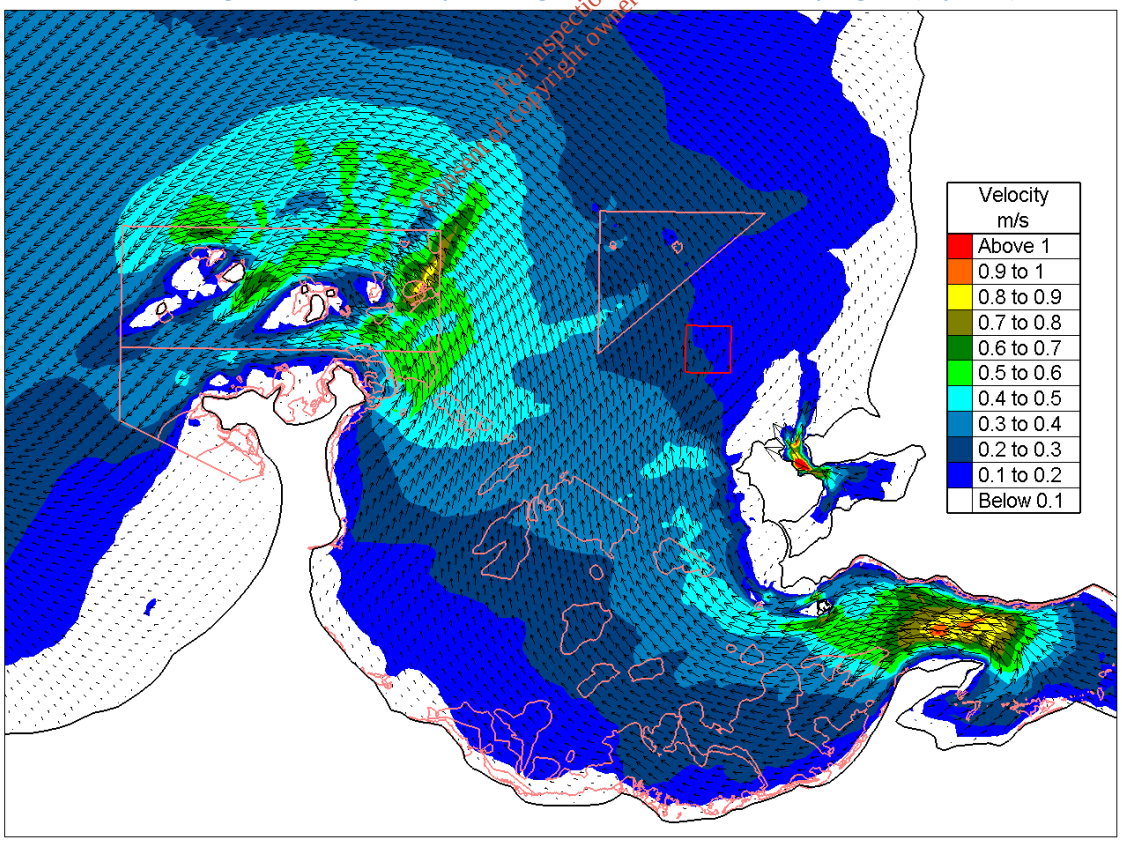
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Figure 10: Computed depth averaged velocities at Low Water Spring Tide(Aquafact)



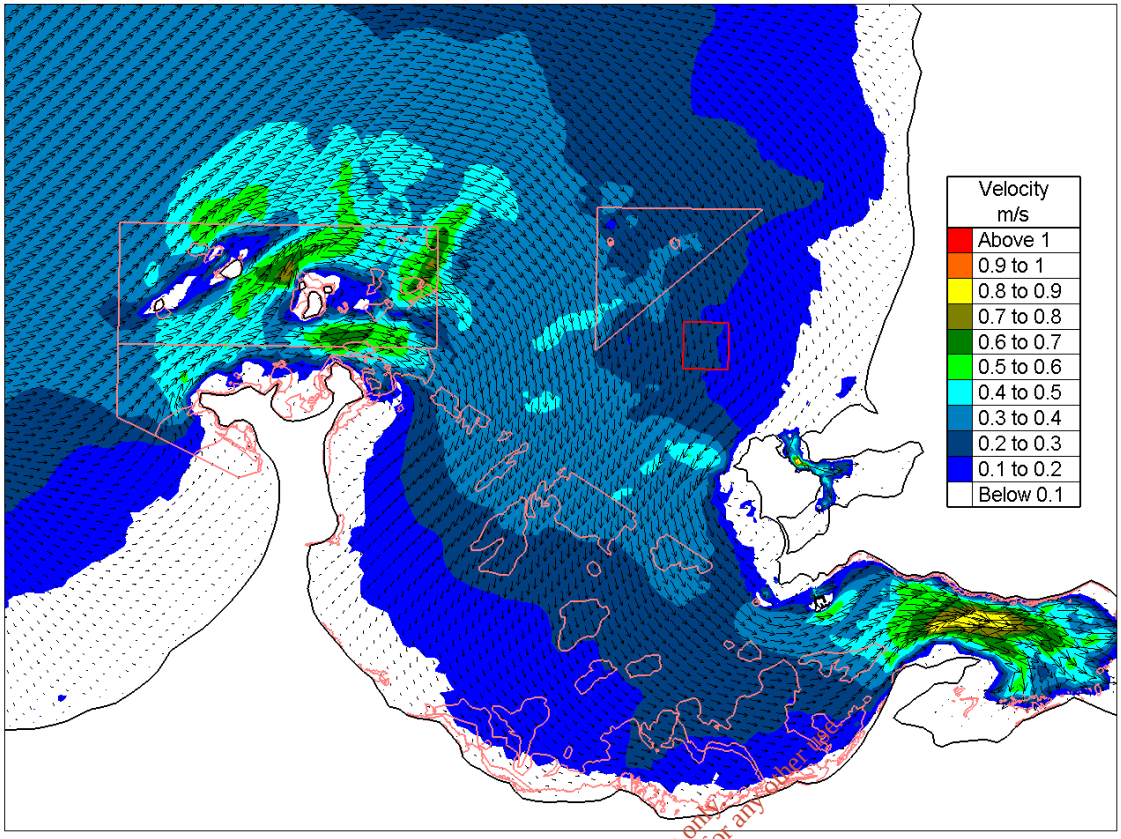
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Figure 11: Computed depth averaged velocities at Mid –Ebb Spring tide(Aquafact)



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Figure 12: Computed depth averaged velocities at Low Water Spring Tide(Aquafact)



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At the dump site previous modelling was undertaken to simulate the effect of dumping with a dredge disposal rate of 5,500m3 per day (Figures 13- 20). The modelling output presented here looks at the two key indicators namely total deposition and suspended sediment resulting from the disposal. The total deposition is shown after 9, 18, 28, 38 and 49 days of disposal (Figures 13 to 17). Over the course of these simulations it is shown that at the dumpsite the total deposition reduces from a maximum of 100kg/m2 initially to a maximum of 30kg/m2 in within the site and local maximum of 50kg/m2 directly south of the site, where disposed sediment has migrated, but generally the majority of the initial load is shown to remain at the site.

The suspended silt fractions released during the disposal (Figures 18 to 20) show an interesting circulation pattern of material firstly moving south similar to the 50day trend of total load, but the a migration to the North west and west. The maximum concentrations of suspended sediment are in the 50mg/l after 50 days. Deposition rate are less than 0.2 kglm2 with highs of 3kh/2 around the max concentration locations.

It should be noted that for the proposed dredging campaign, the greatest amount of dredging will be a rate of 3,000m3 per day albeit over a longer period than previously modelled. It is considered reasonable to assume that at the dumpsite approximately 2mm per m2 of coarse sediments is likely to be deposited with the remaining finer silt fractions migrating offshore.

Therefore during the dumping operations it is expected that there will be a localised increase in turbidity as there will be disturbance of silt/sand on the bed as dredge spoil is deposited on the bed from the dredger. In addition there will be material in suspension in the water column while it settles out of suspension and deposits on the sea bed. Some of the material will remain in suspension and will move with currents and will eventually settle out within the coastal system.

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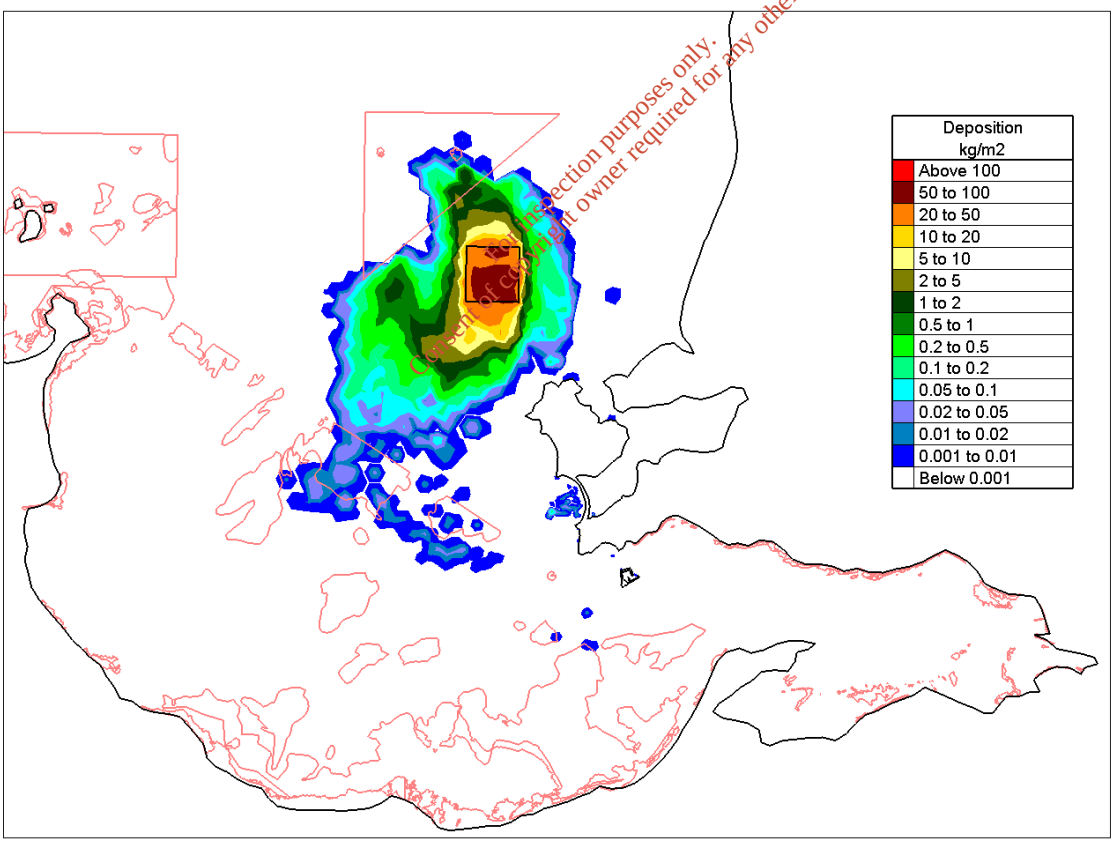
This in effect will generate a localised dredge plume in the immediate vicinity of the dredge vessel while it opens the bottom doors from the hopper and while the material drops to the sea bed. There will be a temporary impact on turbidity levels in the water column but this will reduce over time as the material settles out or disperses in the coastal system.

It should be noted that this type of dredging and dumping at sea campaign has been undertaken on many occasions over the last 20 years and on each occasion control measures and adequate supervision have ensured that no negative effects on water quality were experienced.

Based on good dredge methods, tight controls and monitoring it is possible to effectively manage the deposition of material at the dumpsite during a four week campaign. What is important to state is that turbidity within the water body is influenced by the natural daily tidal cycle and also by weather and storm events. The dumpsite is within open water and so the water column has naturally occurring levels of turbidity due to the effects of the tidal cycle.

The proposed dumping at sea process is a temporary event and the increase in turbidity is manageable and is not deemed significant.

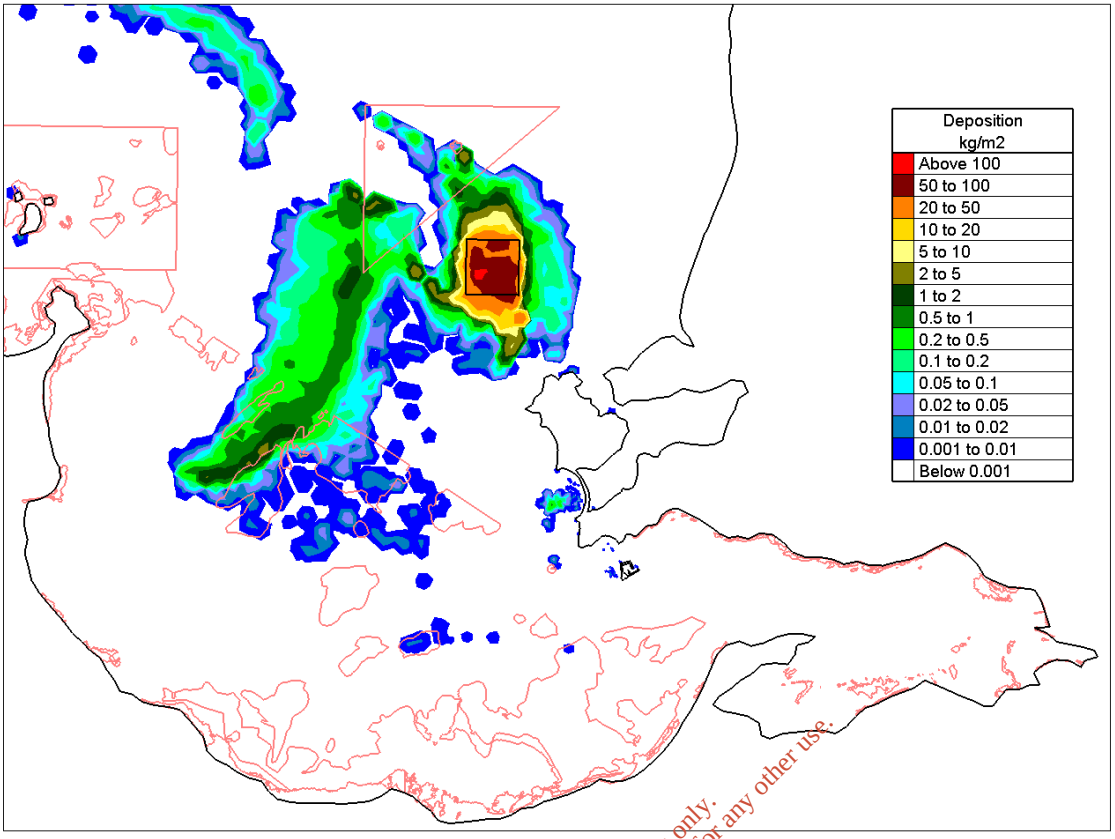
Figure 13: Total Deposition of Sand and Silt after 9days (aquafact)



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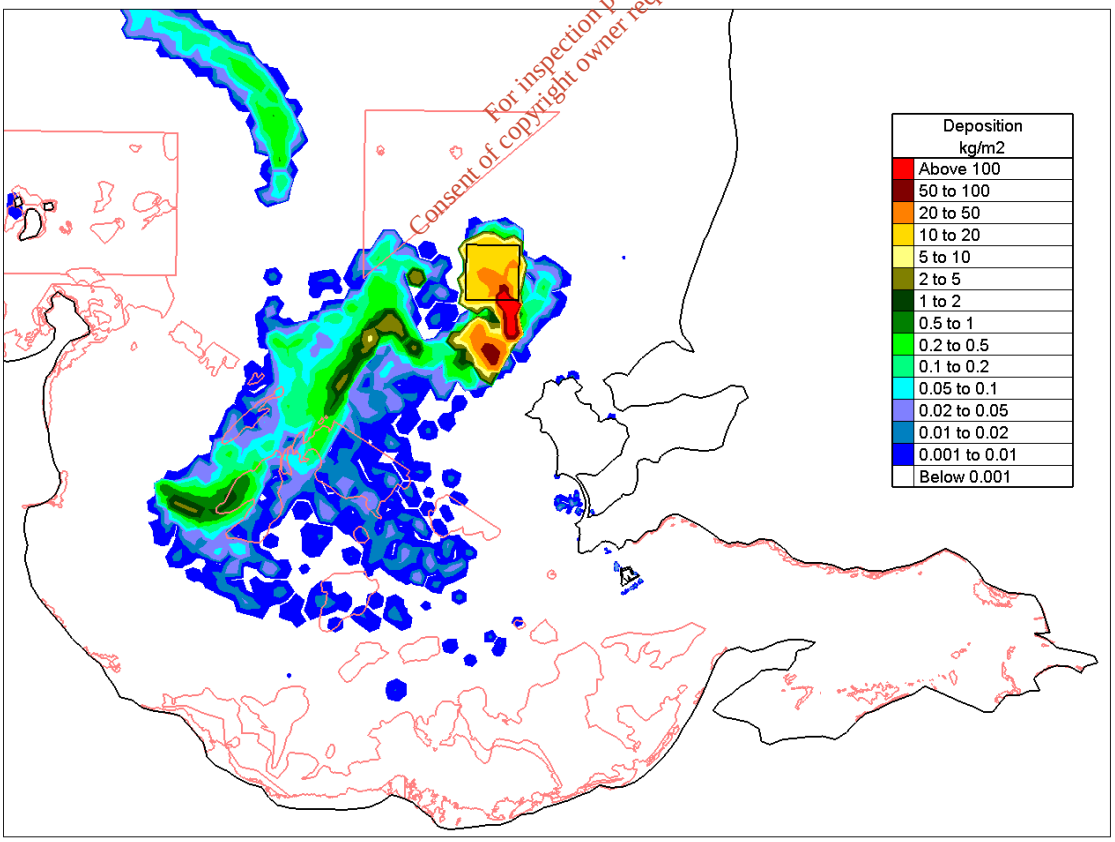
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Figure 14: Total Deposition of Sand and Silt after 18days (aquafact)



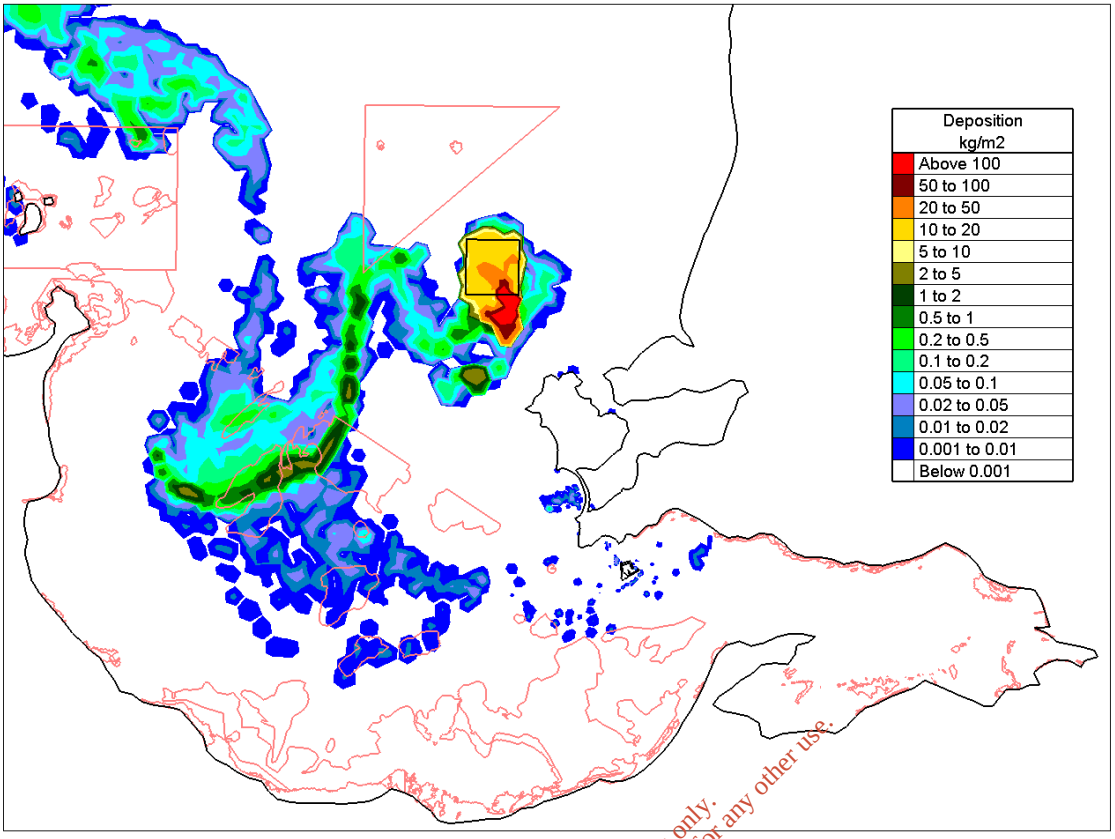
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Figure 15: Total Deposition of Sand and Silt after 28days (aquafact)



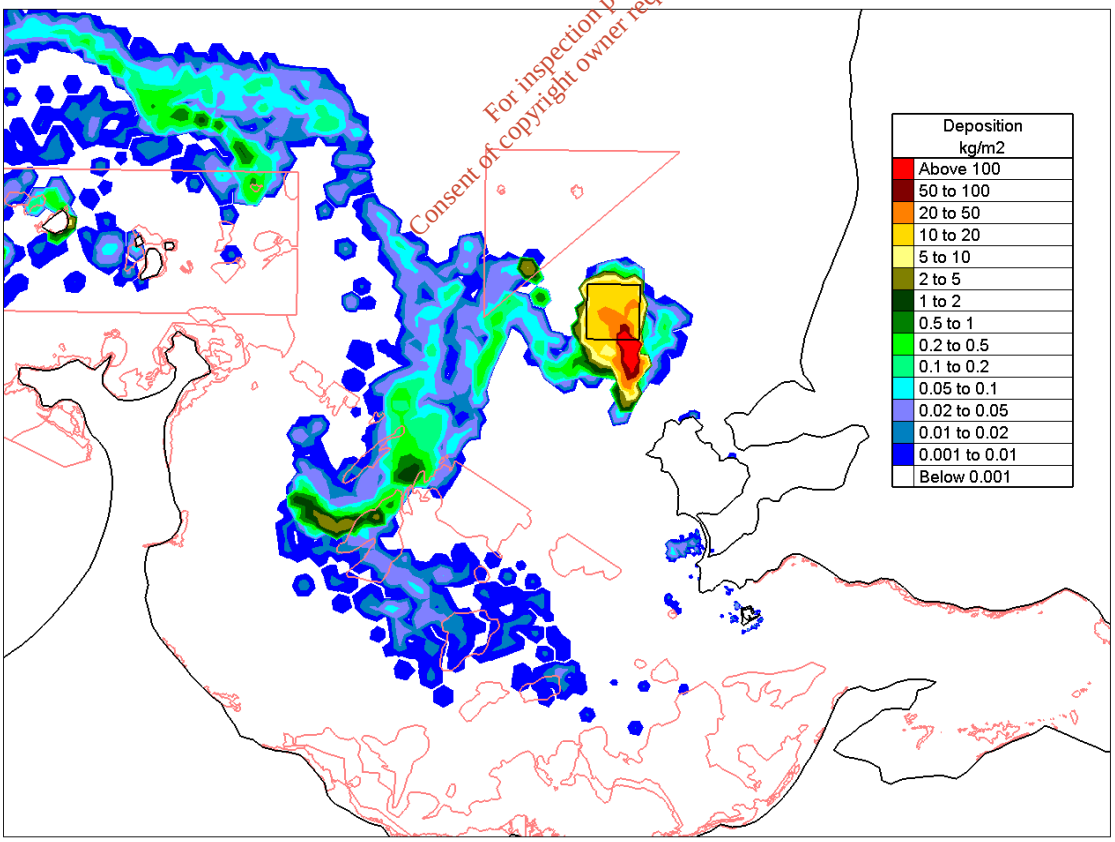
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Figure 16: Total Deposition of Sand and Silt after 38days (aquafact)



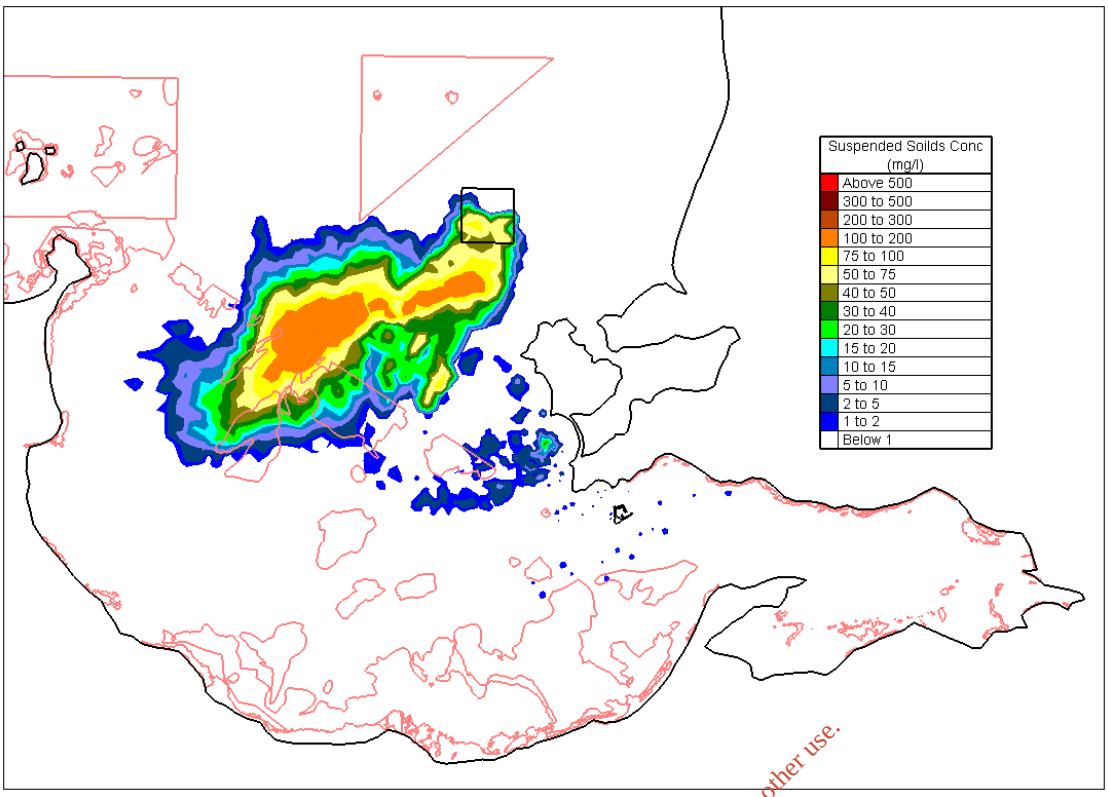
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Figure 17: Total Deposition of Sand and Silt after 49days (aquafact)



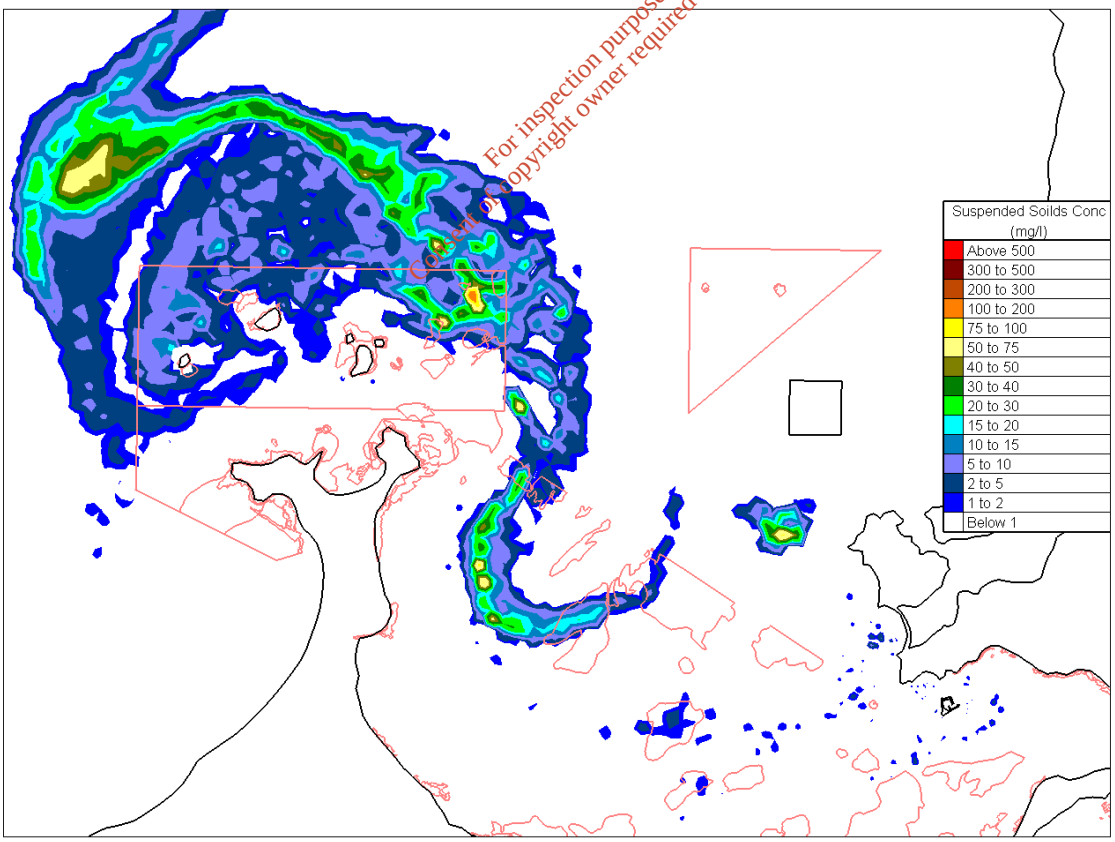
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Figure 18: Silt Fraction Suspended Solids concentration after 9days (aquafact)



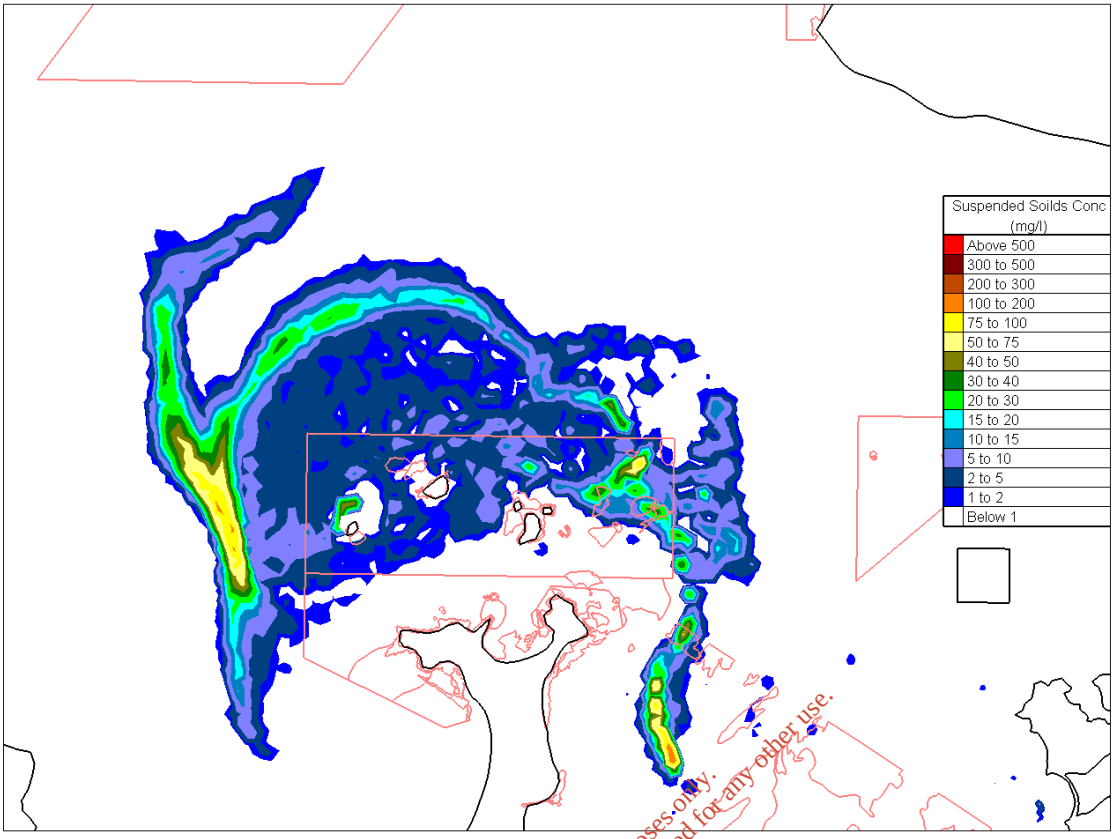
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Figure 19: Silt Fraction Suspended Solids concentration after 38days (aquafact)



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Figure 20: Silt Fraction Suspended Solids concentration after 49days (aquafact)



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3.5.3 Disturbance to species through smothering from the deposition of suspended solids

This impact relates to the species that live within the sea bed at the dumpsite location but also to species that are located in the seabed.

As previous stated, the recent assessment undertaken by Aquafact of the faunal assemblage at the dumpsite however suggest that past dumping operations has not resulted in a significant impact on benthic ecology.

As can be seen from section 3.5.4 above, and similar to similar to the previous disposal activities at this site, the amount of additional sediment depositing on any substrate does not have the capacity to cause smothering or blocking of light. The impact on any habitat or species is therefore considered unlikely.

3.5.4 Temporary noise disturbance from dredging plant

There will be some localised noise impacts from the dredging vessel as it delivers material to the site and deposits the material on the sea bed. There is a significant separation distance from the dumpsite location to the mainland and so any noise levels associated with the dumping at sea process will not reach receptors on land. There may be some perceptible noise levels immediately adjacent to the dumpsite on flat calm days when there is little or no background noise from the sea or environment.

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An assessment of risk to marine mammals from the proposed dredging and dumping at sea activity at Fenit harbour was undertaken by IWDG Consulting (See Appendix 1). The assessment suggests that based on the datasets available, it is unlikely that the proposed works will cause displacement from key functional areas. Correct implementation the NPWS MMO Guidelines should help to minimise any risks to marine mammals over the durations of the works.

3.5.5 Archaeology

An underwater archaeological impact assessment (UAIA) was undertaken to determine the impact of proposed dredging operations around the Fenit Pier area and the subsequent dumping of the dredged material at a previously used dumpsite. This report was prepared by Lar Dunne Archaeology and a copy is included as Appendix 2 of this attachment. The report concludes that there will be no impacts on archaeological resources.

4 DISCUSSION

The process of dredging and dumping at sea has similar potential impacts. The immediate receptor is the water body and good practice and controls can manage this impact. The use of turbidity monitors combined with visual monitoring by a dedicated supervising engineer will allow for control of the dredging and dumping process. Weather allowing it would also be possible to use a drone craft to hover above the dredge and dump locations to get an aerial photograph of the process at various stages and this would inform the control process, as any plume dispersion would be visible. Taking water samples along with data from the turbidity monitors will provide good baseline data for future dredging and dumping at sea events.

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The reports completed discuss the project and assess the potential for impacts. The reports broadly conclude that while there will be some impacts they are not significant. For the majority of the dredging and dumping period there will be some localised temporary impacts or disturbance, but the nature of this is typical of what has been successfully undertaken before without issue.

The dumpsite selection report was completed using a constraints led approach and thus avoiding all ecological, archaeological, fishing sensitivities. That report was also based on consultation with all stakeholders and their views were important in the selection process.

In the opinion of Malachy Walsh & Partners the dredging and dumping at sea process can be safely undertaken providing the controls outlined are fully implemented. As part of the dredging process the local stakeholders will be consulted prior to the dredging taking place, but also during and post completion. This engagement is essential in order to minimise any disturbance or impacts.

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APPENDIX 1

Assessment of Risk to Marine Mammals from Proposed Dredging and Dumping at Sea Activity, Fenit Harbour, Co. Kerry.

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Assessment of Risk to Marine Mammals from Proposed Dredging and Dumping at Sea Activity, Fenit Harbour, Co. Kerry

Client: Malachy Walsh and Partners for Kerry County Council

Ecological Consultants: IWDG Consulting.

Author: Joanne O'Brien and Simon Berrow

Date: 15 December 2017

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Irish Whale and Dolphin Group,

Merchants Quay, Kilrush, Co. Clare, Ireland

www.iwdg.ie

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1. Introduction

The Irish Whale and Dolphin Group (IWDG) were contracted by Malachy Walsh and Partners to carry out a review of marine mammal activity in the vicinity of proposed maintenance dredging operations at Fenit Harbour and dump site (located 1.5km north-northwest of Fenit Island, in outer Tralee Bay; Figure 1) and to prepare a Marine Mammal Risk Assessment.

Fenit Harbour is located on the west coast of Ireland, in County Kerry and lies on the northern shore of Tralee Bay, sheltered from the Atlantic by the Maharees tombolo. Fenit is the most westerly commercial port in Ireland and is the only commercial port between Foynes, Co. Limerick and Cork Harbour. It is used for commercial shipping, servicing a domestic fishing fleet, leisure and amenity and lifesaving. The main deep sea pier is 175m long with extensive storage facilities onsite. The landing quays have a design dredge depth of -7.5mCD. Fenit Harbour is an important logistical base for the Killarney based Liebherr cranes, while the commercial shipping quays facilitate 15,000 tonne ships with container cranes at a frequency of approximately 15 to 20 per annum. Currently, the fishing fleet operating out of Fenit includes approximately 1 large trawler, 2 medium trawlers and 24 half decker trawlers in addition to a number of charter angling vessels. Fenit Marina has a 130 berths and caters to leisure craft from 6-15m in length. It has a plan area of approximately 1.5ha. The marina has a design dredge depth of -3.5mCD (Fitzgerald, 2015b).

The proposed works at the site are planned to take place on an annual basis for a duration of 8 years, with the removal of dredge material somewhere in the region of 250,000 tonnes in year 1, decreasing to 75-000 to 150,000 tonnes each year thereafter (Table 1). A previous dredge campaign in 2016 involved the removal of 132,000tonnes. The increase in this quantity is to reflect the larger dredge area covering the entire harbour area, turning area and part of the approach channel outside the harbour. It is envisaged that works in Year 1 will take place over a 4-6 week period, and annually thereafter over a 2-3 week period. Dredging is envisaged to take place between February-May, or between September-October annually.

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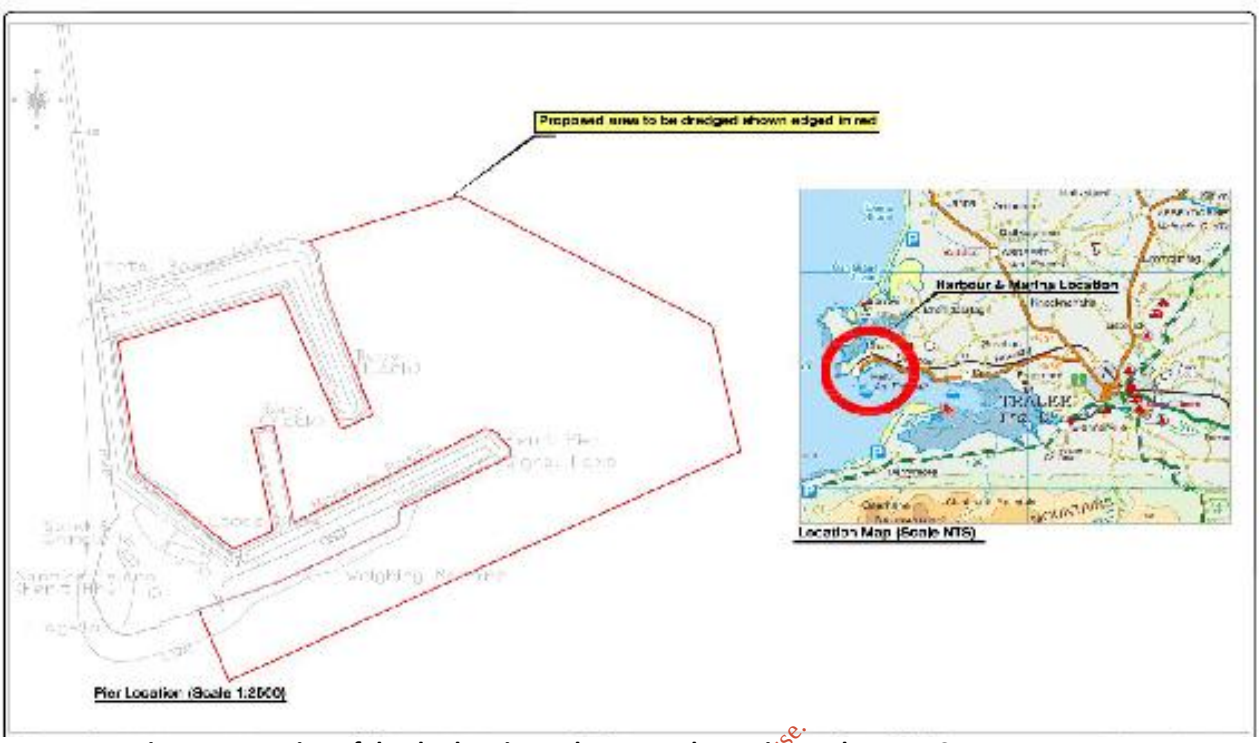


Figure 1. Location of the dredge site and propose dump site, Tralee Bay, Co. Kerry
(c) Malachy Walsh and Partners

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Table 1. Approximate annual estimates of material be removed on an annual basis from Fenit Harbour

Year	Amount (Tonnes)
1	250,000
2	100,000
3	150,000
4	75,000
5	150,000
6	75,000
7	100,000
8	100,000

Similar operations to the proposed works have been undertaken at Fenit on a number of occasions over the last 20 years. The proposed dump site is outside of designated areas, Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) and was derived as a suitable location after consultation with a number of stakeholders in the area as well as conforming to navigational safety of the port authority. However it is adjacent to the Lower River Shannon SAC with bottlenose dolphins as a qualifying interest and Tralee Bay and Magharees Peninsula, West to Cloghane SAC with otter as a qualifying interest.

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The proposed works will take place over a 4-6 week period 24 hours a day during the months of February through to the end of May or September through to end of October. It is expected that up to five loads of sediment will be filled on the dredger per day and disposed at the dump site.
A Marine Mammal Risk Assessment is a requirement for the application of a dredging and dumping at sea permit. This marine mammal risk assessment will consider the following based on the NPWS guidance document (NPWS, 2014); 1) Source, 2) Species and 3) Environment.

1. Source; where the source of anthropogenic noise will come from the dredger itself at the harbour and during transit to and from the dumpsite. Noise will also result from the excavation activities.

2. Species; based on assessment from various data sources on the species of marine mammals occurring within the proposed dredging and dump locations as well as surrounding areas.

3. Environment; where dredging activities and dumping at sea will take place, marine mammal occurrence within these areas will be assessed.

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2. Legal Status of Marine Mammals in Ireland

In Ireland, cetaceans (whale, dolphins and porpoises), pinnipeds and the Eurasian otter (*Lutra lutra*) are protected under a suite of national and international legislation. All cetaceans, as well as grey (*Halichoerus grypus*) and harbour seals (*Phoca vitulina*) and our only species of otter are protected under the Wildlife Act (1976) and amendments (2000, 2005, 2010 and 2012). Under the act and its amendments, it is an offence to hunt, injure or wilfully interfere with, disturb or destroy the resting or breeding place of a protected species (except under license or permit from the Department). The act applies out to the 12 nm limit of Irish territorial waters. Additionally, all cetaceans, pinnipeds and otter and are protected under the EC Habitats Directive, where all cetaceans are included in Annex IV of the Directive as species '*in need of strict protection*'. Under this Directive, the harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*), grey seal, harbour seal and Eurasian Otter are listed under Annex II, which identifies these species of community interest and whose conservation requires the designation of SACs.

In 2007, the National Parks and Wildlife Service (NPWS) of the Department of Arts, Heritage and the Gaeltacht produced a '*Code of Practice for the Protection of Marine Mammals during Acoustic Seafloor Surveys in Irish Waters* (NPWS, 2007). These were subsequently reviewed and amended to

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produce '*Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters*' (NPWS, 2014). This guidance document sets out the potential risks to marine mammals from man-made sounds. It states that "*An assessment of risk forms an important part of the decision-making framework for mitigating the effects of anthropogenic sound in the marine environment. It is recommended that … [certain] coastal and marine activities undergo a risk assessment for anthropogenic sound-related impacts on relevant protected marine mammal species, to inform the consenting process*."

The NPWS draft guidance states:

> *"A risk assessment for each marine mammal species of relevance to the proposed works area needs to consider the nature of the sound source, its likely and/or potential effects on individuals and/or populations and on their likely habitat…*
>
> *Where an assessment identifies the likelihood of a risk to protected marine mammal species, either by virtue of (a) the proposed operation or activity and/or (b) the sensitivity of a particular site in which the sound-producing operation or activity is proposed, it is recommended that appropriate risk management measures are pursued by the relevant Regulatory Authority."*

The guidance goes on to state:

> *"Following the initial identification and assessment of risk arising from an operation or activity … a menu of management options is available to Regulatory Authorities in their decision making process and it includes:*
>
> ***A1. Consent without mitigation*** *(e.g., where the risk of any adverse effects has been ruled out)*
>
> ***A2. No consent given for the activity***
>
> ***A3. Avoid critical habitats for marine mammals*** *(e.g., designated sites or other locations identified as sensitive via the risk assessment process)*
>
> ***A4. Avoid operations during key periods of the species' life cycle*** *(e.g., breeding/resting, migration)*
>
> ***A5. Avoid time periods when effective impact mitigation is not possible, and/or***
>
> ***A6. Risk minimisation measures, namely***
>
> > ***A6.1.*** *Minimise the duration over which the sound-producing activity is intended to take place;*
> >
> > ***A6.2.*** *Minimise the individual and cumulative sound pressure and exposure levels delivered into the environment by the activity. If necessary the use of alternative, lower impact equipment and methods should be explored (e.g., vibratory hammer, gravity base piles).*

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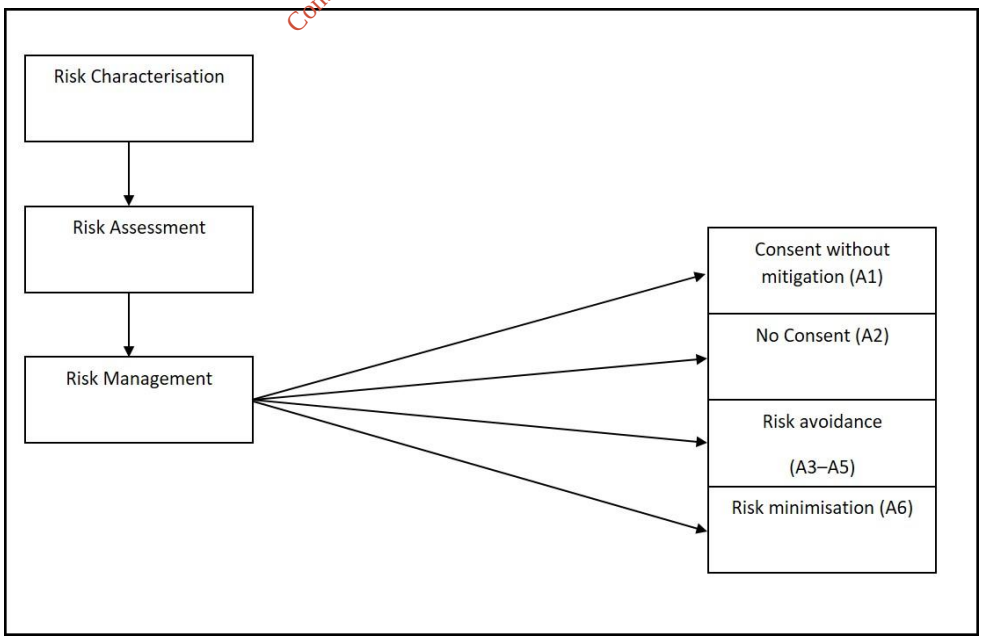
A6.3. *Incorporate the use of clear "ramp-up" or "soft-start" procedures, whereby sound energy input to the marine environment is gradually or incrementally increased from levels unlikely to cause significant behavioural impact on marine mammals to the full output necessary for completion of the activity.*

A6.4. *Incorporate the use of fully enclosing or confined bubble curtains, encircling absorptive barriers (e.g., isolation casings, cofferdams) or other demonstrably effective noise reduction methods at the immediate works site, in order to reduce underwater sound propagation from on-site operations. Studies have shown that such methods can provide a significant reduction in sound input to the wider aquatic environment in the order of 10-30 dB.*

A6.5. *The use of trained marine mammal observers (MMO's) provides effective means of detecting marine mammals in the vicinity of coastal and marine operations. Associated operational considerations should also be taken into account."*

The NPWS guidance document includes measures specific to dredging activities. The guidelines recommend that listed coastal and marine activities (including dredging) be subject to a risk assessment for anthropogenic sound-related impacts on relevant protected marine mammal species to address any area-specific sensitivities, both in timing and spatial extent, and to inform the consenting process. Once the listed activity has been subject to a risk assessment, the regulator may decide to refuse consent, to grant consent with no requirement for mitigation, or to grant consent subject to specified mitigation measures (Figure 2).

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Figure 2. Flow diagram illustrating the staged process towards managing risk (NPWS, 2014).

4. Information on the Proposed Activity

Fenit Harbour previously required maintenance dredging on a 3 to 5 year cycle, both within the commercial shipping berth and the marina harbour. Since the area was last dredged in 2016, the area has silted up and safe navigation and berthing of commercial ships is compromised based on recent bathymetry data. In 2016, approximately 132,000 tonnes of material was removed. However, recent assessments highlighted the need for annual dredging to avoid having to deal with excessive accumulation. The proposed works at the site are planned to take place on an annual basis for a duration of 8 years, with the removal of dredge material somewhere in the region of 250,000 tonnes in Year 1, decreasing to between 75,000 and 150,000 tonnes each year thereafter. The proposed dump site (located 1.5km north-northwest of Fenit Island) is outside of designated areas Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) but adjacent to the Lower River Shannon SAC and Tralee Bay and Magharees Peninsula, West to Cloghane SAC. It is estimated that the proposed works will take place across 4-6 weeks in year 1 and 2-3 weeks annually thereafter, with excavation works taking pace 24 hours a day.

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The dredge area in comparison to previous years is larger, as it covers the entire harbour, the turning area and part of the channel outside the harbour. Due to the physical shape of the harbour and its piers and structures within the bay, there is a need for routine maintenance dredging as the harbour footprint is an obstacle within the bay, and interrupts the natural hydrodynamics of the area. The harbour acts as a barrier or semi enclosed structure that catches sediment by means of reduced and impeded flows. This contributes to an ongoing accumulation of material within the commercial berth and the inner harbour area and hence the requirement for routing maintenance dredging (Fitzgerald, 2015a). The proposed works aim to remove approximately 1,000,000 tonnes of sediment over the 8 year period. These figures are the maximum dredge volumes, where actual volumes will be determined at the time by funding availability. It is estimated that during year one, operations will take place over a 4-6 week period and for 2-3 weeks each year thereafter.

Based on past models simulated for dredge operations (Malachy Walsh and Partners, 2015 b), it is expected that there will be a localised increase in turbidity due to disturbance of silt/sand on the bed as it is removed and there will also be overspill from the hopper as it is filled. This will generate a localised dredge plume in the immediate vicinity of the dredge vessel. It thought that this will be a

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temporary impact as once each stage of dredging is completed some of the material will settle out and be deposited on the seabed while some will remain in suspension within the water column. Results from model simulations over a 50 day period showed that silt deposition should migrate southwards, then westward and eventually northwards out of Tralee Bay and westward to open sea (Fitzgerald, 2015b).

The proposed dump site (located 1.5km north-northwest of Fenit Island) is outside of designated areas Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) and was chosen after consultation with stakeholders in the area. Assessments carried out by Malachy Walsh and Partners (2015a) concluded that the material being dredged is not contaminated and that it is suitable for deposition at the proposed dumpsite location, while the assessment of the dumpsite location showed that it is suitable to receive the material from the dredge footprint within the harbour.

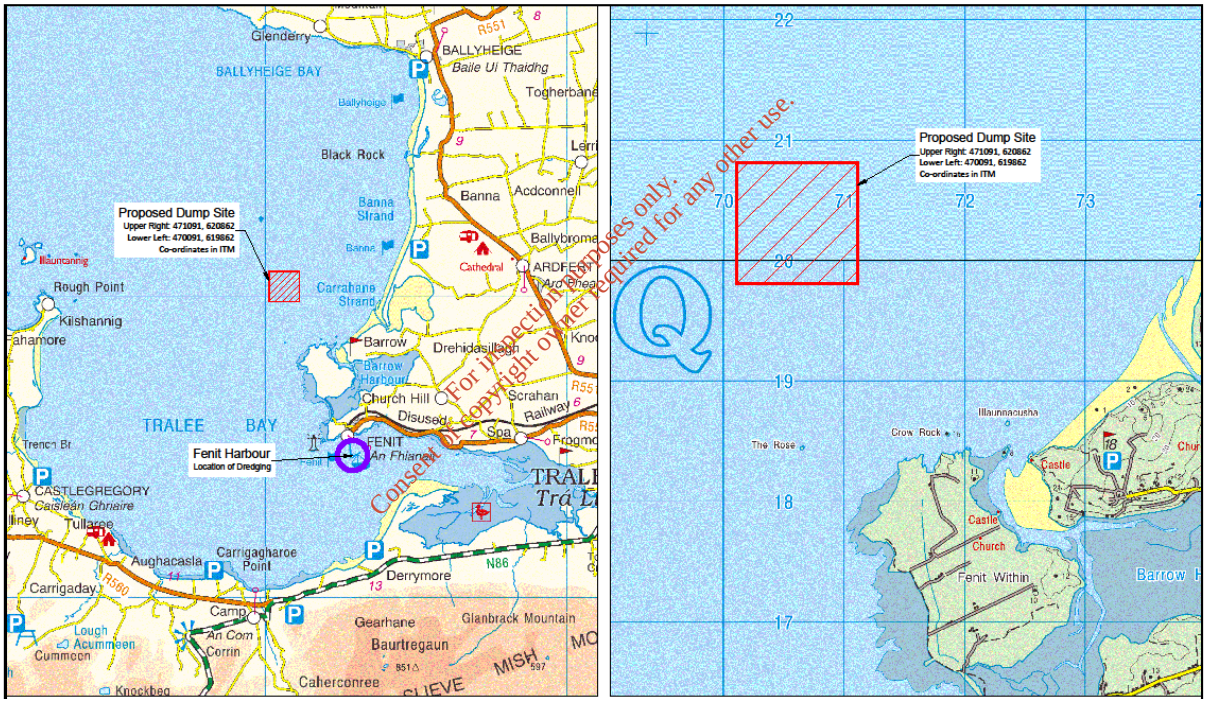


Figure 3. Location of dumpsite

5. Marine Mammal Activity within the Area of Proposed Activity

To date 25 species of cetaceans have been recorded in Irish waters and two regularly occurring seal species, *the Grey Seal and Harbour/Common Seal*. Of the 25 cetacean species recorded in Irish waters, one species is known only from strandings (Gervais beaked whale (*Mesoplodon europaeus* (Gervais 1855)), two species are known only from sightings ((beluga *Delphinapterus leucas* (Pallas 1776)) and northern right whale), while 21 species have been recorded both stranded and sighted

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(Berrow 2001; O'Brien *et al.,* 2009a). This high number (around a quarter of the world's total number of species) reflects the diversity of habitats from the relatively shallow (<200m) continental shelf, to the deep water (>2000m) to the west (including the shelf edge). Seal species have been found to breed around all shorelines of Ireland and use the coastal and offshore waters in their daily lives for foraging, transit between terrestrial resting places (known as haul-out sites), and other behaviours linked to their annual life cycles (e.g., social behaviour, territoriality).

The following sources of records for marine mammals were accessed to assess their occurrence within and around the area of the proposed dredge and dumping operations. These sources included;

1. The National Biodiversity Data Centre (NBDC) online database of species (accessed at www.biodiversityireland.ie on 20 November, 2017)
2. The Irish Whale and Dolphin Group (IWDG) online database of sightings of primarily cetaceans but other marine megafauna, including basking sharks and turtles (www.iwdg.ie, 20 November, 2017).
3. Previous MMO report from dredge monitoring carried out at Fenit, Co. Kerry (Dywer, 2016).
4. Appendix 4 of the National Parks and Wildlife Service guidance document (NPWS, 2014) which provides generalised maps of marine mammal distribution and habitat in Irish waters.

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This risk assessment was based on a review of available literature and data sources. Maps of the distribution of cetacean sightings within the Tralee Bay region were prepared using data from the Irish Whale and Dolphin Group's sightings database (IWDG, 2017). Results from searches of the NBDC database are provided in Tables below. However, it is acknowledged that absence of records does not provide conclusive evidence that marine mammals are absent from an area.

5.1 The National Biodiversity Data Centre's online mapping system of species records

The National Biodiversity Data Centres' (NBDC) online database was accessed for grey and harbour seal records, as well as European otter records in the vicinity of the proposed works at Fenit. The maintenance dredge operations at Fenit will take place entirely within National Grid Square (NGS) Q71. This NGS as well as the surrounding marine NGSs; Q61, Q62, Q72 and Q81 were also checked for records of all three species.

(i) Harbour seal

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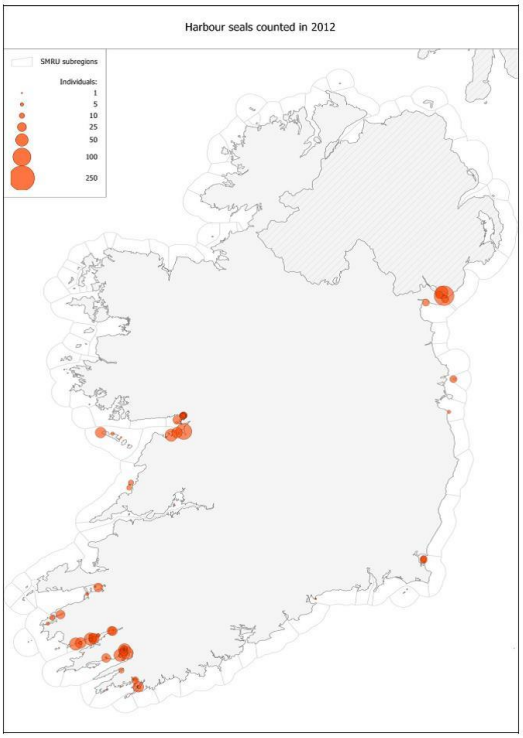
Some of the most important haul-out sites for harbour seals are along the west coast of Ireland, including; Bantry Bay, Kenmare River, Galway Bay, Sligo Bay and the Donegal Coast and Carlingford Lough (Lyons, 2004). Harbour seals are less widespread and abundant in Ireland than grey seals, but recent abundance estimates include; 2,905 common seals in total for the Republic of Ireland (Cronin *et al*. 2004). More recently, counts were combined from 2011 and 2012 surveys, which showed a total of 3,489 harbour seals, an increase of 18.1% from 2003 (Duck and Morris, 2013). Only two records of harbour seals exist for the Tralee Bay area in the NBDC dataset, one of which occurs within the NGS Q71 but across the bay from the proposed works (Table 2). The last seal survey undertaken in Tralee Bay was in 2012, when a single harbour seal was sighted (Duck and Morris, 2013; Figure 4).

(ii) Grey seal

Grey seals are widespread and abundant in Ireland, with the greatest numbers found in the south-western, western and northern coasts, but smaller populations are also found on the east and south coasts. Previous work has shown the largest populations exist on the Blasket Islands, Inishkea Island group and the Saltees (Lyons, 2004). A minimum estimate of 5,343 grey seals was recorded among haul-out sites in the Republic of Ireland between 1-9 March, 2007, with over 45% of all grey seals recorded on two islands, Inishkea North, Co. Mayo and the Great Blasket Island, Co. Kerry (O'Cadhla et al. 2007). Grey seals are highly mobile and may remain at sea for extended periods, especially outside the breeding season travelling distances of several hundred kilometres from breeding colonies (Cronin *et al.* 2013). During the 2012 aerial survey, no grey seals were recorded in Tralee Bay (Duck and Morris, 2013; Figure 5) and only six records exist on the NBDC database for the species, all outside the NGS Q71 (Table 2).

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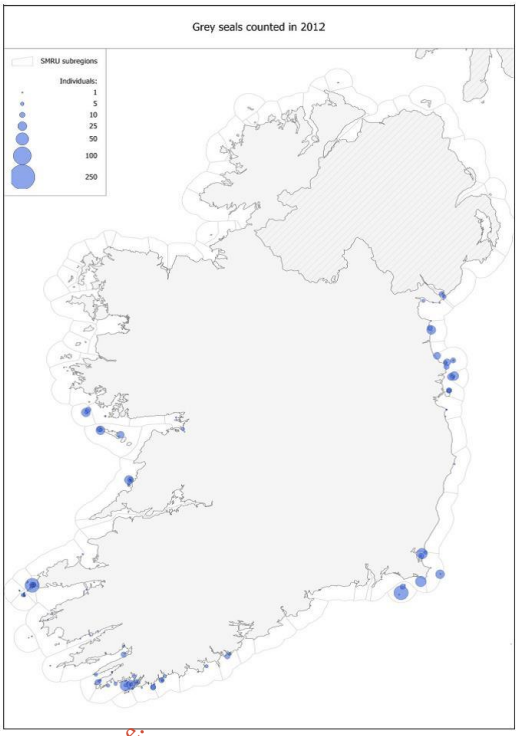


Figure 4 and 5. The number and distribution of harbour (orange) and grey seals (blue) counted in west, south-west, south and east Ireland in August-September 2012 (From Duck and Morris, 2013).

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Table 2. Records of Harbour and Grey seals within and surrounding NGS Q71 and 72.

Grid square	Species	Date	Location	Precision	Source
Q69	Harbour seal	08/06/2013	Tralee Bay	10km	NBDC
Q66	Harbour seal	17/07/2015	Tralee Bay	10km	NBDC
Q71	Harbour seal	17/08/2013	Tralee Bay	10km	NBDC/NPWS
Q72	Grey seal	1983	Ballyheigue Bay	10km	NBDC
Q72	Grey seal	1983	Ballyheigue Bay	10km	NBDC
Q62	Grey seal	24/10/2010	Tralee Bay	10km	NBDC/NPWS
Q68	Grey seal	17/08/2003	Tralee Bay	10km	NBDC/NPWS
Q68	Grey seal	01/09/2014	Tralee Bay	10km	NBDC/NPWS
Q68	Grey seal	01/09/2014	Tralee Bay	10km	NBDC/NPWS
Q69	Grey Seal	02/09/2012	Tralee Bay	10km	NBDC/NPWS

(iii) Otter

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Otters are found across a variety of aquatic habitats, including; rivers, lakes, estuaries, canals, marsh and along the coast. Coastal dwelling otters require access to fresh water to regularly rinse their fur to avoid problems with insulation. Only a single record for otters exists on the NBDC database in the vicinity of the proposed works, while another 9 records were found for Tralee Bay, but all outside the NGS Q71 where the proposed works will take place (Table 3). The Tralee Bay area is an important place for otters given the designation of the Tralee Bay and Maharees Peninsuala, West to Cloghane SAC with otter as a qualifying interest.

Table 3. Records of Otter within and surrounding NGS Q71 and 72.

Grid square	Species	Date	Location	Precision	Source
Q72	Otter	16/04/2015	Fenit	100m	NBDC
Q79	Otter	07/12/2014	Cockleshell Bay	100m	NBDC
Q65	Otter	31/03/2013	Aughacasla	100m	NBDC
Q81	Otter	18/09/2012	Blennerville	100m	NBDC
Q81	Otter	05/12/2012	Blennerville	100m	NBDC
Q81	Otter	28/11/2014	Blennerville	100m	NBDC
Q64	Otter	06/10/2010	Owencashla	100m	NBDC
Q64	Otter	17/04/2017	Camp	100m	NBDC
Q66	Otter	17/09/2015	Meenascarty	100m	NBDC
Q70	Otter	29/09/2010	Not recorded	100m	NBDC

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5.2 The Irish Whale and Dolphin Group Online Database of Cetacean Sightings

The Irish Whale and Dolphin Group operate an online validated database of cetacean sightings and other megafauna including basking sharks and sea turtles. This database was accessed to map the sighting records from the area around the proposed works out to a distance of approximately 30km. The database was searched for records around Fenit Island from 2000-2017. A total of 106 records exist for this time frame, accounting for five species, including; Bottlenose dolphin, Humpback whale, Risso's dolphin, Common dolphin, Long-finned Pilot whale and Harbour porpoise (listed in order of occurrence; Figure 6), and a total number of animals equating to 957 individuals. 23 of the 106 sightings include unidentified dolphin and cetacean species and three basking shark sightings were also included.

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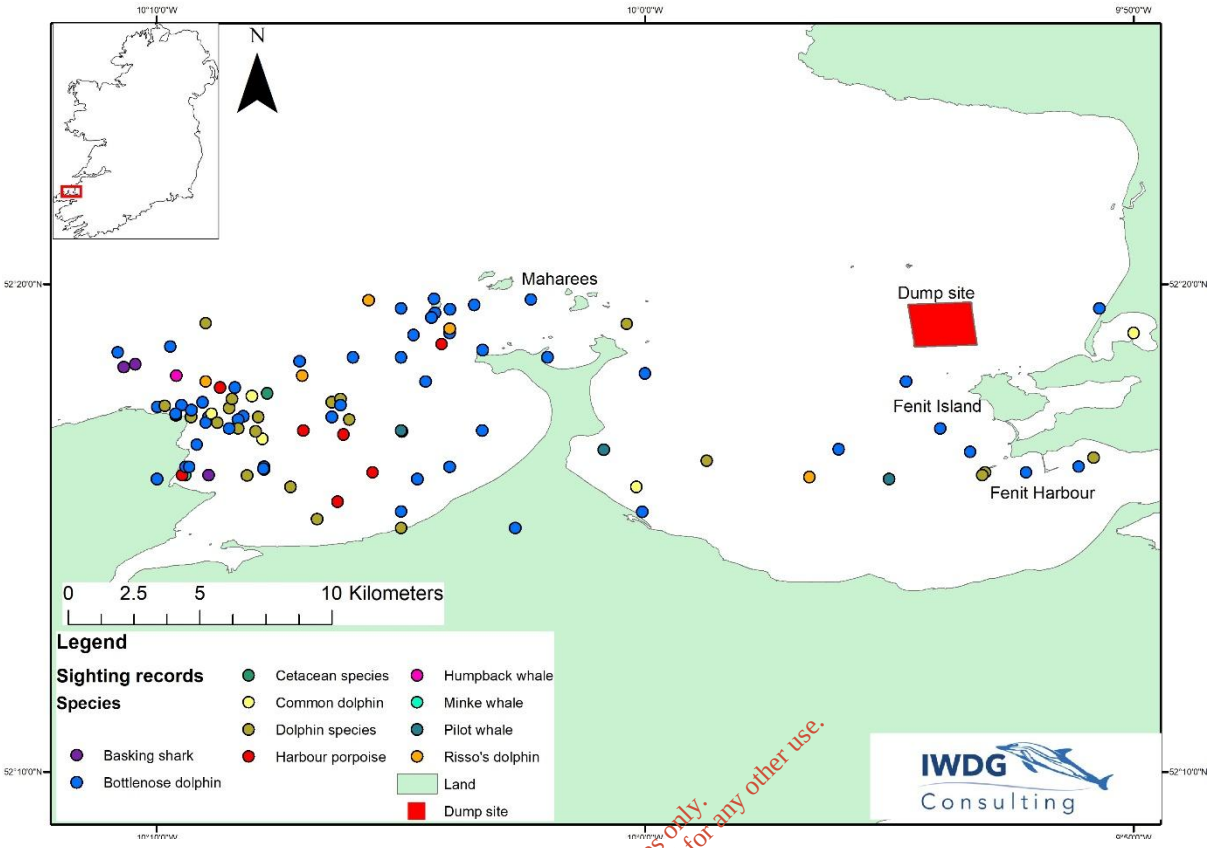


Figure 6. Map of cetacean distribution in Tralee Bay 2000-2017 (including 3 basking shark sightings).

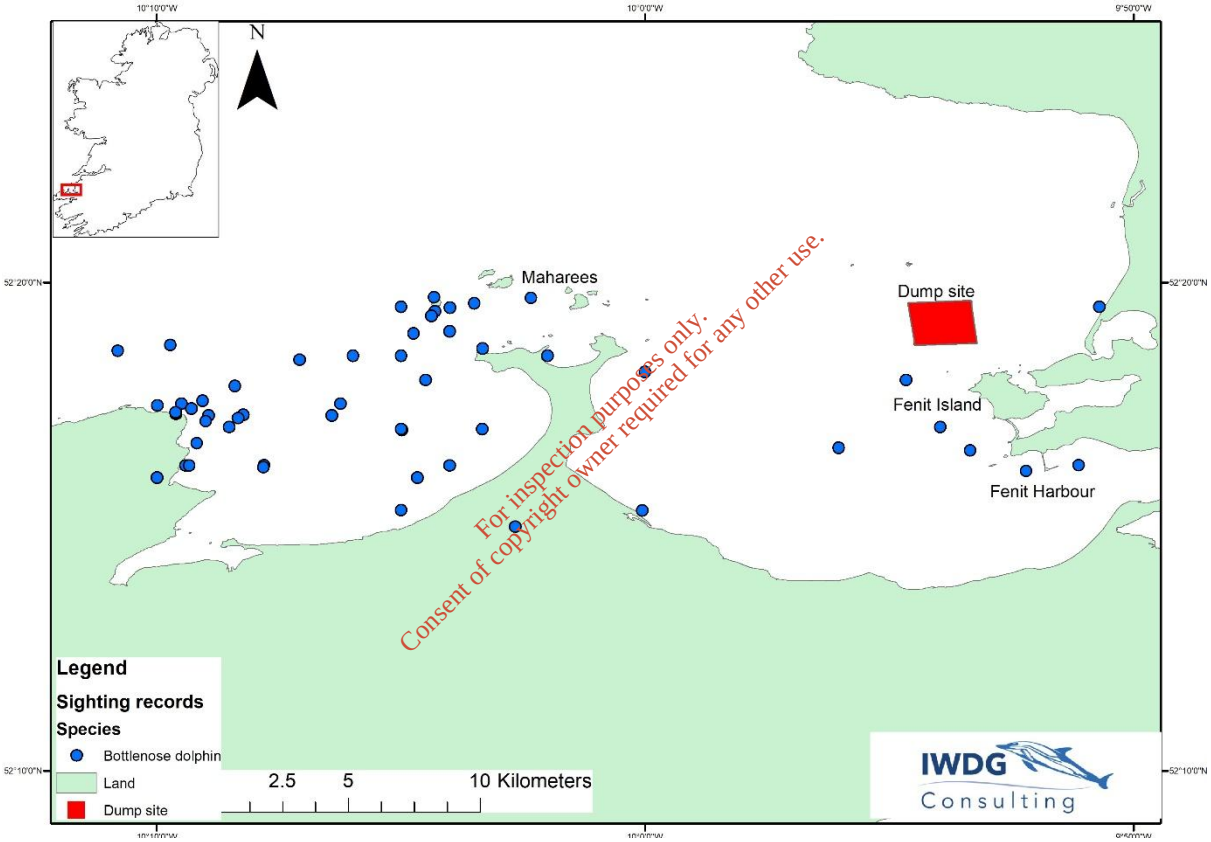
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(i) Bottlenose dolphin

Bottlenose dolphins are widespread and relatively abundant off the Irish coast with most sightings along the western seaboard (Berrow *et al.* 2010). Recent genetic evidence (Mirimin *et al.* 2011) suggests the existence of three discrete populations of bottlenose dolphins in Ireland: the Shannon Estuary, a coastal inshore population and a putative offshore population. The "putative offshore population" that was suggested by Mirimin *et al.* (2011) has recently been confirmed by Louis *et al.* (2014) who showed offshore dolphins in Ireland are genetically discrete from the Inshore population and part of a large wide-ranging group that includes dolphins from the Bay of Biscay and the Azores. O'Brien *et al*. (2009b) showed that the "Inshore population" (referred to as the Connemara-Mayo population by Ingram *et al*. 2001 and Mirimin *et al.* 2011) which is regularly recorded off Connemara is highly mobile with re-sightings of individual bottlenose dolphins from around the entire Irish coast including records from waters within and adjacent to the proposed site. IJsseldijk *et al.* (2012) carried out a more recent analysis which included 50 individual dolphins photographed off Connemara and showed a very high overall re-sighting rate of c.28%. These results suggest that this highly mobile population is relatively small and exhibits high local site fidelity. Recently individuals

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from this "Inshore population" in Ireland have been matched to the northeast and west coast of Scotland (Robinson *et al.* 2012) and to southwest England (Ryan *et al.* 2010). Bottlenose dolphins were the most frequently recorded species in Tralee Bay over the time-frame accessed, with a total of 19 sightings (constituting 58% of total sightings; Figure 7). Group sizes recorded in Tralee Bay ranged from 2 to 55 individuals. Given the close proximity of Tralee Bay to the Shannon Estuary SAC, it is likely that these sightings are of the Shannon population who has been previously recorded at the site on a number of occasions (Berrow and O'Brien, 2013; Levesque et al. 2016). Additionally, previous Static Acoustic Monitoring (SAM) for the species at Brandon Bay found dolphins to be present on 88% of days monitored (N=60 days).



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Figure 7. Map of bottlenose dolphin distribution in Tralee Bay 2000-2017.

(ii) Common dolphin

The southwest of Ireland is one of the best locations in European waters for common dolphins with high densities, especially in the autumn and winter. Common dolphins are regularly recorded along the west coast and often in very large groups and they are highly mobile and may travel long distances to find food. Group size ranged from 1-18 individuals in Tralee Bay. This is the third most frequently sighted species in Tralee Bay, but with six sightings listed (Figure 8).

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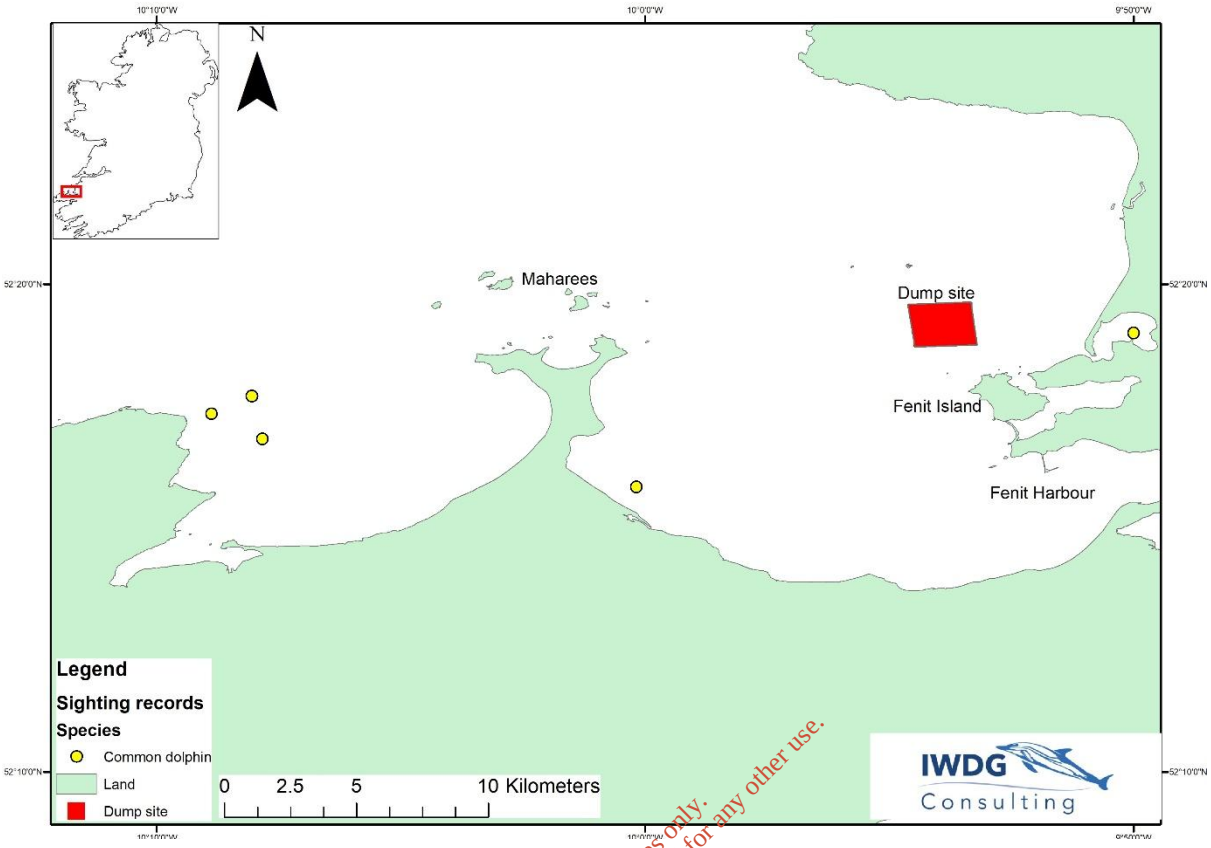


Figure 8. Map of Common dolphin distribution in Tralee Bay 2000-2017.

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(iii) Harbour porpoise

All harbor porpoise records exist west of the Maharees for the Tralee Bay area (Figure 9). This lack of records is most likely due to the elusive nature of the species and it going unnoticed by the general public. Tralee Bay was the target of Static Acoustic Monitoring (SAM) in 2009 and harbour porpoise were detected on 48% of days monitored in Ballyheigue Bay (N=36 days), while detections were recorded on 80% of days monitored in Brandon Bay (N=60 days; Berrow and O'Brien, 2013).

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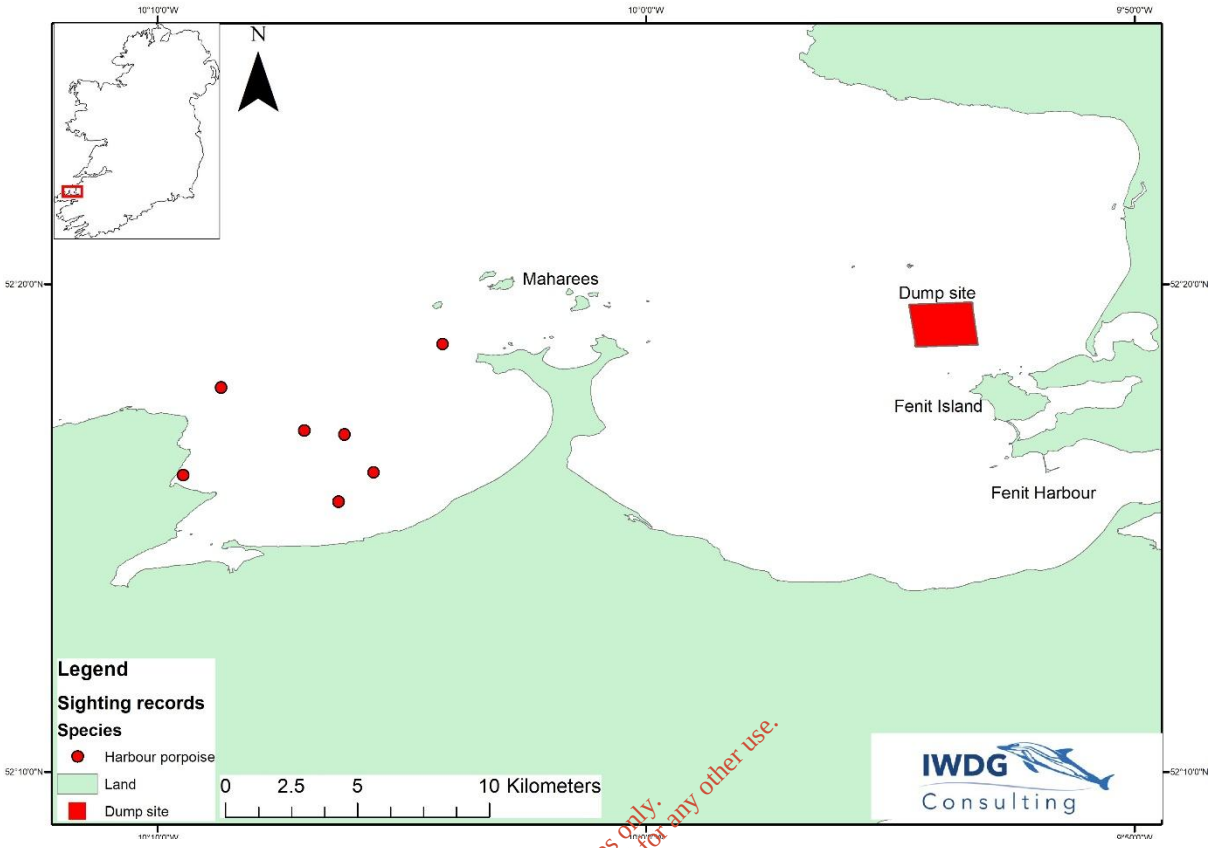


Figure 9. Map of Harbour porpoise distribution in Tralee Bay 2000-2017.

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(iv) Risso's dolphin

In Ireland, Risso's dolphins have a localised distribution, with some evidence of an inshore movement during the summer (IWDG). All six sightings in Tralee Bay were across the months April, June, September October between the years 2000 to 2017 (Figure 10).

(v) Long-finned Pilot whale

Long-finned pilot whales have an offshore distribution usually restricted to waters of the continental shelf and beyond. They are rarely recorded in inshore waters, except they live-strand. In 2002, a group of 10 individuals were recorded in Tralee bay and again in August 2009 where they remained in shallow waters for several days (Figure 11).

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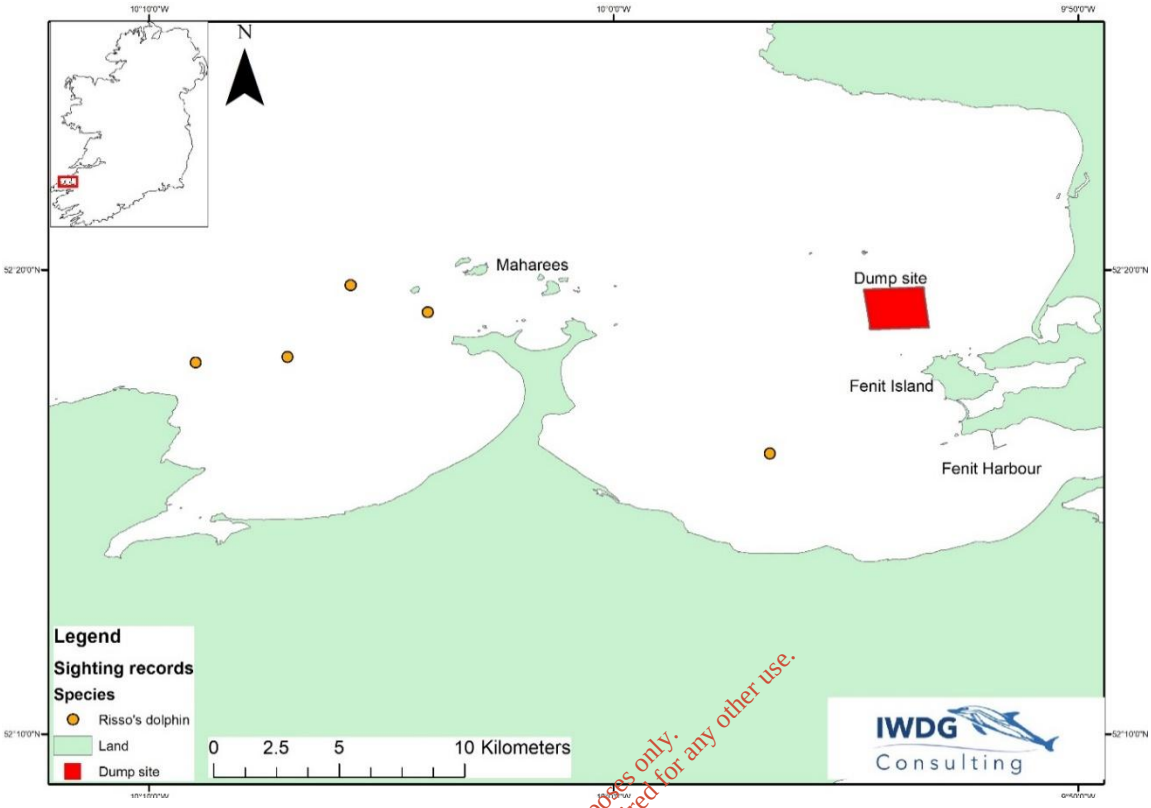


Figure 10. Map of Risso's dolphin distribution in Tralee Bay 2000-2017.

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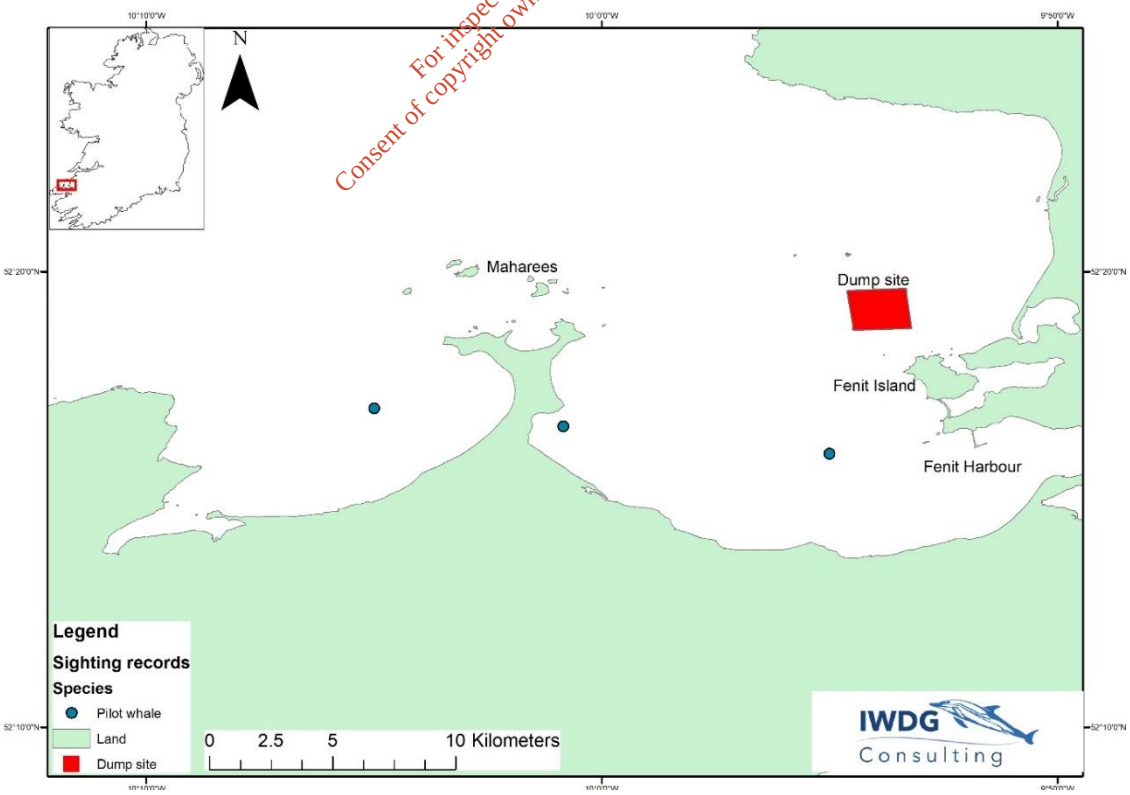
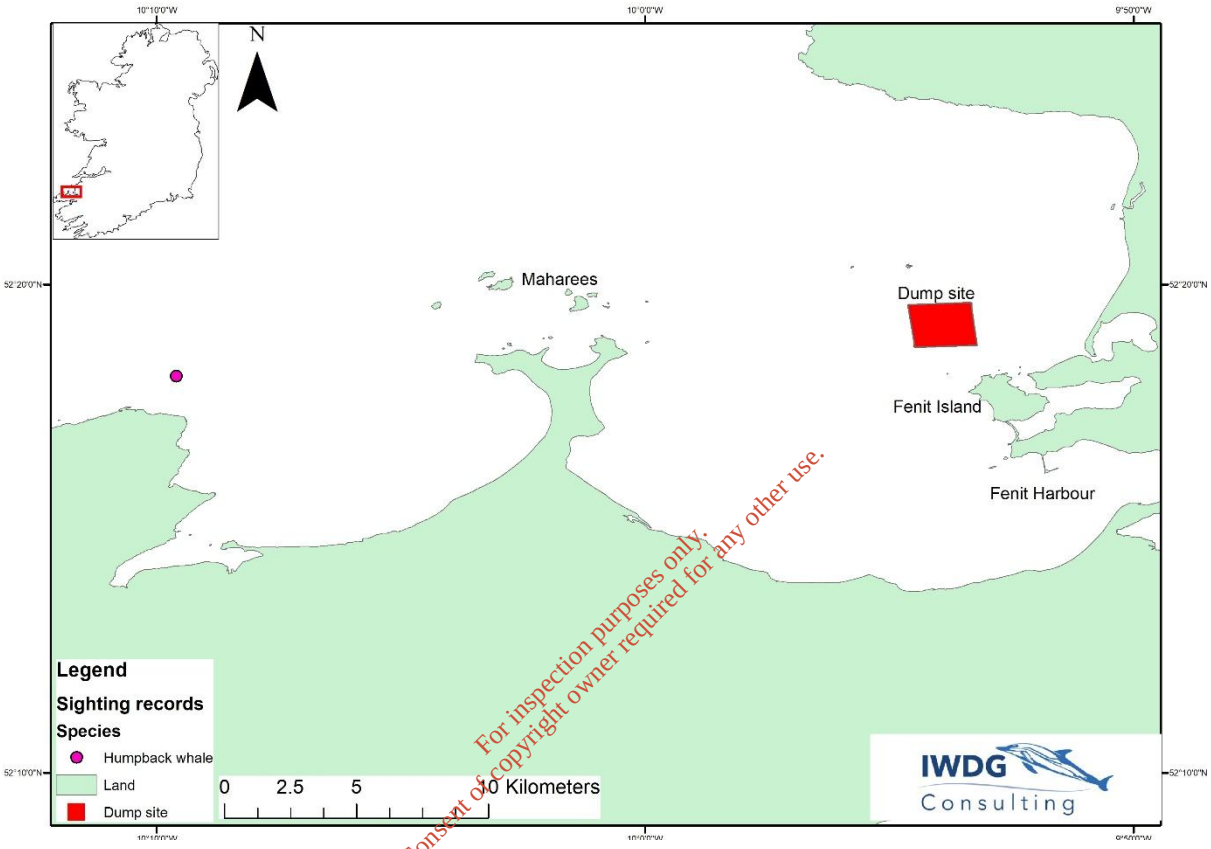


Figure 11. Map of Long-finned Pilot whale distribution in Tralee Bay 2000-2017.

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(vi) Humpback whale

Humpback whale occurrence is on the rise off the Kerry coast each year. An unprecedented number were recorded from June to October 2015 off the Blasket and Skellig Islands, while this continued into 2016 and 2017. However, only a single sighting exists for outer Tralee Bay (Figure 12).



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Figure 12. Map of Humpback whale distribution in Tralee Bay 2000-2017.

(vii) Minke whale

Minke whales occur frequently and at high densities off the Kerry coast (Wall *et al.*, 2013). They occur from late spring to early winter but are largely absent during late winter and early spring. However, only a single sighting exists on the IWDG database for Tralee Bay, some 30km west of the proposed works (Figure 13).

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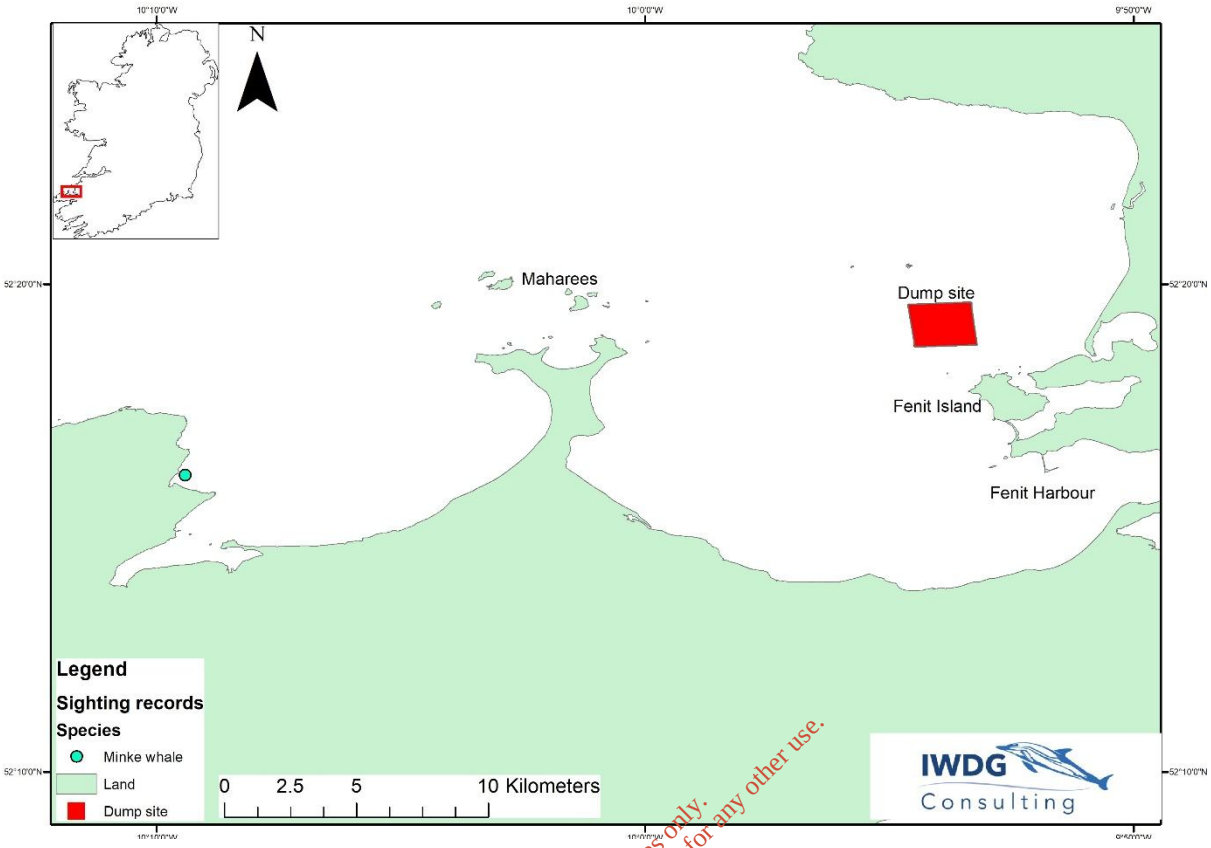


Figure 13. Map of Minke whale distribution in Tralee Bay 2000-2017.

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(viii) Unknown cetacean and dolphin species

A total of 22 sightings of dolphins which could not be identified to species level were also recorded across the time-frame (Figure 14). These are most likely to be bottlenose or common dolphins. However, 3 of these sightings occur within a 1km radius of the dredge operation zone at Fenit.

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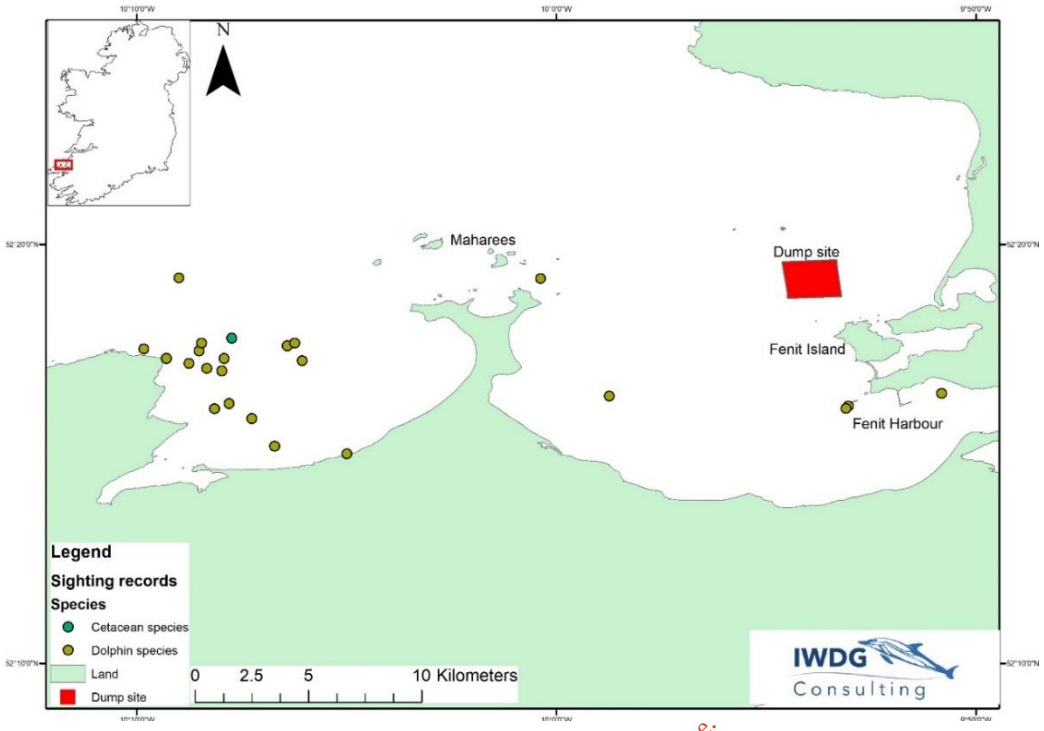


Figure 14. Map of unidentified-dolphin species distribution in Tralee Bay 2000-2017.

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(i) Basking shark

A total of three basking shark records exist for Tralee Bay but both occurring in the outer reaches of the Bay at Brandon Point during the months June and August (Figure 15).

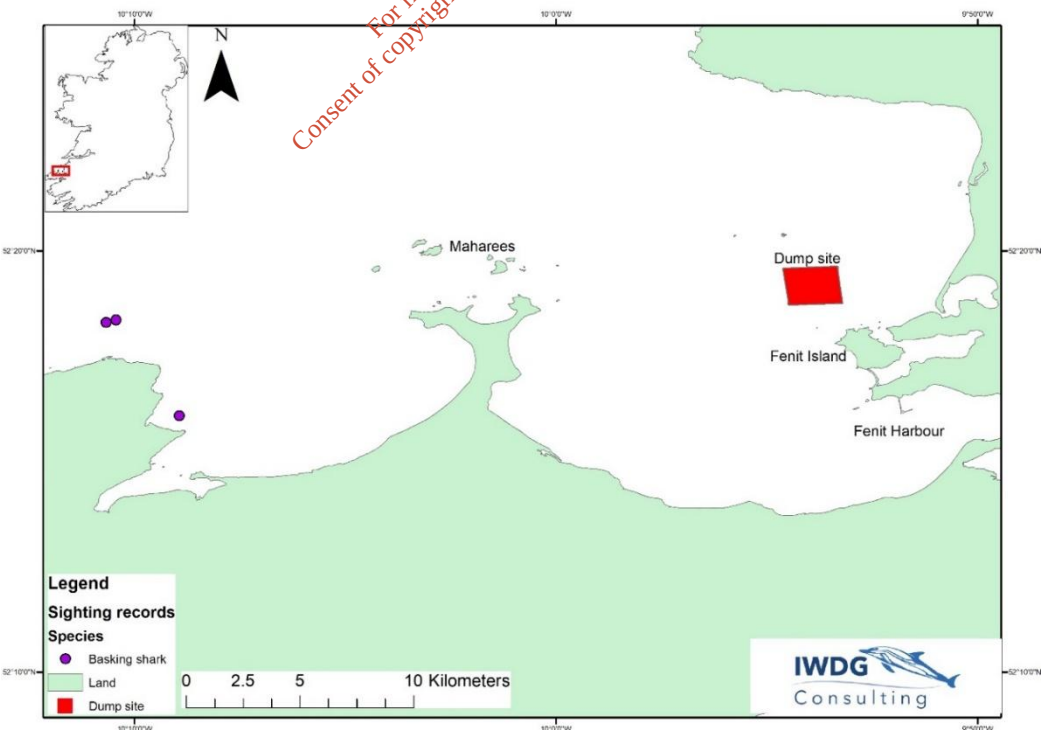


Figure 15. Map of basking shark distribution in Tralee Bay 2000-2017.

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5.3 Monitoring report 2016 (Dwyer, 2016)

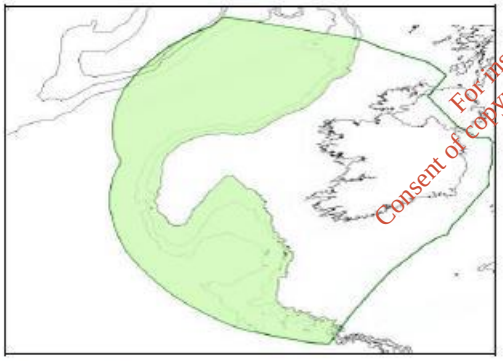
A marine mammal monitoring report was produced by Dwyer (2016) based on marine mammal observations over the duration of the dredging works at Fenit. Operations took place over an 8 day period from 21-29 April, 2016. The report details the marine mammal monitoring activities over the duration where marine mammals were recorded on 6 out of the 8 days dredging took place. Two species were encountered, bottlenose dolphin (6 sightings, group size ranging from 4-11 individuals) and grey seals (3 sightings, of single individuals). Bottlenose dolphins were present within the mitigation zone during the pre-watch on four occasions.

5.4 Appendix 4 of NPWS Guidance Document (NPWS, 2014)

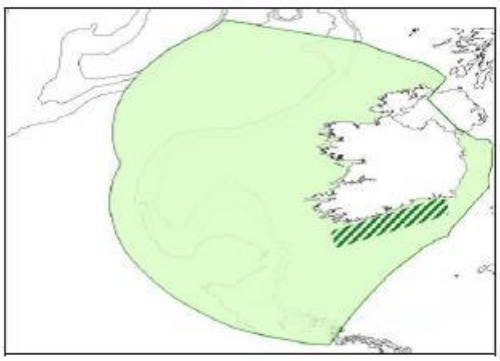
This NPWS publication provides generalised maps of marine mammal distribution and habitat in Irish waters. These maps indicate that there is habitat suitable for the following species in waters adjacent to the proposed works.

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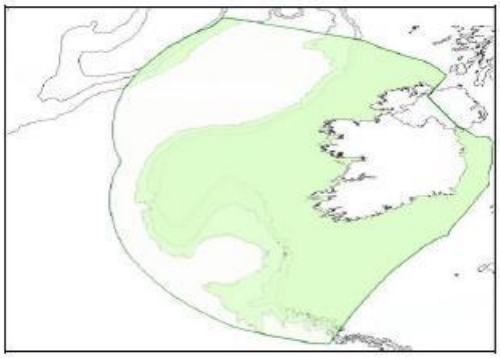
BALEEN WHALE DISTRIBUTION



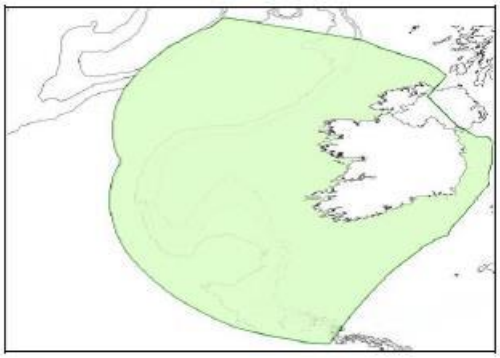
Blue whale



Fin whale



Minke whale

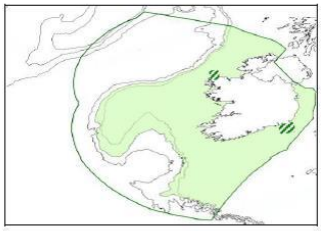


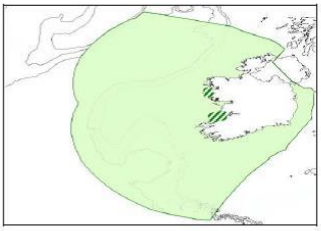
Humpback whale

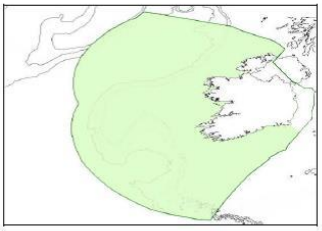
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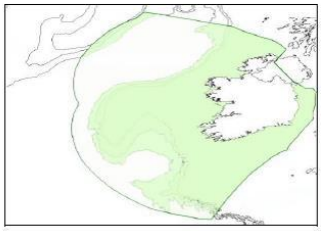
= Cetacean habitat
= High number of records
(v) = Vagrant species

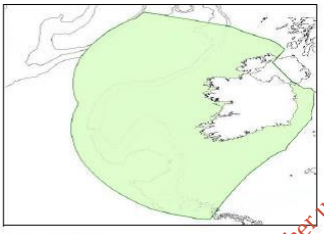
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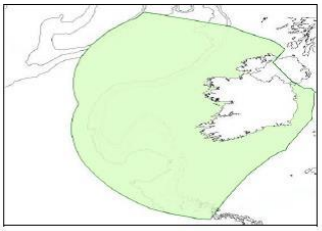

Risso's dolphin


Common bottlenose dolphin


Atlantic white-sided dolphin

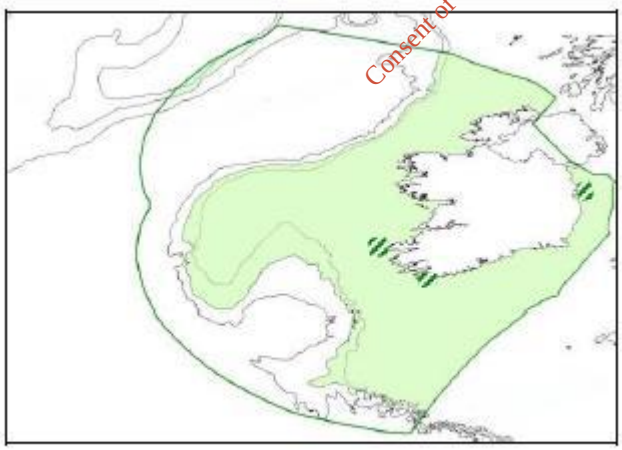

White-beaked dolphin


Striped dolphin


Short-beaked common dolphin

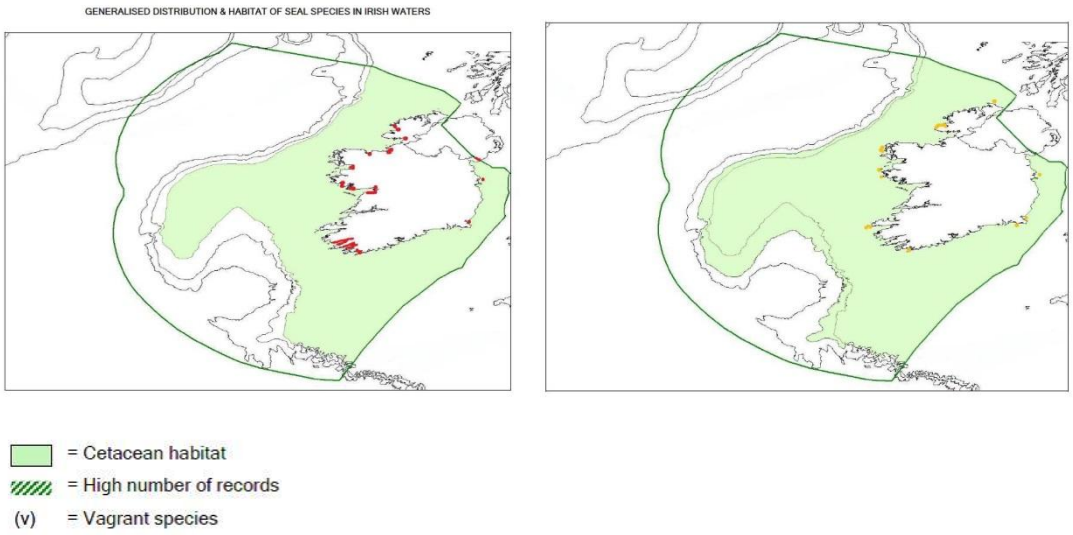
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= Cetacean habitat
= High number of records
(v) = Vagrant species


Harbour porpoise

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Harbour seal **Grey seal**



The maps presented in the NPWS guidance document confirm the results from data accessed through the IWDG and the NBDC. It shows the large amount of habitat offered to a variety of marine mammals along the west coast but only high numbers of records of bottlenose dolphins have shown up for the Tralee Bay region.

4.4 Summary of Desktop Data Records of Marine Mammals

In summary, from the data sources accessed, the cetacean species most regularly occurring in this area include bottlenose dolphins with the remaining species rarely recorded over the time-frame. Additionally, grey and harbour seals have also been recorded but not in great numbers over the years accessed. The number of otter sightings is also low given they are a qualifying interest in the adjacent SAC. Most marine mammal sighting are located away from the area of the proposed works. However, records from the dredge campaign off Fenit showed bottlenose dolphins and grey seals to be encountered during dredge and dumping operations off Fenit by the MMO present (Dwyer, 2016).

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6. *Impact Assessment*

6.1 Description of Dredging Activity and Impacts

For the majority of dredge operations worldwide, one of four kinds of dredgers are used. These include; cutter suction dredgers (CSD), trailing suction hopper dredgers (TSHD), grab dredgers (GD)

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and backhoe dredgers (BHD). TSHD's have previously been used during excavation works at Fenit. Dredge operations emit continuous low frequency sound into the marine environment, and because of this sound signature, these type of works are generally considered of lesser concern for impacts on marine mammals.

A trailing suction hopper dredger (TSHD) will be used for the majority of works at Fenit, Co. Kerry (Figure 12), while a plough or grab dredger may be used on hard to reach areas. Results from noise measurements conducted internationally during the extraction of sand using a TSHD showed that the dredger had an estimated source level of between 184-188 dB re $1\mu Pa^2m^2$, with the main energy occurring between 100 and 500Hz (Itap, 2007; WODA, 2013). These source levels (SL) at frequencies below 500 Hz are similar with those expected from a cargo ship travelling at a speed of between 8 and 16 knots (Arveson and Vendittis, 2000). However, additional work by Robinson *et al.* (2011) has shown that source levels at frequencies above 1 kHz show elevated levels of broadband noise generated by the aggregate extraction process; which is dependent on the aggregate type being extracted, e.g. coarse gravel generating higher noise levels than sand.

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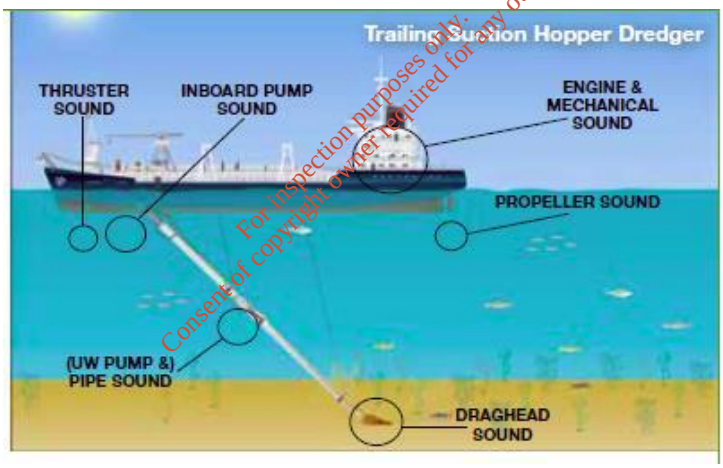


Figure 13. Trailing Suction Hopper Dredger (TSHD)©WODA

A review of the literature on the effects of dredging on marine mammals found that previous work in Aberdeen Harbour showed a clear avoidance response by bottlenose dolphins to dredging activity in a highly urbanised foraging patch (Pirotta *et al*. 2013). Given the level of vessel activity in the harbour, these dolphins were expected to show a high level of tolerance towards disturbance at the site, but results showed dolphins spending proportionally less time in the harbour as the intensity of dredging activity increased and in one year with dolphins leaving the harbour completely for approximately five weeks during the dredge works (Pirotta *et al*. 2013).

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Todd *et al*. (2014), carried out a review of impacts of marine dredging activities on marine mammals, highlighting collision as a possibility but only a single incident is available in the literature of a single right whale. The authors conclude, collisions are possible, but improbable given that operating dredgers are either stationary or moving at slow speeds. Studies on New Zealand fur seals were reviewed where results showed no evidence of disturbance, despite the relative closeness of a dredger to popular haul-out sites.

Additionally, in this review, Todd *et al.* (2014) highlight that with respect to sound from dredging activities, a marine mammals response is likely to depend on types of dredger used, state of operation, local sound propagation conditions, and the receiver characteristics with regard to the sensitivity and bandwidth of hearing. The authors go on to say that noise from dredging is usually below suspected injury thresholds or PTS (exposure criteria from Southall *et al*., 2007); however, TTS cannot be ruled out if marine mammals are exposed to noise for prolonged periods [as highlighted in a study on effects of long-term exposure in harbour porpoises; Kastelein *et al.* (2012). Limited data exists on the effects of dredging, but is unlikely to cause physiological damage to marine mammal auditory systems, but more likely leading to masking and behavioural disturbances, with baleen whales the most at risk taxa. Indirect impacts are listed as changes to their physical environment, to their prey and toxins and pollutants from dredge spoil. Effects of turbidity are often localised with minimal direct impact on marine mammals.

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Sound exposure levels from such operations are thought to be well below that expected to cause injury to a marine mammal. However, noise generated by dredging, from the physical presence of the dredger, and possibly from the increased water turbidity in the area of operations have the potential to cause low level disturbance such as masking or behavioural impacts such as displacement. The presence of an operational dredger at the site will lead to a small local increase in noise, given that Fenit is already used for commercial shipping, houses a domestic fishing fleet, as well as the presence of leisure, amenity and lifesaving vessels.

6.2 NPWS Assessment Criteria

1. Do individuals or populations of marine mammal species occur within the propose area?

- From the four data sources accessed, the most likely species to be encountered at the site include; bottlenose dolphin, harbour seal, grey seal and otter. However, sightings are intermittent and more regularly recorded in the outer reaches of Tralee Bay.

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2. Is the plan or project likely to result in death, injury or disturbance of individuals?

- There is some potential for direct or indirect impact from the dredge operations on marine mammals in the area, mainly through increased noise, leading to masking or displacement.
- With regards to these potential impacts, the proposed works are expected to be completed within 4-6 weeks, keeping potential disturbance to a minimum. Additionally, Fenit is a busy shipping and fishing port so the presence an additional vessel for a 4-6 week period should not have a significant impact.
- The risk of injury or mortality of a marine mammal over the course of the works is considered extremely low as the sighting rates for the area are low. If marine mammals occur with the area, they are already exposed to vessel noise on a daily basis and would be aware of their presence. The dredge vessel is relatively slow moving and thus ensuring any animals in the area would have sufficient time to avoid any collisions and thus injury or mortality.

3. Is it possible to estimate the number of individuals of each species that are likely to be affected?

- The number of sightings available for inner Tralee Bay is low, so the number of cetaceans likely to be encountered on any given day could range from zero to a large group of dolphins, as previously up to 55 Bottlenose dolphins have been recorded in the outer region of Tralee Bay. Results from short-term acoustic monitoring (n=60 days) have shown dolphins and porpoises to be present in the outer bay on a daily basis during summer months.

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4. Will individuals be disturbed at a sensitive location or sensitive time during their life cycle?

- No sensitive areas are evident within the vicinity of Fenit Harbour or dump site based on the data accessed, so it is unlikely the proposed works will cause disturbance at a sensitive location or time during their life cycle. Bottlenose dolphins from the Shannon Estuary have been found to frequent Tralee Bay during the summer months but were recorded mainly around the Maharees and Brandon Bay areas, up to 15km from Fenit Harbour. Dredging is due to take place outside of the summer months when highest numbers of dolphins have been recorded in the area.

5. Are the impacts likely to focus on a particular section of the species' population, e.g., adults vs. juveniles, males vs. females?

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- It is impossible to assess this impact/risk as the data available does not permit. Sightings of all species recorded to date in Tralee Bay are sporadic.

6. **Will the plan or project cause displacement from key functional areas, e.g., for breeding, foraging, resting or migration?**

- Based on the datasets available, it is extremely unlikely that the proposed works will cause displacement from key functional areas.

7. **How quickly is the affected population likely to recover once the plan or project has ceased?**

- It is expected that animals displaced from the vicinity of the dredging and dump site would return after the works have stopped. Displacement if evident should be short lived based on the duration of the proposed works (4-6 weeks 2018, and 2-3 weeks annually).

6.3 Mitigation

To minimise the risk of permanent or temporary injury and disturbance to marine mammals in the vicinity of dredging operations, the NPWS 'Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters (NPWS, 2014) recommended that stated mitigation procedures for dredging are followed and monitored by a suitable qualified Marine Mammal Observer (MMO).

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1. A qualified and experienced marine mammal observer (MMO) shall be appointed to monitor for marine mammals and to log all relevant events using standardised data forms (as presented in Appendix 7; NPWS, 2014).

2. A dedicated Marine Mammal Observer will conduct a 30 minute watch for marine mammals within 500m of the *dredging* vessel prior to start up. If a seal, cetacean, basking shark, turtle or otter is sighted within 100m of the vessel, start-up must be delayed until the animals is observed to move outside the mitigation zone or the 30 minutes has passed without the animal being sighted within the mitigation zone.

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Pre-start monitoring

3. Dredging activities shall only commence in daylight hours where effective visual monitoring, as performed and determined by the MMO, has been achieved. Where effective visual monitoring, as determined by the MMO, is not possible the sound-producing activities shall be postponed until effective visual monitoring is possible.

4. An agreed and clear on-site communication signal must be used between the MMO and the Works Superintendent as to whether the relevant activity may or may not proceed, or resume following a break (see below). It shall only proceed on positive confirmation with the MMO.

5. In waters up to 200m deep, the MMO shall conduct pre-start-up constant effort monitoring at least 30 minutes before the sound-producing activity is due to commence. Sound-producing activity shall not commence until at least 30 minutes have elapsed with no marine mammals detected within the Monitored Zone by the MMO.

6. This prescribed Pre-Start Monitoring shall subsequently be followed immediately by normal dredging operations. The delay between the end of Pre-Start Monitoring and the necessary full dredging output must be minimised.

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Dredging operations

7. Once normal dredging operations commence, there is no requirement to halt or discontinue the activity at night-time, nor if weather conditions or visibility deteriorate nor if marine mammals occur within a 500m radial distance of the sound source, i.e., within the Monitored Zone.

Breaks in sound output

8. If there is a break in dredging sound output for a period greater than 30 minutes (e.g., due to equipment failure, shut-down or location change) then all Pre-Start Monitoring must be undertaken in accordance with the above conditions prior to the recommencement of dredging activity.

Dumping at sea

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9. An MMO will ensure that no marine mammals are not within the dumpsite prior to dumping and will ensure an exclusion zone of 500m is in place.

Reporting

10. Full reporting on MMO operations and mitigation undertaken must be provided to the Regulatory Authority as outlined in Appendix 7 (NPWS, 2014).

6.4 Summary

Based on the exposed nature of Tralee Bay, the sporadic nature of sightings and its use by a small genetically discrete population of bottlenose dolphins from the Shannon Estuary, it is recommended to adopt the NPWS guidelines. Based on current literature and experience gained elsewhere and following the NPWS guidelines for risk assessment, it is unlikely any marine mammals will be injured or killed as a direct result of the proposed works in Fenit Harbour. Marine mammals are generally not present within the harbour and therefore will not be impacted upon. However, bottlenose dolphins and grey seals have been recorded close to the dumpsite during previous operations showing the need for an MMO to mitigate against disturbance and to assess if the works have an effect on marine mammals present.

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Increased noise levels are associated with the presence of the dredge vessel, but given the frequency and number of boats that enter and exit Tralee Bay on a daily basis, the increase should not be significant. It must be noted however that bottlenose dolphins in other areas have shown avoidance behaviour to a harbour when dredging took place even though these individuals showed a high tolerance to shipping activity. MMO work carried out in the Shannon Estuary recorded bottlenose dolphins passing through an area during operations, and no clear signs of disturbance were noted (IWDG, 2016). Correct implementation the NPWS MMO Guidelines should help to minimise any risks to marine mammals over the durations of the works.

However, as this licence is for an 8 year period, a review of the operations should take place on an annual basis after the works take place to ensure the mitigation is working or to identify potential issues that may arise to ensure effective mitigation over this licence period. Based on past MMO operations by Dwyer (2016) in Fenit, an MMO can only officiate operations during daylight hours whilst under licence, operations can take place during the hours of darkness. Clarification between departments should be sought to ensure the works are compliant as in such MMO reports operations during night-time hours are reported as non-compliant. A pragmatic approach to this

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would be to ensure an acceptable percentage of the overall works are officiated and to make an assessment based on best available information whether the works had an effect local marine mammals populations or not. Guidance and clarification on how to effectively implement the MMO guidelines in Fenit Harbour should be sought from the NPWS to avoid reporting of non-compliance.

Fenit offers some vantage points for an MMO to be based on land but based on past recommendations by Dwyer (2016), having the MMO present on the vessel was more suitable given the close proximity to the dredging and dumping operations. The proposed works with the mitigation outlined are considered unlikely to present a risk to marine mammals but given the presence of the Shannon population in the bay this could be further assessed through the use of acoustic monitoring before, during and after the proposed works especially when taking place annually over an 8 year licence.

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APPENDIX 2

Underwater Archaeological Impact Assessment Report
Fenit Harbour and Tralee Bay, Co. Kerry

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Underwater Archaeological Impact Assessment Report, Dumping at Sea & Foreshore Licence Application, Fenit Harbour, Tralee, Co. Kerry.

12th October 2018

Report prepared on behalf of: Malachy Walsh & Associates,
Rinn Point,
Blennerville,
Tralee,
Co. Kerry.

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1 Introduction

This underwater archaeological impact assessment (UAIA) was undertaken to determine the impact of proposed dredging operations around the Fenit Pier area and the subsequent dumping of the dredged material at a previously used dumpsite of *c*.1.2km² in Tralee Bay NW of Fenit Island (Figures 1-2 & Table 1). The UAIA is being undertaken on behalf of Malachy Walsh & Partners, Engineers & Planners acting for Kerry County Council who are applying for Dumping at Sea (DAS) and Foreshore Licenses for a multi annual permit to facilitate dredging in Fenit Harbour. The dredging is necessary *'to facilitate the unfettered access of vessels into and from Fenit Harbour and in the provision of the safe loading of cargo within the commercial berth dredging has to be carried out at regular intervals to ensure a significant depth of water under the vessels within the pier itself and in adjoining waters… It is envisaged that over the 8–10 year period the quantity of dredged material to be dumped at sea could be in excess of 1 million tonnes following a number of dredging campaigns'* (KCC Scoping doc. 2017).

The proposed dredging operations incorporates all of the area of recent previous suction dredging works carried out around the Fenit Pier area in April 2016 under an EPA Dumping at Sea Licence No. S-0007-02 (Figure 3). In advance of these works an Underwater Archaeological Impact Assessment (UAIA) that included licensed dive truthing surveys of the Fenit Pier area and dumpsite was submitted in August 2015 with negative archaeological results (Dunne 2015). The subsequent 2016 dredging operations were archaeologically monitored by this author under license issued by the National Monuments Service (Licence No. 15E0557) and a report submitted on the results (Dunne 2016, 21). The dredged material was deposited at a dumpsite in Tralee Bay (Figure 4 & Table 1). Nothing of archaeological interest was found during the monitoring (ibid).

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Figure 1: Site Location Map

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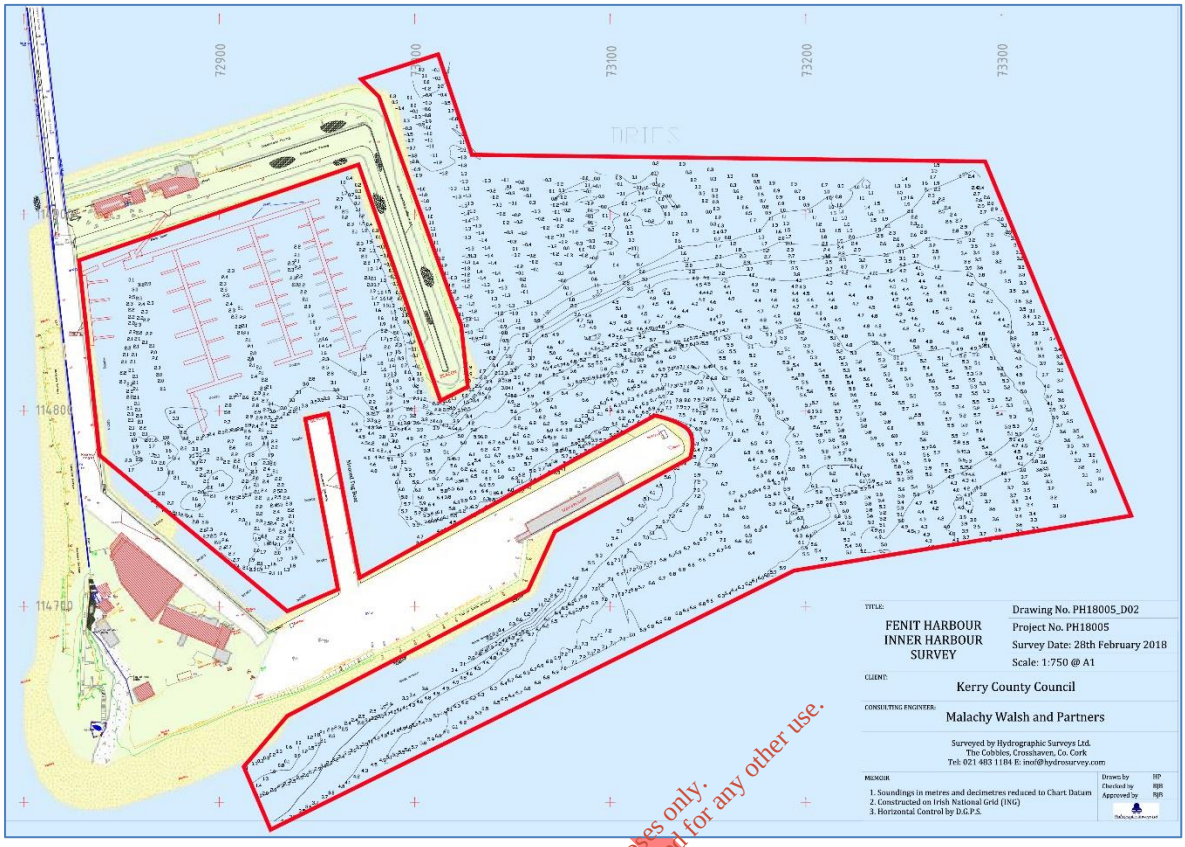


Figure 2: Bathymetric survey of proposed dredging area in Fenit Harbour.

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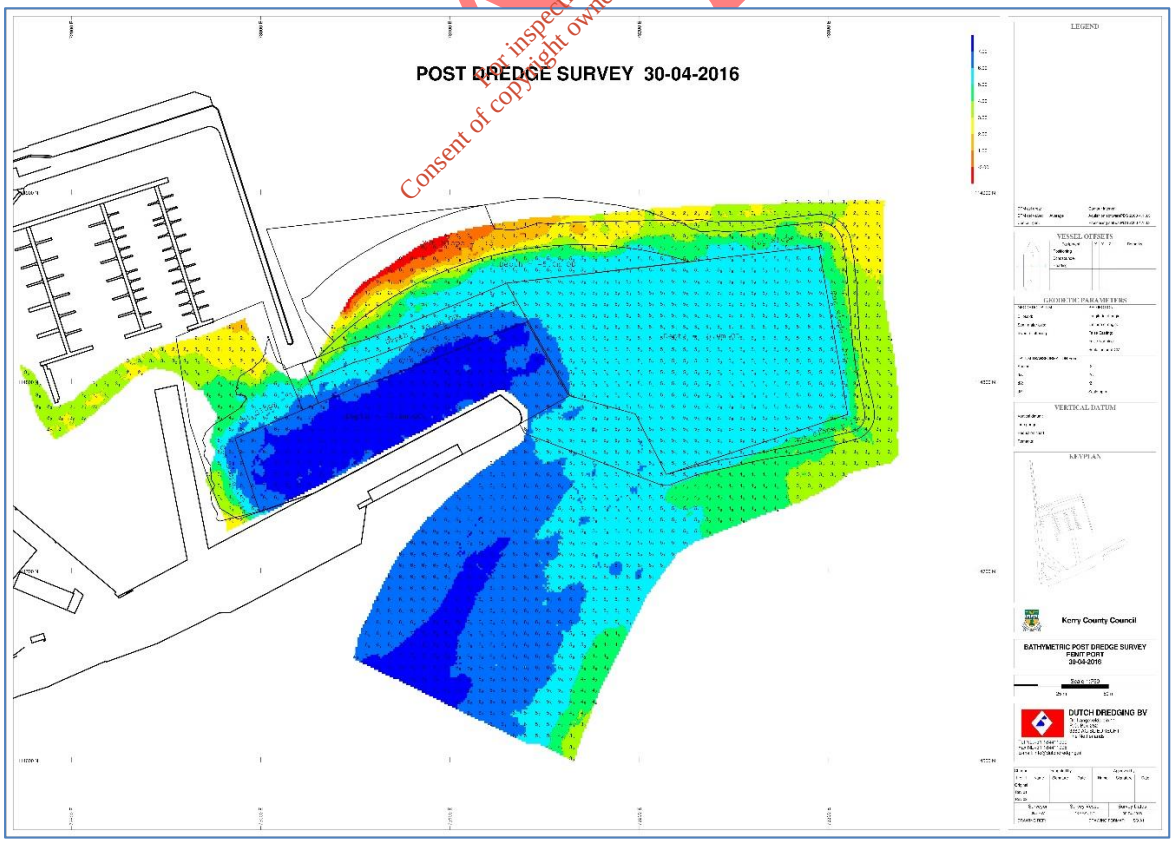


Figure 3: Post dredging survey undertaken 30th April 2016.

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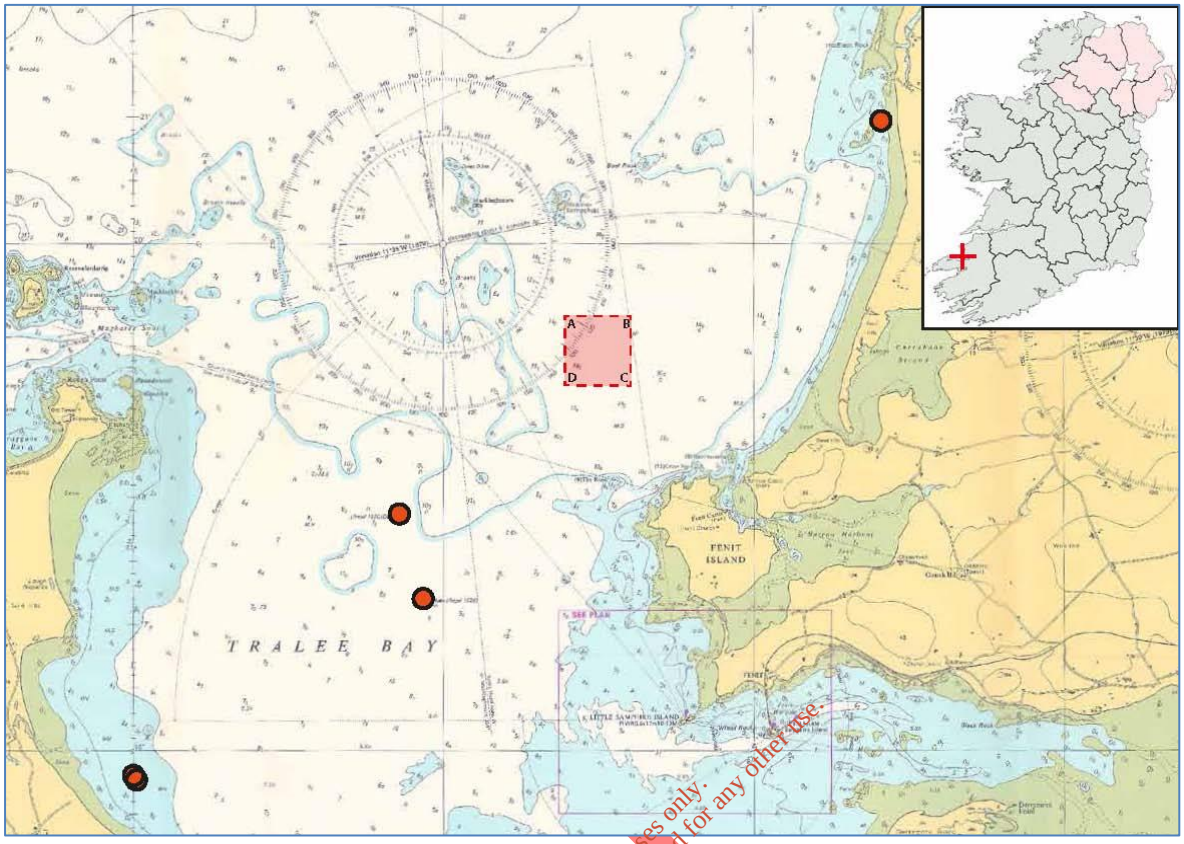


Figure 4: Existing dumpsite Tralee Bay.

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Table 1

Fenit dumpsite co-ords.	Latitude	Longitude	Easting (ITM)	Northing (ITM)
A	52.324	-9.905833388	470055.50	620903.38
B	52.32399998	-9.891666734	471020.96	620878.04
C	52.31500003	-9.891666713	470994.79	619877.03
D	52.31500003	-9.905833277	470029.14	619902.37

2 Scope of UAIA

2.1 Sources

A combination of documentary, cartographic (terrestrial & underwater), & aerial photographic sources were examined (for a full list of sources examined, see References section below).

2.1.1 Documentary Sources

Several published and unpublished documentary sources were examined including annalistic publications and gazetteers. Of particular use was *A History of the Port of Tralee* by Liam Kelly. Anthony Marmion's *The Ancient and Modern History of the Maritime Ports of Ireland.* This report relies heavily on a number of recent unpublished reports on Fenit Harbour especially two previous reports by this author submitted in 2015 & 2016 with regard to a previous DAS licence application

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and the results of the subsequent archaeological monitoring of the dredging and dumping operations in Fenit Harbour -Tralee Bay (see References below).

2.1.2 Shipwreck Inventory of Ireland

The online map-based wreck viewer of Irish shipwrecks was examined. This database is operated via the Underwater Archaeology Unit (UAU) of the National Monuments Service (NMS) of the Dept. Culture Heritage & the Gaeltacht (DCHG), www.archaeology.ie. The unpublished files comprising the Shipwreck Inventory of Ireland for the Kerry - Tralee Bay area held by the UAU is an essential baseline of underwater shipwreck research. The inventory is principally a desktop survey of information gathered from a broad range of cartographic, archaeological and historical sources, both documentary and pictorial pertaining to shipwrecks around Irish shores of which there is a current estimate of *c.*18,000.

2.1.3 Sites and Monuments Records / Record of Monuments and Places

The Sites and Monuments Records (SMR) / Record of Monuments and Places (RMP) compiled by the Archaeological Survey of Ireland comprises lists, classifications of monuments and maps of all recorded monuments with known locations and zones of archaeological notification. The monument records are searchable online from the NMS of the DCHG at www.archaeology.ie.

2.1.4 Record of Piers and Harbours

The Record of Piers and Harbours is a draft unpublished document compiled by the National Monuments Service. It draws on various historical sources dealing with historical piers and harbour development in Ireland.

2.1.5 Excavations Bulletin

The Excavations Bulletin and its online database which contains summaries of all archaeological excavations (marine and terrestrial) carried out in Ireland, was also examined (www.excavations.ie).

2.1.6 National Museum of Ireland Records of Artefacts found in Kerry

The artefact records held in the National Museum of Ireland were examined in the online mapping database operated via the Heritage Council, www.heritagemaps.ie.

2.1.7 Cartography

Several historic maps and charts were examined. These included the 17th Century Down Survey of Kerry, Mackenzie's Charts of 1799 and 19th-20th Century Ordnance Survey Maps & Charts (see References section below).

2.1.8 Photography

A variety of aerial photography was examined including infra-red aerial images undertaken by the Marine Institute, aerial orthophotos from the National Monuments Service website, www.archaeology (see references below). Of particular interest were the aerial photos of the area taken by the Air Corps in May 1949.

General site survey images were undertaken with digital SLR cameras with additional low flown vertical and oblique UAV imagery also undertaken.

2.1.9 Geophysical Data

The INFOMAR data produced by the Geological Survey of Ireland for Tralee Bay-Fenit area was re-examined for evidence of archaeological potential in the proposed licence areas.

Previous site-specific geophysical data pertaining to the Fenit Pier area undertaken under the auspices of this author with regard to a previous DAS licence application in 2015 and the subsequent

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results of data recorded before and after archaeological monitoring of the subsequent dredging operations in 2016 was also examined.

2.2 Consultation

Discussions took place between this author and archaeologist Dr. Connie Kelleher of the Underwater Archaeology Unit (UAU) of the National Monuments Service of the Dept. of Culture, Heritage and the Gaeltacht, regarding the impact of the proposed dredging works and the current data of shipwrecks in the Tralee Bay- Fenit Harbour area. Furthermore, given that the terrestrial archaeology of the area and its wider area was comprehensively dealt with by the author, it was agreed that a chronological summary of the previous terrestrial archaeology be included in this report for brevity sake. However, the underwater records were fully re-examined as the criteria for determining when a wreck becomes a monument automatically occurs when the wrecking event achieves 100 years.

2.2.1 Site inspection

Following discussions with Dr, Connie Kelleher of the UAU, an underwater dive inspection was not deemed necessary at Fenit Harbour or at the proposed dumpsite as both locations had been subjected to licensed dive and geo-physical surveys in 2015-2016 under the auspices of this author.

3 Existing Environment

Fenit Harbour is located on the northern side of the inner limits Tralee Bay while its southern shoreline comprises the coastal region of the Dingle Peninsula from Blennerville to the Magharee Islands. The original L-shaped Fenit Pier was constructed in the 1880's connecting the townland of Fenit Without to the nearby rocky island, the Great Samphire by a wooden viaduct and became the principal port in Kerry.

Fenit Lighthouse is situated on the nearby Little Samphire Island a little to the west. Samphire is a hardy coastal plant (*Crithmum Maritimum)* known in Irish as *lus na gCnámh,* (Ó Maoldhomhaigh 1919, 26). The plant is edible and prodigiously grows on the rocky islands and coastal areas of Tralee Bay.

3.1 Description of Proposed Dredging Area

The proposed dredging site encompasses the north, south and eastern limits of the deepwater berth that delimits the entrance to Fenit Harbour. Additionally, dredging works are proposed for the inner fishing boat area and also within the leisure craft pontoons of Fenit Marina (Figure 2).

4 Archaeological & Historic Background

4.1 General

For the purposes of this report the contextual wider study area encompasses the northern limits of the Dingle Peninsula as far as Kerryhead.

4.2 The Port of Tralee and Fenit

There are several custom returns from the mid-13th and early 14th centuries referring to several ports in Kerry with possibly Tralee and Dingle as being the "Kerry Ports" (Othway-Ruthven, 1968, 123). Certainly, it would appear that goods were dispatched and received at several locations including Ardfert (Kelly 1989, 199). In 1254 John FitzThomas paid 1 Mark duty on wines and whiskey and Howel de Cantelupe (Cantillon) paid 16s 8d for the same beverages. The customs collectors at the

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time were Mayler FitzRobert and Philip Thurnsteyn. An account of 1314 records an order from the Exchequer to Reginald Broun, sheriff of Kerry to summon James Henry of Winchelsea to answer the King (Henry III) as to why he carried hides from Smerwick without paying dues. Interestingly, the Kings collector of Customs at the time was a Florentine merchant Thorald Del Papa (KAM, 1917, 130). After that the collectors for Ardfert were Thomas FitzAdam and Andrew FitzThomas in 1323.

In the Inquisition of the Desmond estate of 1587 three years after the demise of the last Earl there is an interesting account of the customs and their value that the Earl used receive: *'From the customs or subsidies called the Cocquet (customs on goods passing through a custom house) of Dingle-de-Cuishe of merchandise, as well of English merchants as of foreigners for goods and merchandise imported or exported into and from the ports and creeks of Dingle, Bantry, Smerwick and Ardcanny, and other places, and wrecks of ships in storms, from the island in Desmond called Valentia to Beale in the County of Clanmorris; and also the presage of all wines discharged within the aforesaid Ports and Creeks, which the late Earl received in right of inheritance. And further the aforesaid Earl of Desmond used to receive and perceive a custom from every ship or boat, coming there to fish, when, and as often as it would come. All which the premises are valued by the aforesaid Commissioners at £33 6s 8d'* (Kelly, 1989, 199). From this historic documentary account, it would appear that Dingle was indeed the main Kerry Port.

Recent excavations by the writer in Tralee shows a remarkable number and variety of foreign destinations for trade in ceramics and other produce between 1550 and 1700. The ceramics include large quantities of utilitarian kitchen wares from Devon as well as high quality table wares from several locations in Germany, and the Lowlands, France and indeed from Pisa and Genoa in Italy. Other ceramics were used to transport wine and olives from Spain and Portugal (Dunne 2007; Dunne 2009). A very small assemblage of imported ceramics was recovered by the writer from Dingle in 1996 and do provide tantalising empirical evidence of foreign trade, otherwise no imported pottery has been found as yet in Dingle. However, it also appears certain that quite an amount of trade into Kerry was via Ardfert whose port was situated at Barrow and it is likely that small vessels travelled up the Barrow River, at top tide, to Rahoneen Castle that was then the residence of the Bishop of Ardfert. Barrow Harbour was the main port for Ardfert with its narrow entrance channel guarded by Fenit Island castle and the earlier round castle opposite it at Barrow. Once within the harbour it is likely that the landing and discharge was undertaken near the third castle in the area at Tawlaght of which nothing now stands. Reference to Tawlaght is again to be found in the Inquisition of 1587 whereby it records: *'An old castle at called Tawlaght, otherwise Towlaght...a certain ffishery in the water or port of ffynett, near the aforesaid Castle of Towlaghte, in which port a vessel of the burthen of 80 tons can cast anchor at low water, worth by the year, as appears to the aforesaid Commissioners, 10s sterling'*, (Hickson, 1879, 165). A trading token found in Tawlaght is currently on display in the County Museum Tralee. The 1587 account is therefore the first reference to the Port of Fenit which at the time was closely guarded by three castles, Fenit owned by the Fitzmaurices, Barons of Kerry while Tawlaght and Barrow were owned by the Earls of Desmond.

Ardfert was always an important monastic complex founded by St. Brendan in the latter half of the 5th century. Later, in 1117 AD Ardfert became the Episcopal See for Kerry (O'Shea 2005, 46). A large Franciscan Friary was further established there in 1253. The importation of wine from France and Spain would have been of the utmost importance in the celebration of the Mass. A royal receipt Roll from 1293 notes that £8 18s was received in customs on 44 hogsheads (around 2400 gallons) and

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one pipe (cask of 108 gallons or two hogsheads) of wine at Ardfert (Sweetman 1875-6). The combined total would be about 15,200 bottles of wine today.

By the start of the seventeenth century the borough of Tralee had developed much more commercially than Ardfert and Fenit. In 1612 there is a reference to a ship being moored "in the Harbour of Tralee" and in 1628 a Hamburg ship of 120 tons was captured when it came into Tralee Harbour with a cargo of palstaves, timber and tar (Bradley 1984-5, 102). However, an account from 1628 puts a different light on the status of Tralee viz: "formally a town of some trade and a resort of shipping but now seldom applied to but in stress of weather" (O'Sullivan, 1971, 38). It is however, likely that the original port area within the actual town of Tralee, around the Princes Quay Staughton's Row area, had gone into decline due to silting up from neglect and lack of use. The inner port area, around the walls of the Dominican Abbey, were only reachable by small boats or lighters up to 9-tons burden and only at spring tides. The lack of use and maintenance of the port no doubt reflects the previous destruction and repetitive burnings in Tralee in the Elizabethan era up to 1600. This destruction included the Dominican Abbey who would have imported wine in large quantities.

The peace and prosperity of Tralee, now the property of the Elizabethan Grantee Sir Edward Denny was only to last one generation as the bitter wars of 1641 closely followed by the Cromwellian wars of 1653 and finally culminating in the Jacobean wars of the last decade of the century, destroyed Tralee to the ground to such an extent that virtually nothing remains today of the medieval town of Tralee above ground. Indeed, the destruction of Tralee was such that there was much debate as to whether it was viable to rebuild it at all or create a new county town at Castlemaine.

After the Restoration in the 1660's Kerry had its own customs officer appointed who possibly resided in Strand Street, Tralee, near the now recently demolished customs house to facilitate the mini-bout at the junction of High Street and Strand Road. By 1682, the port in Tralee was no longer in use except during periods of bad weather (Bradley 1995, 174).

Smuggling was prevalent, indeed endemic, on the coasts of Ireland and Britain in the 18th century and it would appear that the Fenit-Barrow area was a smugglers haven. The old fishing village and quay known as the Randy, near the round castle in Barrow, is probably derived from the French word rendezvous (Kelly 1989, 203). Barrow House was originally built by the Cromwellian family of Collis around 1650. During renovations in the recent past, historian Edward Roe, (now recently deceased), discovered hidden chamber in the gable of the house containing quantities of tobacco (ibid). The revenue officials finally caught up with the renowned smuggler Collis and ransacked his house to such an extent that he abandoned his smuggling ways.

Barrow House was later modified and enlarged and was subsequently purchased in 1870 by a Tralee merchant Robert McCowen who developed an important oyster fishery there in 1873 (Wilkins 1989, 182-3). The Irish Folklore Commission recorded in 1938 that a bar of gold was found by workmen near Tawlaght and not realising at the time that it was gold they sold it for 7s 6d to a local jeweller (ibid).

By the 18th century the port of Tralee had gradually established itself at the fishing village near Tralee known then as *Cathair Mhóráin*. Its name was changed to Blennerville by the Blennerhassett family who built their family home Blennerville House in the seventeenth century and were most likely responsible for building the quay around the same time. In the late eighteenth century economic prosperity is further exemplified when the windmill was constructed, possibly around 1790. It is ironic that Millicent Blennerhassett was later killed when she was struck by a rotating blade of the

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mill. The prosperity was primarily due to the boom in the grain trade between 1790 and 1840. Thomas Radcliffe records that in 1812 the exports in grain from Blennerville comprised 2,000 barrels of wheat (20 stone per barrel), 4,000 barrels of barley (16stone per barrel) and 1,000 barrels of oats (14 stone per barrel), (Radcliffe 1841). Between 1825 and 1833 the corn export trade from Blennerville increased by 33.33% and the home trade by 20% (Kelly, 1989, 205). The figures peaked in 1833 with the export figures reaching 18, 354 barrels of wheat, 68,993 barrels of oats and 3, 948 barrels of barley. It is interesting that barley was mainly grown for home consumption but also possibly also reflecting its use in the increasing brewing and distilling industry of Tralee also. A brewery and distillery were located in Ballymullen and the latter had an annual production of 70,000 gallons of whiskey in the early part of the century (O'Dwyer 1991, 15).

Siltation at Blennerville continued to be a real problem. In the summer of 1822 Richard Griffith surveyed the estuary and the need for the reclamation and re-establishment of the whole area as a workable port was identified. Better port facilities, other than the small quay at Blennerville, were required to ensure Tralee's commercial viability. A proposal for the development of a canal was put forward by Griffith who wrote that the inhabitants of Tralee are 'desirous of having a canal made from Blennerville up to the town, a distance of one mile on which vessels of about 80 tons burden could ply' (Kelly 1989, 214).

From 1827 to 1833 a total of 51 foreign vessels traded with the port; 273 coasters imported goods and 384 exported goods to Britain while 173 vessels brought cargoes from various ports in Ireland to Blennerville and 109 took goods from Blennerville to various ports around the country (ibid,207).The estimated gross value of exported corn meal and flour from Blennerville in Tralee in 1845 was £40,315 and the gross value of imports for the same period was £7,270 of which coal, slates and iron made up £4,295.

Due to cheaper American imports and ultimately the Repeal of the Corn Laws in 1848 many mills had closed or got into financial difficulties. However, the windmill at Blennerville continued operating until the 1880's, exporting flour to England and the continent. One of the most poignant shipwrecks in Tralee Bay was the loss of the sloop Industry at, Kilshannig, Magharees on Christmas Eve in 1847 at the height of the famine with a cargo of flour and meal destined for Tralee.

At a human social level, Blennerville Quay was the departure point for thousands of emigrants, old and young alike, who left the port for America and Canada. It was during this period that the Jeanie Johnston used the port on her numerous journeys between the years 1848 to 1856 to the New World.

The canal was opened in April 1846. According to Lewis (1837) 'Due to the shallowness of Tralee Bay, vessels exceeding 50 or 60 tons cannot approach nearer than Blennerville and obligates large vessels to lie (about six miles out) at the Samphire Islands off Fenit point. To remedy this a local act was procured…the purpose of constructing a navigable canal adequate to bring up large vessels to the town. The canal which is now in progress commences at Crompane-Rickard, near the west end of the town where there is a basin 400 feet by 150, on the north of which is to be a quay faced with hewn stone. The canal is to be 74 feet wide by 15 deep and estimated to cost £24,000. When finished, vessels of 300 tons will be enabled to discharge at the quay.' A tow path is located on the northern side of the canal to enable barges to be hauled up the canal. Coal, maize, timber, slates and bricks were brought in to the basin. The canal was closed to navigation in the 1930's. Restoration and refurbishment of the area of the canal and basin was undertaken in the mid 1990's. The works

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included the emptying of the silt along its entirety and the installation of a new watergate lock at the entrance and a new hydraulic swing gate beside Blennerville Bridge.

The creation of the canal also had its problems as vessels had to wait at the Fenit-Samphire Roads, to make the tide to enter it. Consequently, it was decided to build a new deepwater pier at Fenit which extended out to the Samphire Island from the mainland and connected by rail from Tralee. The entire project costing around £140,000.00 and was completed in 1887.

5 Shipwrecks of Tralee Bay

In advance of dredging operations, the author undertook a comprehensive archaeological impact assessment of the dumpsite that included geophysics and subsequent licensed dive and metal detection surveys (Dunne, 2014; Dunne 2015).

According to the Shipwreck Inventory of Wrecks in the files of the Underwater Archaeology Unit there are over three hundred and sixty shipwrecks recorded around and off the coast of Kerry. Of this total, at least 102 are recorded in the Tralee Bay area alone between Brandon Point, Ballyheigue and Tralee. The wrecks listed vary in date from 1578 to 1930. The exact location of many of these wrecks is not precisely known as historical records usually only give general locations i.e. 'Tralee Bay', 'Tralee' or 'near Tralee'.

At least twelve shipwrecks are recorded with the location given at Fenit or Samphire Island or at Fenit Point a little west of the Pier. The worst year for shipwrecks in the age of sail was 1874 when seven ships were lost. Tralee Bay is a dangerous bay to end up in a storm especially during the age of sail. The bay is shallow and has many reefs and rocks.

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Name	Date	Location
Alessandris	1874	Samphire Is. 242 ton Russian barque lost in storm after delivering coal
Darling	1839	Point of Fenit. Wrecked on rock with cargo of corn and sold by auction
Erin	1888	Off Fenit. 53 ton steamship wrecked, crew of five survived
Giles Lang	1894	Stranded 1 mile east of Fenit Pier. Anchor dragged during gale.
Glad Tidings	1874	Cuan Eargnis(?)West of Fenit Is. Schooner wrecked in force 11 gale, four of crew of five drowned. Timber cargo was used to build Fenit House
Harry	1903	Moored at Fenit. 7 ton fishing dandy wrecked in force 10 gale
Heroine	1889	Fenit. 60 ton vessel (possibly same reference as below)
Heroine	1900	Stranded at Fenit. 60 ton wooden ketch, total loss in force 10 gale
Mischief	1907	Moored at Fenit. 12 ton wooden steamship, total loss in gale
Rob the Ranter	1852	Fenit Point, schooner from Troon, grounded but later re-floated
Seaward	1874	74 ton barque out of Glasgow, grounded in gale, later re-floated
Weasel	1858	Tralee Pier/Samphire Roads, 1 year old steam tug, 54 tons, engine blew up and she sank. One of the crew of five was drowned.

Table 1

In 1858 the *Weasel*, a one-year-old steam tug of 54 tons, sank at the Samphire Roads when her engine blew up with the loss of one of her crew of five. Apparently, efforts were made to raise her as she was in shallow water but the success of this operation or otherwise is unclear. The worst year was shipwrecks in Tralee Bay was 1874 when seven wrecks were recorded-three of which were located in

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the Fenit roads as the Pier was not built by then. The *Alessandris* and the *Seaward* were both wrecked on the 12th February 1874 while Glad Tidings went down in April the same year. The *Alessandris* wreck location is given at Samphire Island. The *Seaward* was carrying iron for merchants Donovans of Tralee when she sank in the same gale as the *Alessandris*. Divers caulked her bottom and she was refloated. The schooner *Glad Tidings* went down one mile west of Fenit Island and some of her cargo was used in building Fenit House. In 1894 the *Giles Lang* put in at Fenit Pier due to bad weather on her way from Galway to Cardiff with a cargo of hay. However, she dragged her anchor and became stranded apparently one mile east of the pier. Her crew of five were saved by the *Louisa and Emma* lifeboat. In 1900 the *Heroine*, a 60-ton wooden ketch was stranded in a force 10 gale at Fenit and was a total loss. Three years later a small seven-ton fishing boat, the *Harry*, owned by S. Tansley of Fenit, was wrecked at her moorings at Fenit in a force 10 gale. In 1907 the same fate happened to the *Mischief*. This unregistered 12-ton wooden steam vessel, owned by B. Moncas of Fenit, was moored in ballast at Fenit when she foundered in a force 7 gale and became a total loss.

In essence, therefore, there are or were at least four shipwrecks either within or close to the dredging zone viz: the *Weasel*, the *Alessandris* at Samphire Island, the *Mischief* and the *Harry*. The *Giles Lang* also sank to the east of the area after dragging her anchor.

Many of the shipwrecks in the Tralee Bay area may be due to poor navigation charts. Tralee Bay is very dangerous for shipping with several islands, rocks and dangerous reefs. Early cartographers placed the Magharee Islands (referred to on earlier maps as the 'Hogs' or the 'Hogges') in the wrong place while often omitting Kerryhead altogether. Fenit, the largest Island, is also often wrongly mapped. Consequently many shipwrecks occurred because vessels assumed they were entering the Shannon Estuary for Limerick confusing Loop Head with Kerryhead. The *Venus* was travelling from Oporto to Limerick in 1777 when she was wrecked near Ballyheigue while a similar fate happened to the Norway enroute from Falmouth to Limerick with a cargo of wheat was wrecked in Tralee Bay in 1850.

Navigating around the Magharee Islands today is difficult enough in good weather but in poor weather with incorrect charts the area is extremely dangerous and many wreckings have occurred there. In 1314 Robert De Clahull then sheriff of Kerry paid to the Exchequer £6 10s in rent ...for having the wrecks of the sea of Offerbe for many years (Hickson 1879, 167).

The earliest in-depth description of Tralee Bay was recorded by Charles Smith in 1756 and who also provided a map. Smith writes... '*The east side is a flat, low land, called Magheriebeg, off which are 7 small islands called the Hogs...By giving the Hog Islands a berth, and sailing east by north you come into Tralee Bay, little frequented by ships, being dry at low water; however small vessels lie safe aground in it. The channel is towards the middle of the bay, the entrance is between two small islands, called the Sampier Isles to the north, and the mainland to the south. All the maps of Ireland and sea charts place Fenit Island, which they call Fenor, in the middle of this bay, whereas it lies close to the shore on the north side, between which and the main there is a small creek for ships, which must be entered from the north, but the passage is so narrow and foul, that it cannot be entered without a good pilot*' (Smith, 1756, 201). Some fifty years or so later in 1807 a more scientific and measured survey of the Irish Coast was done by Captain William Heather on behalf of the British Admiralty. The chart extract for Tralee Bay provides accurate information of the positions and names of islands, rocks, headlands, anchorage points, sounding depths and the nature of the seabed as well as other topographic features.

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In 1854 a lighthouse commenced operating on the Little Samphire Island which greatly improved navigation in the Bay.

A lifeboat and boathouse were built at Fenit in 1879, known as the Tralee Bay station and later changed in 1892 to Fenit. The boathouse site was given by John Hurley of Fenit House and was built at a cost of £393 15s 0d while the 34', 10-oared lifeboat, the Admiral Butcher, built by Woolfe and Son of London, cost £363. She was named after an eminent Dublin surgeon, R.G. Butcher.

In 1920 a Bronze Medal was awarded to a 12-year-old boy John F O'Mahony for attempting to save a friend at Lighthouse Point, Fenit. During rescue work associated with the stranding of the *Co-operator* at Frogmore, The Spa in 1930 Bronze Medals were awarded to John Nolan and John and Joseph Cahill for saving three crew from the stricken steamship. The RNLI continue to operate at Fenit with a Trent-class lifeboat, the *Robert Hywel Jones Williams* and the D-class *Cursitor Street*.

5.1.1 The Development of the modern Harbour and Pier at Fenit

In 1846 a proposal was made to establish the Port of Tralee at Fenit was mooted by Knox Maunsell, the County Engineer. The plan involved *'...extending the line (railway) from Tralee to a point on the north-western coast, directly opposite the first Samphire Island and where an excellent harbour may be found-a pier or breakwater being thrown out from the mainland to that Island....and for the erection of which there are most suitable means available in the limestone cliffs and quarries on the spot, and which would be gratuitously tendered by for that purpose by the proprietor. Thus would be formed as safe and capacious a harbour as can anywhere be found. ...The facilities for large tonnage vessels both getting under weigh and coming alongside, at all tides and under different changes of the weather, have been so frequently proved, and the fact of foreign and colonial vessels riding with the greatest safety during the most severe storms in the Samphire roads, is such sufficient testimony of this locality being the proper site for a commodious harbour and anchoring ground as to make any further reference to this part of the subject quite unnecessary'* (Kelly 1989, 272). The plan also proposed that the project would provide much needed employment to the poor of the area and improve the lot of the fishermen as well.

It was to be over thirty years later before work on the project commenced by the then County Engineer, Mr. Frazer, whose plan differed somewhat from Mr. Maunsell's. Frazer estimated that the six miles of railway would cost £30,000 and the pier £70,000, making a total of £100,000. After getting an act of Parliament to construct the pier at Fenit an application for a loan of £95,000 was made to the Treasury. In advance of this loan the Treasury ordered that an inquiry into the project should be carried out by the Commissioners of the Board of Works which was held in Tralee between the 5th and 8th of April 1881 (ibid, 275). Evidence at the enquiry was given by Charles Green, chief boatman of the Coast Guard for thirty-five years of which eight were spent at Fenit. Green stated that *'...the Samphire Roads provided excellent holding ground for ships with twenty-four feet of water at the inner roads at low water'*. His testimony is also very useful as a record of the fishing industry of the area and stated that 280 fishing boats of one and a half tons operated from Tralee, Kilfenora, Spa and Fenit of which eleven were hookers (ibid 276). The Commissioners approved the project and the contract was awarded to Messrs. Falkiner and Tancred to construct the pier for £82,000, the total cost in the end was £95,000. They also built the railway line for the Tralee and Fenit Railway Company. Work commenced on the 3100' (*c*.940m) pier in August 1882 that included a wooden viaduct of 1000' (*c*.300m) that was originally intended to be iron. This was changed to creosoted pitch pine piles instead whose lifespan was estimated at between 14-18 years. However, due to an error ninety piles (over half) were inserted without creosote that reduced their lifespan considerably. In 1909 the

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wooden piles of the viaduct were replaced by Messrs Moran & Sons who replaced them with Oregon Pine (Plate 1).



Plate 1: Early image of Fenit Pier from the NE (unknown date). Note the sailing ships.

The first cargo of corn arrived at the pier on the 11th May 1887 for Robert McCowen & Sons and for passengers on the 5th July. From the outset the project was beset with difficulties and merchants discovered that costs were actually dearer than before. However, issues were resolved, and business gradually improved annually although trade through the canal continued until 1940 (ibid 277).

The herring and mackerel fishing was very productive in the area in the 1880's. The new pier facilities at Fenit heralded the arrival of the entire Manx fishing fleet who became annual visitors from March to May. The Manx brought their wives to clean and fillet the fish while their religious services were provided on their own mission ship the *Temple Tate*, (ibid 283; Hanafin 1996, 58-59, & Plate 2).



Plate 2: Fenit Pier c. 1907. Note two railed steam cranes discharging coal from steamer. Further note Manx fishing fleet at anchor.

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In 1906 the Manx fishing fleet of over 150 Nobbies arrived at Fenit. These, two masted double-enders, were between 35' and 40' long. The Congested District Board (CDB) had begun purchasing these Nobbies from the Isle of Man and other similar fishing boats called Zulu's from Scotland, for use by Irish fishermen who up until then did not have the boats to fish in deep waters. Later the CDB brought over shipwrights to build these boats in Ireland and established boatyards around the coast at Dingle, Baltimore, Aran Islands and at several other small yards.

Trade dramatically slumped during the First World War down from 97,000 tons in 1915 to 16,000 in 1918. U-Boat activity accounted for around thirty-eight sinkings during WWI alone off the Kerry coast. By 1923 the US embargo on imported fish killed the industry and the Manx fishing fleet departed for the last time.

Butter was the biggest export in the 1920's along with bacon and other food produce necessitating the construction of a cold storage facility in 1927 (Hanafin 1996, 65). Maintenance dredging was undertaken at Fenit by the *Samphire*, a steam hopper dredger built in Dublin in 1907 and only decommissioned after decades of work in 1975 as she was too expensive to run as a coal burner (Kelly 1989, 257-8).

One of the most dramatic incidents at Fenit Pier occurred at the height of the Civil War in August 1922 when Irish Free State troops landed. The viaduct had been mined by Republican forces in advance of a possible landing. However, in a top-secret operation Free State troops boarded the coaster the *Lady Wicklow* and made it undetected to Fenit Pier. The Republicans tried to detonate the explosives, but the wires had been cut by the pier-workers who feared for their livelihood. A skirmish between opposing forces occurred but the Free State troops, finding two wagons on the pier, pushed them along in front creating good fire cover and forcing the Republicans to retreat along the railway line. Another skirmish took place at Sammy's Rock at Kilfenora where they were again forced to retreat leaving one soldier dead while another was shot at the Spa (Hanafin 1996, 65).

Trade gradually improved again with 1931 being the best recorded year with 116,412 tons going through the port of which only 3,672 tons were exported. However, business during the Second World War was again disastrous and not helped by the poor state of the pier. Plans were undertaken to repair the pier as an engineer's drawing from 1930 attests.

An account of the Pier from 1945 records that the principal imports are coal, timber, iron, salt, grain, oils, cement and artificial manures while the exports are given as barley, oats and pitwood. Vessels from 5000 to 6000 tons were able to be discharged. The depth at Fenit pier is given at 22' (6.6m) and there were 8 steam cranes with a lifting capacity of between 2 and 10 tons. Pilotage was optional in the Tralee Pilot District that extended from the Hog Islands (Magharees) to the Canal Basin with rates varying by the tonnage between £4 to £13 10s for foreign vessels. Rates for coasters and for outward journeys were considerably less. The harbour dues were 1s. 6d. per ton, (Foreign) and 9d. per ton (Coastwise). The Harbour Master at the time was T.F. Barrett (Lawlor 1945, 204-5).

In 1950 the Harbour Commissioners finally got sanction to improve the pier at a cost of £171,614 and the work was awarded to Messrs John Paul & Co of Donnybrook, Dublin who tendered against eight other firms. The dangerous wooden viaduct was replaced with a concrete one 27' wide (8.18m) while the section of the pier parallel to the pier was widened from 33' (10m) to 58' (17.6m). An extra railway track was also added, and all tracks re-laid flush. Old buildings were cleared away to create bigger storage, new offices and sheds while improved lighting was also installed. The works were completed in 1955.

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Plate 3: Vertical aerial image from May 1949 taken on behalf of the Irish Air Corps by the RAF.

The Limerick Steamship Company was the main user of Fenit Port and operated a fleet of coasters carrying general cargo between Ireland and several destinations on the Continent. Timber and coal were also imported, in particular for Robert McCowen & Sons, Tralee. However, costs at Fenit Pier were often prohibitive. In August 1974 a small 400-ton coaster bringing a cargo of timber to Kerry Timber Products in Tralee took three days to discharge using thirty dockers, who opened all the metal straps around the bales of timber in the hold to increase the amount of time discharging. The same cargo would have been discharged in Cork in a morning with 16 dockers. It proved cheaper to bring the timber down by road from Cork than to discharge in Fenit (Dunne pers. comm.).

Oil exploration off the west coast also created a temporary upsurge in business for Fenit in the 1980's (Plate 4). By 1997 the sole import to Fenit was oil as coal was discontinued. However, oil is no longer imported at the port. In 1998 the Irish Baltic trading was established at Fenit that involved the export of white fish to France and provided berths for French fishing vessels.

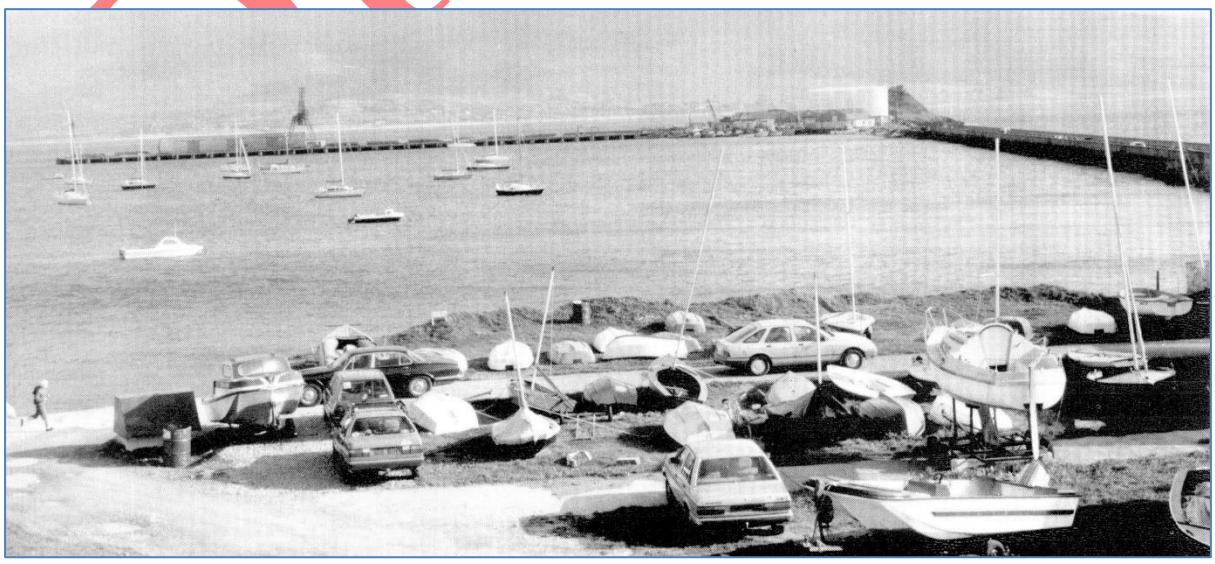


Plate 4: Image of Fenit Pier in the 1980's. Note the large oil tanks.

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In 2003 Fenit Pier had a major upgrade and refurbishment including the addition of a new marina, breakwater and ancillary buildings. The marina has 130 berths capable of dealing with boats up to 25m in length. Extensive dredging works were also undertaken at the time. Today its 175m long deep-sea pier caters for shipping of up to 15,000 tons. The mainstay or anchor tenant at Fenit Port is the crane company Liebherr from Killarney who currently export cranes almost bi-weekly to global destinations.

6 Previous Underwater Archaeological Results

6.1 Fenit Pier Area

In January 2000 an archaeological Desktop Survey was undertaken by Management for Archaeology Underwater Ltd, (MAU) with regard to maintenance dredging at Fenit Harbour. That research report was subsequently followed up in May 2000 by licensed archaeological monitoring of the dredging by MAU under license 00E0261 to Eoghan Kieran with negative results. The dredging was undertaken with regard to the major upgrade and refurbishment including the addition of a new marina and breakwater in 2003.

In 2009 *Laurence Dunne Archaeology* undertook an archaeological and wider cultural study of Fenit as a chapter of an EIS with regard to developing Fenit Port. That study also included an underwater dive and metal detection survey (License Nos. 09D048 & 09R127). The results of the dive survey were also negative (Dunne 2009).

In April 2016 archaeological monitoring dredging was undertaken along the inner and outer limits of the deep-water berthing area of Fenit Port by Dutch Dredging B.V. on a 24-hour basis from the 21st to the 29th April 2016 inclusive (Figure 5 & Plates 5-6). The limits of the dredging essentially comprised two linked areas: the largest Area A comprising 11,820 sq. m, was situated at the westernmost limits of site. Dredging was undertaken to -7.5m Chart Depth (CD) comprising a total volume material of 44,000 m³. Area B is contiguous to Area A and the total volumetric material dredged was 19,000 m³ with reduction of 5.0m CD.



Figure 5: Location of dredging operations Fenit Pier undertaken in April 2016.

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Plate 5: Survey and bed-levelling vessel *Kees Jr.* on left and suction dredger vessel *Mahury* operating at Fenit.



Plate 6: Archaeologist inspecting recovered material on the *Mahury* after the dredge head had been secured at Fenit deep-water berth in April 2016.

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6.2 Tralee Bay Dredging Dumpsite

6.2.1 Previous Geophysical Surveys

The 1.0 km² dumpsite is situated c.1.5 NW of Fenit Island in Tralee Bay (Figure 4). A bathymetric survey of the dumpsite was undertaken in November 2013. This was followed up by side scan sonar and magnetometer surveys undertaken in July 2014 by Hydrographic Surveys Ltd., Crosshaven, Co. Cork. The 2014 geophysical surveys were undertaken with due regard to the unpublished guidelines for undertaking geophysics underwater for archaeological purposes by the Underwater Archaeology Unit of the National Monuments Service and were overseen by marine archaeologist Julianna O'Donoghue on behalf of *Laurence Dunne Archaeology*. A second magnetometer survey was undertaken on the 5th September 2014 as there were problems with the datasets from the July magnetometer survey. The results of the geophysical data were examined by the author and subsequently reviewed by Brian Smith.

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There were a number of potential archaeological anomalies identified by the geophysics across the dumpsite all of which were subjected to follow-up licensed archaeological dive truthing and proved to be archaeologically negative.

In April 2016 all the dredged material from Fenit was deposited in the dumpsite by the suction dredger the *Mahury* (Plate 7).

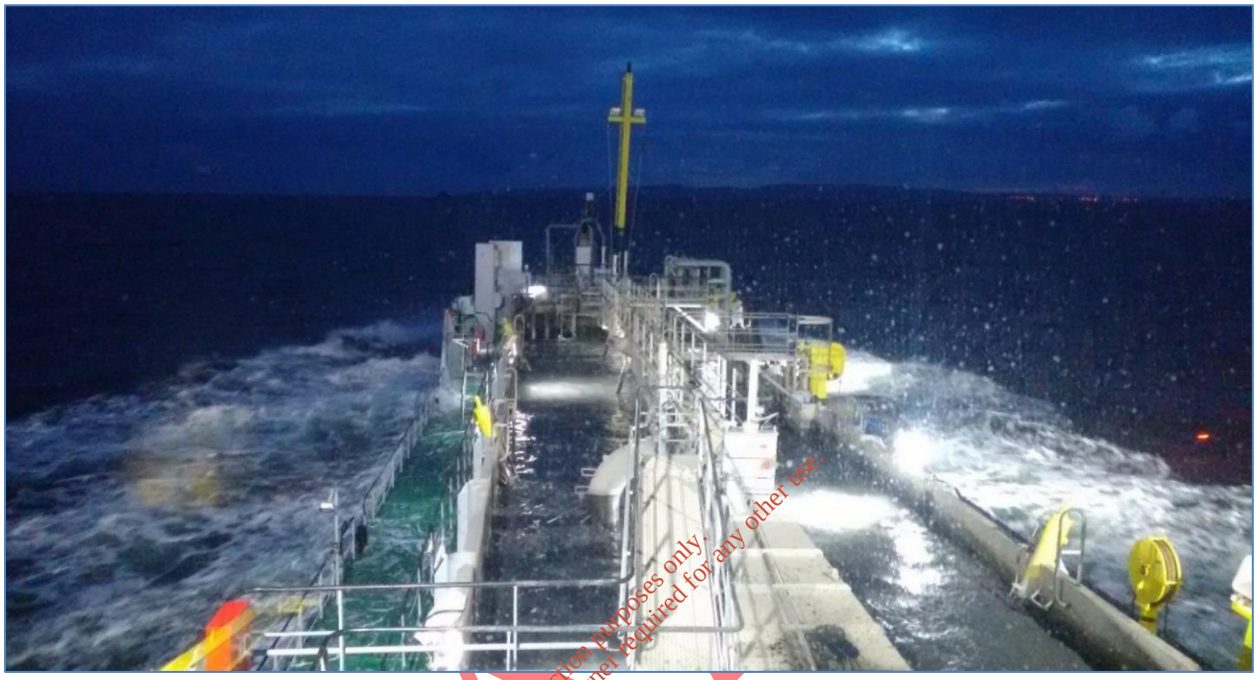


Plate 7: The deck of *Mahury* awash and laden with dredged material enroute to the dumpsite in Tralee Bay, April 2016.

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7 Proposed Dredging Operations

The proposed dredging operations will be undertaken in three areas viz: (1) along the inner and outer limits of the deep-water berth; (2) within the inner fishing boat berthing area; (3) within and around the leisure craft pontoon marina area (Figure 2). In that context, dredging operations could include plough, suction back-hoe and possibly grab to cater for the difficulties in manoeuvrability particularly in the inner harbour area.

8 Archaeological Impacts

8.1 Fenit Pier Area Dredging

- The majority of the proposed dredging will be undertaken around the deep-water berth. In 2015 a comprehensive Underwater Archaeological Impact Assessment (UAIA) was undertaken by this author with regard to recent previous dredging operations around the deep-water berth (Dunne 2015). The UAIA included a licensed archaeological dive survey. A number of recorded shipwrecks were noted for the Fenit Pier area. However, in a follow-up licensed archaeological dive survey nothing of archaeological interest was found. Subsequent archaeological monitoring of the dredging operations was undertaken by *Laurence Dunne Archaeology* in April 2016 with negative results (Dunne 2016; Plates 5-6). There will be no archaeological impacts by the proposed dredging operations around the deep-water berthing area.

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- Previous archaeological monitoring of the inner Fenit Pier and Marina areas was undertaken in 2000 by MAU Ltd. However, the archaeological monitoring was only undertaken during daylight hours while dredging operations were undertaken on a 24-hour basis. Consequently, there is a slight possibility that there may be discrete areas of archaeological potential within the inner harbour area that could be impacted by dredging operations. The impact is classified as slight.

8.2 Tralee Bay Dumpsite

- A previous UAIA report by this author with regard to the dumpsite was submitted in 2015. The UAIA included comprehensive research, geophysics and dive truthing. The results of the report determined that no archaeological shipwrecks or other archaeological material was present within the dumpsite. There will be no archaeological impacts by the proposed dumping at the designated site in Tralee Bay (Figure 4).

9 Mitigation

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11 Photographic sources

Black and White historic photos extracts from NLI and from the *Port Of Tralee* by Liam Kelly.

All other photography by *Laurence Dunne Archaeology*.

12 Appendices

12.1 Appendix 1

Shipwreck Inventory of Tralee Bay between Brandon Point and Kerryhead to Tralee. Extracted from the unpublished Co. Kerry Shipwreck Inventory files in the Underwater Archaeology Unit of the National Monuments Service, Custom House, Dublin.

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APPENDIX 3

NATURA IMPACT STATEMENT

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Malachy Walsh and Partners
Engineering and Environmental Consultants

Natura Impact Statement (NIS)

Fenit Harbour Maintenance Dredging and Dumping at Sea (2020 – 2027)



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ISSUE FORM	
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1 SUMMARY OF FINDINGS

1.1 NATURA IMPACT STATEMENT

Project Title	Fenit Harbour Maintenance Dredging and Dumping at Sea (2020 – 2027)
Project Proponent	Kerry County Council
Project Location	Fenit Harbour, Fenit, Co. Kerry
Natura Impact Statement	In cases where an Appropriate Assessment is required a Natura Impact Statement (NIS) is prepared. This is a report based on a scientific examination of evidence and data, carried out by competent persons with the aim of identifying and classifying any implications of a proposal, either individually, or in combination with other plans or projects, on Natura 2000 sites in view of the conservation objectives of the sites
Conclusion	In conclusion, provided the recommended mitigation measures are implemented in full, it is not expected that the proposal to carry out maintenance dredging at Fenit Harbour and dispose of dredged material at sea will result in any adverse residual impacts on the Natura 2000 sites considered in this NIS, namely: • Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070) • Akeragh, Banna and Barrow Harbour SAC (000332) • Tralee Bay Complex SPA (004188) • Magharee Islands SAC (002261) • Magharee Islands SPA (004125) • Lower River Shannon SAC (002165)

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2 INTRODUCTION

Appropriate Assessment is the consideration of the impact on the integrity of the Natura 2000 site of the project, either alone or in combination with other plans or projects, with respect to the site's ecological structure and function, and conservation objectives. Additionally, mitigation of these impacts can be considered. A Screening for Appropriate Assessment was completed and determined the need for full Appropriate Assessment (see Appendix 2).

In cases where an Appropriate Assessment is required a Natura Impact Statement (NIS) shall be prepared and shall include a report of a scientific examination of evidence and data, carried out by competent persons to identify and classify any implications for Natura 2000 sites in the view of the conservation objectives of the site. The aim of the assessment is to provide a sufficient level of information to the competent authority on which to base their appropriate assessment of the plan or project. The plan or project should be fully described particularly in relation to the aspects that could interact with the surrounding environment. The proposal to carry out maintenance dredging at Fenit Harbour is fully described in Section 4.5 below.

The focus of the assessment is to determine whether the proposed maintenance dredging at Fenit Harbour and subsequent disposal of dredge material at sea will have a significant negative impact on the features of interest of the Natura 2000 site i.e. habitats and species. This assessment identifies the environmental aspects of the project that will interact with the ecological requirements or sensitivities of the habitats and species, and in this case relate to the dredging activity and potential water quality and species disturbance effects.

The 'test' of the assessment is whether the plan or project will have an adverse effect on the integrity of the site. Where potentially significant effects are identified proven mitigation measures will be recommended.

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3 METHODOLOGY

3.1 APPROPRIATE ASSESSMENT GUIDANCE

This Natura Impact Statement, Stage 2, has been undertaken in accordance with the European Commission Methodological Guidance on the provision of Article 6(3) and 6(4) of the 'Habitats' Directive 92/43/EEC (EC, 2001) and the European Commission Guidance 'Managing Natura 2000 sites' (EC, 2000) and guidance prepared by the NPWS (DoEHLG, 2009).

3.2 DESK STUDY

In order to complete the Natura Impact Statement certain information on the existing environment is required. A desk study was carried out to collate available information on the subject site's natural environment. This comprised a review of the following publications, data and datasets:

- OSI Aerial photography and 1:50000 mapping
- National Parks and Wildlife Service (NPWS)
- National Biodiversity Data Centre (NBDC) (on-line map-viewer)
- BirdWatch Ireland
- Ireland's Marine Atlas (IMA) (on-line map-viewer)
- The Dingle Peninsula Bird Reports from 2008-2010 & 2011-2013

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- General ornithology literature
- Teagasc soil area maps (NBDC website)
- Geological Survey Ireland (GSI) area maps
- Environmental Protection Agency (EPA) water quality data
- Other information sources and reports footnoted in the course of the report

3.3 FIELD SURVEYS

A number of marine surveys were completed by AquaFact International Services Ltd, Hydrographic Surveys Ltd, and IWDG (Irish Whale and Dolphin Group) Consulting, all specialist marine consultancies. These surveys, carried out in support of either the current or previous FL and DaS licence applications for dredging in Fenit Harbour, were in turn used to inform the NIS and include:

- Bathymetric Survey Fenit Harbour - Inner Harbour (Hydrographics Survey Ltd., 2018)
- Bathymetric Survey Fenit Harbour - Dumpsite (Hydrographic Survey Ltd., 2018)
- Tidal Current Metering (Hydrographic Survey, 2014)
- Sediment Transport Model (STM)(Aquafact)
- Fenit Harbour Dredging and Disposal Operations Marine Benthic Study Report (AquaFact, 2018)
- Fenit Harbour Dredging and Disposal Operations Marine Sediment Characterisation Report (AquaFact, 2018)
- Fenit Harbour Marine Benthic Flora and Fauna Survey (see Marine section of Chapter 4 Ecology of Fenit Harbour and Marina Extension EIS - Doc. No: 12693-6001-A (marine section authored by Aquafact, 2009, EIS produced and compiled by MWP)
- Assessment of Risk to Marine Mammals from Proposed Dredging and Dumping at Sea Activity, Fenit Harbour (O'Brien & Berrow, 2017)

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The following sections summarise the methodologies employed for each of the elements listed above.

3.3.1 Bathymetry

A bathymetric survey was completed by Hydrographic Surveys Ltd. in October 2018 to map the sea floor terrain and depths within the inner harbour/marina area and approach channel to Fenit Harbour. This survey followed on from a previous bathymetric survey of the same area completed in February 2018. A bathymetric survey of the proposed dumpsite was completed by Hydrographic Surveys Ltd. in January 2018.

3.3.2 Current and Tidal Metering

A current and tidal survey was completed by Hydrographic Surveys during the summer of 2014 to characterise the hydrodynamic environment at the dumpsite. An ADCP (Acoustic Doppler Current Profiler) was deployed at grid location E70524, N120342 from 17th July 2014 to 1st Aug 2014 providing almost 15 days of records.

3.3.3 Baseline Characterisation of Dredge Area

3.3.3.1 Benthic Faunal Sampling

In 2009 Aqua-Fact undertook benthic survey work at 10 sampling stations in and around Fenit Harbour to inform the Fenit Harbour and Marina Expansion project. The aim of these surveys was to

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map the faunal communities in the vicinity of the harbour. The results of the 2009 surveys were used in the current assessment of the proposed dredging works at Fenit Harbour.

3.3.3.2 Marine Sediment Characterisation Survey

Surveys to inform sediment characterisation of the proposed dredge area were conducted in November 2017. A total of 12 sampling stations within the harbour area were selected (see Figure 1 below). A grab sample was collected at each sampling station for the analysis of organics and contaminants. Once back in the laboratory, all sediment samples were sent to the SOCOTEC Laboratories in Burton on Trent (Aquafact, 2018).

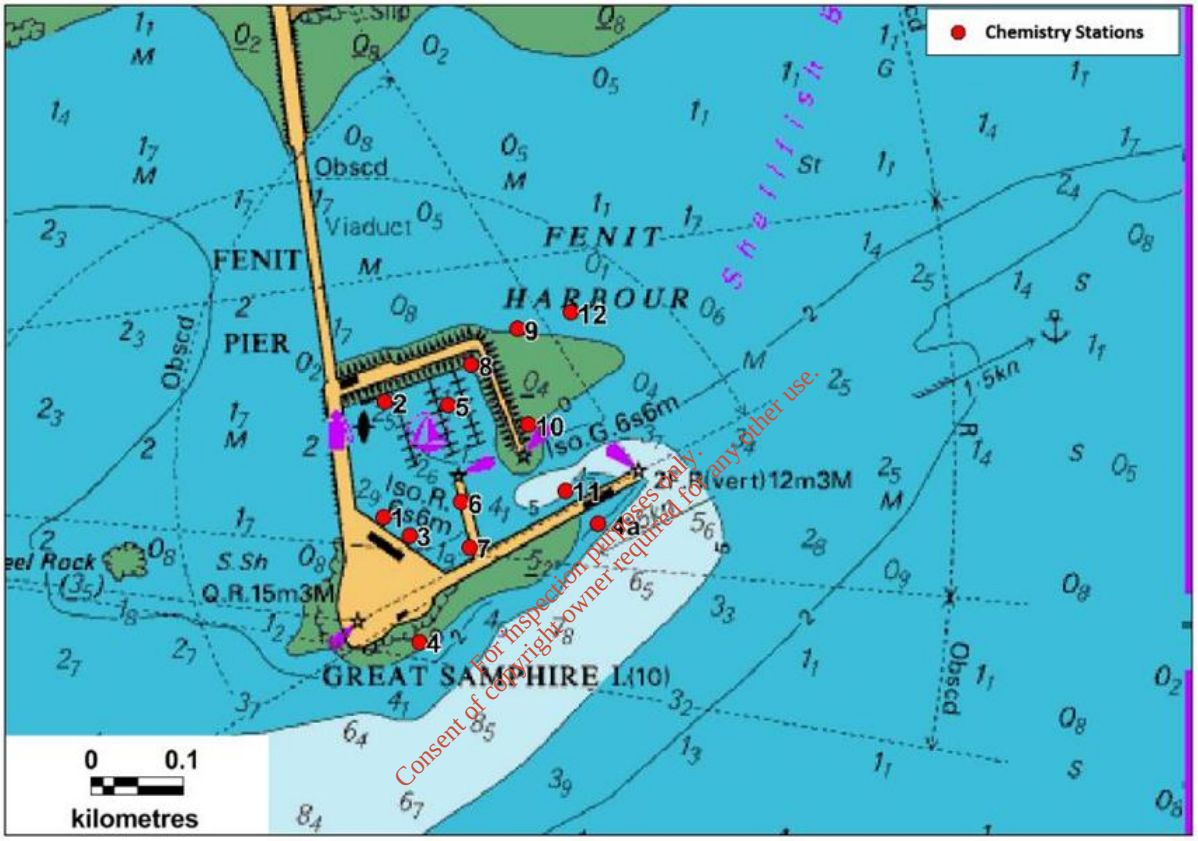


Figure 1. Location of chemistry sampling sites (Aquafact, 2018)

3.3.4 Baseline Characterisation of the Dumpsite

3.3.4.1 Benthic Faunal Sampling

To carry out the sub-tidal benthic faunal assessment of the proposed dumpsite AquaFact International Services Ltd. sampled 8 sites within and around the area in question in November 2017 (see Figure 2 below)(Aquafact, 2018).

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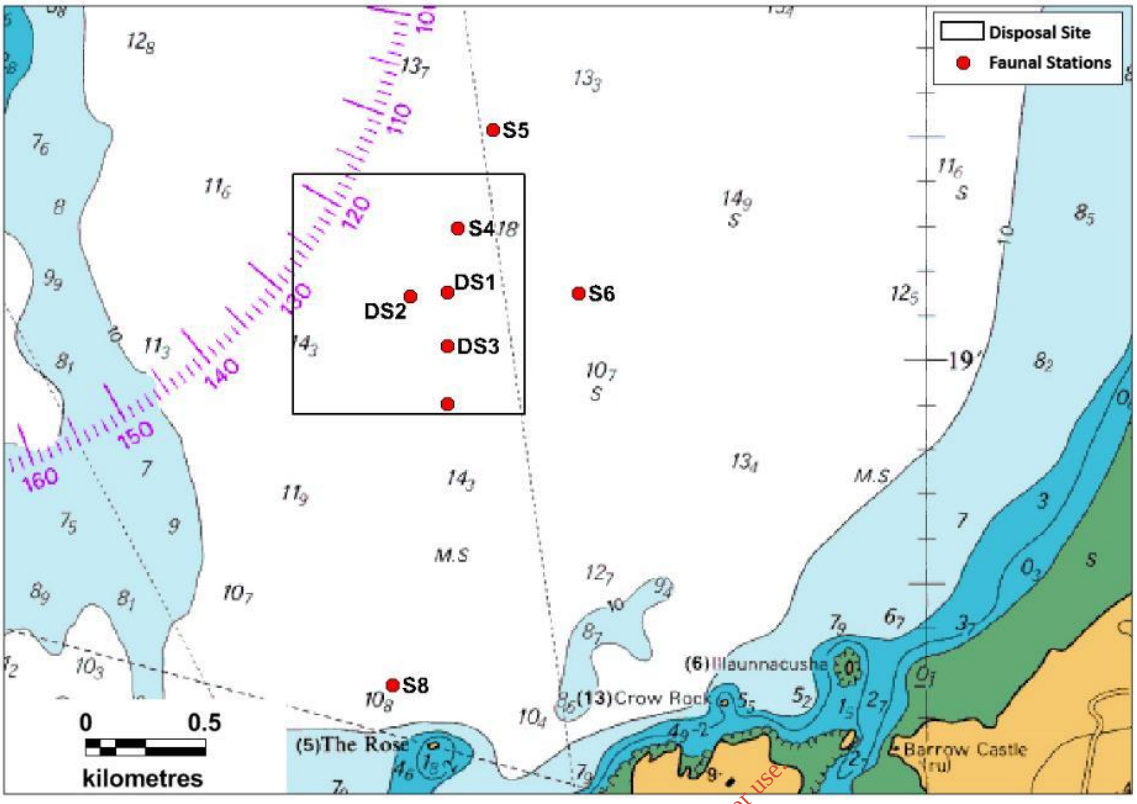


Figure 2. Location of faunal stations sampled in November 2017 (Aquafact, 2018)

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3.3.4.2 Granulometry and Organic Carbon Sampling

At the same time as benthic faunal sampling surveys conducted in November 2017, an additional sample was collected at all 8 stations for grain size analysis and organic carbon content. Organic carbon by Loss on Ignition for the faunal samples was carried out by ALS Labs in Loughrea. AquaFact carried out the particle size analysis and moisture and density content analysis (Aquafact, 2018).

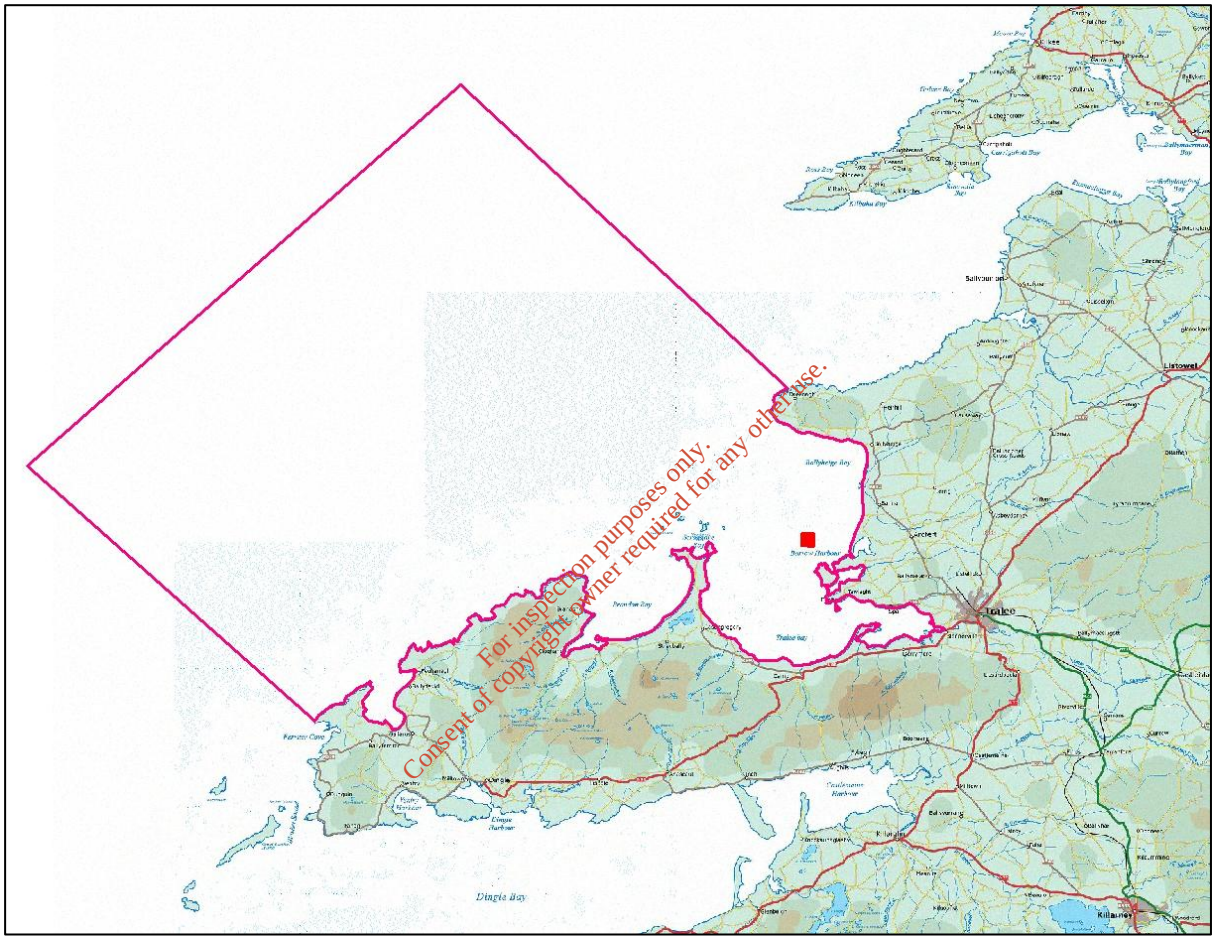
With regards to baseline characterisation of the dumpsite, Aquafact International Services Ltd. carried out the baseline study for the same dumpsite for the 2015 dredging campaign. The stations sampled for the 2015 survey were revisited. Samples were retrieved using a 0.025m^2 Day grab. At the laboratory all samples were sorted and identified to species level. Statistical evaluation of the faunal data was undertaken.

3.3.5 Sediment Transport Model (STM)

Sediment transport modelling has been undertaken previously by Hydro Environmental Ltd. This investigated a proposed dredge disposal site for dredge spoil from Fenit Harbour Co. Kerry. The objective of this study was to identify where suspended dredge material would disperse to from the dredge disposal site during the disposal and thereafter (AquaFact, 2014). The software which was utilised to undertake the sediment transport modelling was the TELEMAC system and specifically the Telemac-2D hydrodynamic module, the software of choice for modelling the complicated hydrodynamics of Tralee Harbour and Approaches. TELEMAC is a software system designed to study environmental processes in free surface transient flows. It is therefore applicable to seas and coastal domains, estuaries, rivers and lakes. Its main fields of application are in hydrodynamics, water quality, sedimentology and water waves (AquaFact, 2014).

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The hydrodynamics from Telemac are determined for a 50-day period covering nearly two lunar spring and neap tidal cycles and inputted to a STM PSED. PSED is a Lagrangian particle tracking model for simulating non-cohesive sediments developed by the Canadian Hydraulics Centre. PSED simulates the transport of both suspended and bed load of a variety of non-cohesive sediment types from fine silts and sands to coarser sands and gravels. The model computes the mobility, entrainment, advection, dispersion and settling of sediments under steady and unsteady flows (AquaFact, 2014). A 2-dimensional depth averaged hydrodynamic model of Fenit Harbour, Tralee bay and the Atlantic from head of the Dingle Peninsula to Kerry Head and extending 30km offshore was developed to model the tidal hydrodynamics and sediment transport (see Figure 3).



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Figure 3. Extent of Hydrodynamic Model (Aquafact, 2014)

3.3.6 Assessment of Risk to Marine Mammals

A risk assessment of the proposed works to marine mammals was carried out by the Irish Whale and Dolphin Group (IWDG) based on a review of available literature and data sources. Maps of the distribution of cetacean sightings within the Tralee Bay region were prepared using data from the IWDG sightings database (O'Brien & Berrow, 2017).

3.4 ASSESSMENT OF POTENTIALLY SIGNIFICANT EFFECTS

As set out in the NPWS guidance, the task of establishing whether a plan or project is likely to have an effect on a Natura 2000 site(s) is based on a preliminary impact assessment using available information and data, including that outlined above, and other available environmental information, supplemented as necessary by local site information and ecological surveys (DoEHLG, 2009). This is

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followed by a determination of whether there is a risk that the effects identified could be significant. The precautionary principle approach is required.

Once the potential impacts that may arise from the proposal are identified the significance of these is assessed through the use of key indicators:

- Habitat loss
- Habitat alteration
- Habitat or species fragmentation
- Disturbance and/or displacement of species
- Water quality and resource.

4 DESCRIPTION OF THE PROJECT

4.1 BRIEF PROJECT DESCRIPTION

This project involves the excavation of sediment from the seabed, termed maintenance dredging, at Fenit Harbour, a commercial shipping port. Dredging is an activity carried out by a dredge, which removes material from the sea bed and deposits it elsewhere. Dredged material will be transported to outer Tralee Bay to a proposed dumpsite (used previously in the 2016 dredge campaign)(See Section 4.3 and 4.4 below for location of proposed dredge area and dump-site)(Please refer to Planning Drawings).

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A foreshore licence (FL) application for consent under the Foreshore Act for dredging at the harbour and dumping operations at the dumpsite in 2020 will be sought from the Department of Housing, Planning and Local Government (DHPLG). A separate FL consent will be required from the DHPLG for each dredging event undertaken during the eight year dredge campaign (2020 – 2027). A Dumping at Sea (DaS) permit application to dispose of the material at the proposed dumpsite will be sought from the Environmental Protection Agency (EPA) under the Foreshore and Dumping at Sea (Amendment) Act 2009. The previous DaS licence expired in October 2016. The current DaS permit application pertains to an eight year dredge campaign (2020 – 2027) with dredging to take place on an annual basis.

4.2 PURPOSE OF THE PROJECT

Maintenance dredging is required to deepen or maintain navigable channels, which are at risk of becoming silted over time due to the transport of suspended sediments into the sheltered waters of the harbour, that in turn deposit on the seabed. The project will increase the navigability of Fenit Harbour and thereby reduce the associated safety concerns for commercial ships and boats.

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4.3 DESCRIPTION OF THE DREDGE SITE (FENIT HARBOUR AND MARINA)

4.3.1 Site Location and Use

The site is located on the west coast of Ireland, in County Kerry on the northern side of Tralee Bay. The bay is sheltered from the Atlantic by the Maharee tombolo, which extends northwards from the Dingle Peninsula. Fenit Harbour and Marina is located about 10km west of Tralee Town, just south of the mouth of the Shannon Estuary (Lat 52°16'N Long 9°52'W). The village of Fenit lies north of the harbour. A location map of the site is presented in Figure 4.

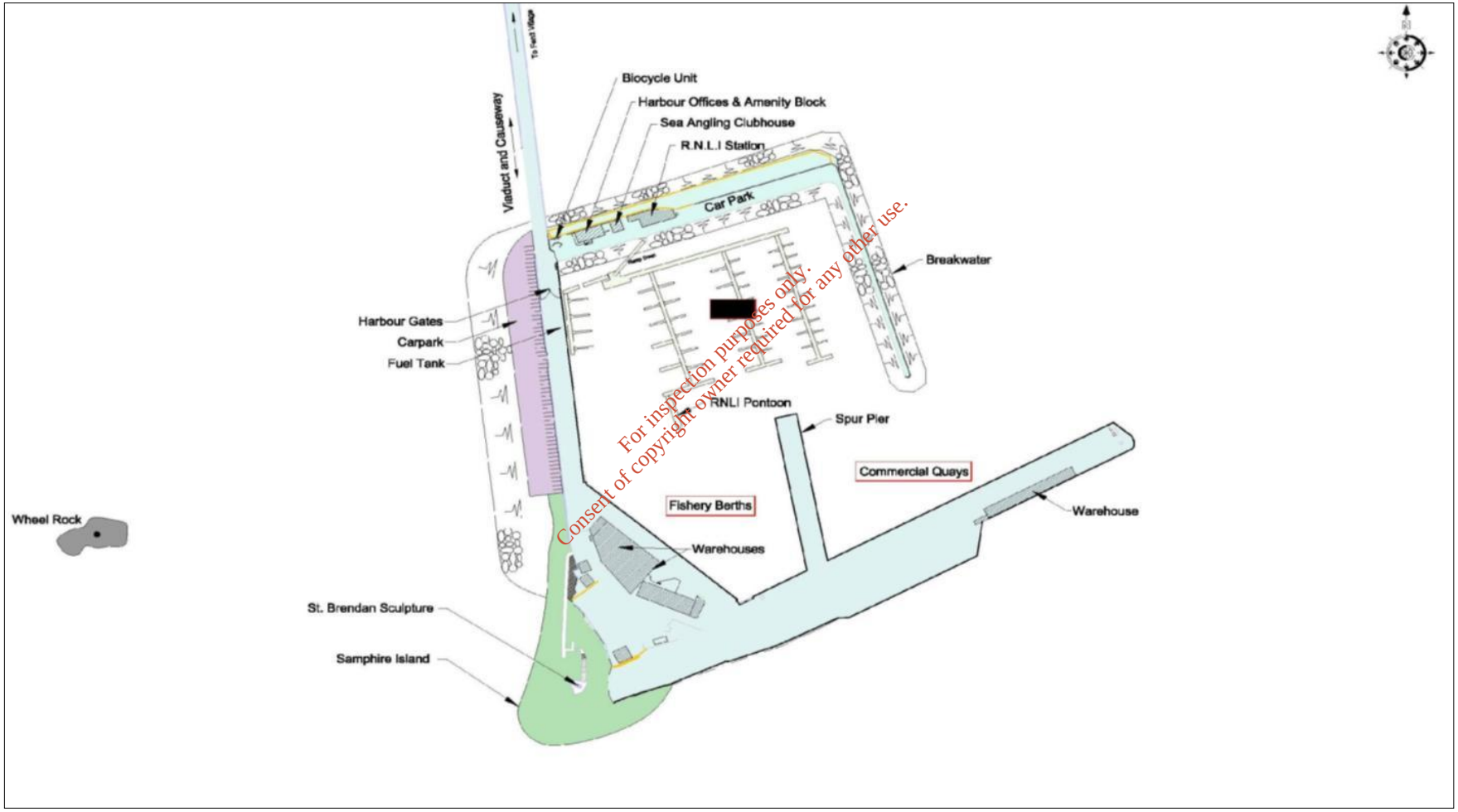


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Figure 4. Location of Fenit Harbour

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A 400 m long causeway and viaduct connects the site to the village. The footprint of the existing harbour and marina is 7ha. From the viaduct the fishing quays stretch south to the rocky outcrop that is Samphire Island and turns east to the newer commercial shipping quays and spur/spring pier. The marina area is located within the shelter of the rubble mound breakwater to the northeast of the site. A plan of the existing site is given in Figure 5.



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Figure 5. Plan of Fenit Harbour

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Land use in the vicinity of the harbour on the mainland includes agricultural, recreational, residential, commercial and open space. The harbour is approximately 500m south of Fenit village. The land directly to the north of the proposed expansion is primarily amenity, residential and open space. The Fenit blue flag beach is located to the northwest of the site and is an important amenity area for the local community. A further stony beach is located to the northeast of the site.

Fenit is the most westerly commercial port in Ireland and is the only commercial port between Foynes and Cork. It is used for commercial shipping, servicing a domestic fishing fleet, as well as leisure, amenity and lifesaving. The main deep sea pier is 175m long with extensive storage facilities available. The landing quays have a design dredge depth of -7.5mCD. Fenit Harbour is an important logistical base for the Killarney based Liebherr cranes. The commercial shipping quays facilitate 15,000 tonne ships of container cranes of a frequency of approximately 15 to 20 per annum. Currently, the fishing fleet operating out of Fenit includes approximately 1 large trawler, 2 medium trawlers and 24 half-decker trawlers in addition to a number of charter sea angling vessels. Fenit Marina was built in 1997 and has a 130 berth marina and caters to leisure craft from 6m to 15m in length. It has a plan area of approximately 1.5ha. The marina has a design dredge depth of -3.5mCD. The existing marina berths facilitate leisure craft during the peak summer months and a mixture of both fishing and leisure in the off-season.

Tralee Bay is sheltered from Atlantic waves by the Dingle Peninsula to the south and the Maharees Peninsula to the west. Wave action and tidal currents enter the Bay from the north. Tidal currents, filling the bay under flood tide, sweep past the harbour in a west to east direction. On the ebb, relatively strong currents approach the harbour from the east. The currents are strong enough to move considerable volumes of sediment in the vicinity of the harbour. These tidal currents and the nature of the seabed result in large volumes of sediment being moved around the bay.

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Both the commercial berth and marina dredge areas are encompassed within the Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070).

4.3.2 Bedrock geology and coastline to the north of Dredge Site

Fenit Harbour is situated on the northern shore of Tralee Bay, north of the Dingle Peninsula. According to Geological Survey of Ireland (GSI) mapping and supporting data the Dingle Peninsula which makes up the southern shore of the bay is a syncline of Devonian Sandstone with Namurian Sandstone on its flanks. In addition, the GSI map indicates that Tralee Bay is underlain with Carboniferous Limestone as is the Tralee area with the hills to the west consisting of Namurian sandstone.

The Carboniferous Limestone outcrops within the harbour at Samphire Island. Geotechnical investigations undertaken in 1996 indicate that the rock dips away under the surrounding overburden which forms the bed of the harbour and nearby area. The existing harbour was constructed on the rock of Samphire Island with an original L-shaped pier extending north and east-northeast of the rocky outcrop. The north oriented leg of the harbour is connected to the mainland via a piled viaduct and causeway. The shore to the north of the harbour consists of a glacial till cliff to the northeast and a short sandy beach to the northwest. Further west the beach merges into a rocky foreshore. The shore immediately east of the viaduct consists of a rock cliff becoming a glacial till cliff further east. Fronting the glacial till cliff is a layer of sand, gravel and cobbles overlying an

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eroded platform in the till. The shoreline at Fenit comprises sandy beach, rocky shore and cobble and gravel shingle.

4.3.3 Bathymetry of Dredge Site

A bathymetry survey of the proposed dredge site was conducted by Hydrographic Services Ltd in 2018 (Refer to application drawings 18598-5003A and 18598-5007A). The bathymetry survey indicates that depths are variable throughout the dredge area and that there is an accumulation of sediment in all parts of the harbour including the navigational channel since the last maintenance dredge of this area in 2016.

The survey indicates depths within the Marina (Area A) range from -1.9mCD to -3.0mCD, which is up to 1.6mCD in places from the optimum design depth of -3.5mCD. Within the commercial shipping berth and navigational channel (Area B), water depths typically range between circa -4.5mCD and -7mCD which is between 0.5 and 3mCD from the optimum design depth of -7.5mCD. The survey shows areas in the outer manoeuvring area (Area C) drying out at 1.4mCD immediately east of the eastern breakwater and due north of the main shipping pier.

4.3.4 Marine Sediments at Dredge Site

Previous reports and site investigations indicate that the composition of the material to be dredged is a clean sand silt gravel mix with no rock. Sediment sampling for quality analysis was undertaken at twelve locations across the harbour area including two at the fishing berth (F1, F3) and commercial berth (F6, F7). Three sampling locations were located within the marina (F2, F5, F8), with another three immediately east of the eastern breakwater (F9, F10, F12). One sampling location was located in the maneuvering area (F11) while another was in the navigation channel (F4a, moved from F4 due to hard ground). F1-F8, and F11 are representative of the dredge area sediment quality while locations F9-F12 are representative of the edge of the backslope dredge areas (see Figure 1 above).

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There are no current or historic heavy industries, boat building or repair associated with Fenit Harbour. The principal sources of pollutants within the harbour would be hydrocarbons associated with vessels, machinery and equipment. The sediments from the harbour area were classified as muddy sand throughout by Folk (1954), being dominated by silt-clay and very fine sand for the most part.

Arsenic values were below the lower guidance level of 9 mg kg^{-1} at stations 9 and 12 while all others exceeded the lower guidance level, ranging from 9.8 mg kg^{-1} to 18.6 mg kg-1. None of the sampling stations exceeded the upper Irish action level for arsenic, or the U.S. probable effects level (PEL) used for biological effects guidelines of 41.6 mg kg^{-1} (Cronin *et al*., 2006). Arsenic can be naturally present in marine sediment and in some locations natural levels of arsenic can exceed the upper value of 70 mg kg^{-1}.

Nickel was below the lower guidance level at four stations (4, 9, 10 and 12) while nickel levels exceeded the lower Irish action level of 21 mg kg^{-1} for the remaining eight sampling stations for sediment quality, namely F1, F2, F3, F5, F6, F7, F8 and F11. None of the sampling stations exceeded the upper Irish action level for nickel of 60 mg kg^{-1}, or the U.S. probable effects level (PEL) used for biological effects guidelines of 42.8 mg kg^{-1} (Cronin *et al*., 2006).

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Zinc was below the lower guidance level at all stations except station 1, which was above the lower guidance level of 160 mg kg^{-1}. None of the sampling stations exceeded the upper Irish action level for zinc of 410 mg kg^{-1} , or the U.S. probable effects level (PEL) used for biological effects guidelines of 271 mg kg^{-1} (Cronin *et al*., 2006). Station 1 lies outside the proposed dredge area.

Copper was below the lower guidance level at all stations except station 1, which was above the upper guidance level. A copper concentration of 263 mg kg^{-1} was recorded for sampling station 1 which exceeds the upper Irish guidance level of 110 mg kg^{-1}. This also exceeds the U.S. probable effects level (PEL) used for biological effects guidelines of 108 mg kg^{-1} (Cronin *et al*., 2006). Station 1 lies outside the proposed dredge area.

Cadmium, chromium, lead and mercury were all below the lower Irish action limit at all stations. See Table 1 below for the full list of parameters and results.

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Table 1. Results of sediment chemistry analysis, with reference to Irish Action Levels (Aquafact, 2018)

Parameter	Units (dry wt) Note 2	Lower Action Limit	Upper Action Limit	Sampling points							
				S1	S2	S3	S4	S5	S6	S7	S8
Arsenic	mg kg^{-1}	9	70	18.6	18.6	18	10.8	16.5	18.4	16.7	15.6
Cadmium	mg kg^{-1}	0.7	4.2	0.3	0.4	0.4	0.4	0.5	0.4	0.5	0.6
Chromium	mg kg^{-1}	120	370	62.6	54.9	53.6	40.1	52.1	54.7	53.8	54.9
Copper	mg kg^{-1}	40	110	263	31.4	18.2	18	19.3	20.5	30.3	18.8
Lead	mg kg^{-1}	60	218	49.8	22.9	21.6	15.9	21.8	22.9	26.1	21.9
Mercury	mg kg^{-1}	0.2	0.7	0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.05
Nickel	mg kg^{-1}	21	60	28.2	26.5	27.3	20.4	26.6	27.5	27	28.7
Zinc	mg kg^{-1}	160	410	205	118	146	68.7	82.6	87.9	106	89
Σ TBT & DBT Note 3	mg kg^{-1}	0.1	0.5	<0.002	<0.002				<0.002		<0.002
γ-HCH (Lindane) Note 4	µg kg^{-1}	0.3	1	<0.1	<0.1				<0.1		<0.1
HCB Note 5	µg kg^{-1}	0.3	1	<0.1	<0.1				<0.1		<0.1
PCB (individual congeners of ICES 7) Note 6 PCB 028	µg kg^{-1}	1	180	<0.08	<0.08				<0.08		<0.08
PCB 052	µg kg^{-1}			<0.08	<0.08				<0.08		<0.08
PCB 101	µg kg^{-1}			<0.08	<0.08				<0.08		<0.08
PCB 138	µg kg^{-1}			<0.08	<0.08				<0.08		<0.08
PCB 153	µg kg^{-1}			<0.08	<0.08				<0.08		<0.08
PCB 180	µg kg^{-1}			<0.08	<0.08				<0.08		<0.08
PCB 118	µg kg^{-1}			<0.08	<0.08				<0.08		<0.08
PCB (Σ ICES 7) Note 6	µg kg^{-1}	7	1260	<0.56	<0.56				<0.56		<0.56
PAH (Σ 16) Note 7	µg kg^{-1}	4000		411.10	391.30				288.30		421.30
Total Extractable Hydrocarbons	g kg^{-1}	1.0		0.158	0.107				0.099		0.15

Note: Sample station 1 is outside the proposed dredge area

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Parameter	Units (dry wt) Note 2	Lower Action Limit	Upper Action Limit	Sampling points			
				S9	S10	S11	S12
Arsenic	mg kg^{-1}	9	70	7.9	9.8	13.9	7.9
Cadmium	mg kg^{-1}	0.7	4.2	0.4	0.4	0.5	0.3
Chromium	mg kg^{-1}	120	370	32.7	40.7	51.1	29.4
Copper	mg kg^{-1}	40	110	11.8	14.1	36.9	13
Lead	mg kg^{-1}	60	218	11.5	15.4	27	9
Mercury	mg kg^{-1}	0.2	0.7	0.02	0.03	0.05	0.02
Nickel	mg kg^{-1}	21	60	16.1	20.2	23.7	14.3
Zinc	mg kg^{-1}	160	410	52.5	61.6	149	47.5
Σ TBT & DBT Note 3	mg kg^{-1}	0.1	0.5	<0.002		<0.002	
γ-HCH (Lindane) Note 4	µg kg^{-1}	0.3	1	<0.1		<0.1	
HCB Note 5	µg kg^{-1}	0.3	1	<0.1		<0.1	
PCB (individual congeners of ICES 7) Note 6 PCB 028	µg kg^{-1}	1	180	<0.08		<0.08	
PCB 052	µg kg^{-1}			<0.08		<0.08	
PCB 101	µg kg^{-1}			<0.08		<0.08	
PCB 138	µg kg^{-1}			<0.08		<0.08	
PCB 153	µg kg^{-1}			<0.08		<0.08	
PCB 180	µg kg^{-1}			<0.08		<0.08	
PCB 118	µg kg^{-1}			<0.08		<0.08	
PCB (Σ ICES 7) Note 6	µg kg^{-1}	7	1260	<0.56		<0.56	
PAH (Σ 16) Note 7	µg kg^{-1}	4000		104.20		809.60	
Total Extractable Hydrocarbons	g kg^{-1}	1.0		0.061		0.11	

***Note: Sample station 1 is outside the proposed dredge area**

	Exceed Lower Irish Action Limit
	Exceed Upper Irish Action Limit

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Note 1: Applicants should highlight in Table B.1 any results which exceed either the upper or lower Irish action levels. Action levels are published in: *Cronin et al. 2006. Guidelines for the Assessment of Dredge Material for Disposal in Irish Waters. Marine Environment & Health Series, No. 24. Marine Institute.*
Note 2: Total sediment <2 mm
Note 3: Sum of tributyl tin and dibutyl tin
Note 4: 1α,2α,3β,4α,5α,6β-hexachlorocyclohexane
Note 5: Hexachlorobenzene
Note 6: ICES 7 polychlorinated biphenyls: PCB 28, 52, 101, 118, 138, 153, 180.
Note 7: Polyaromatic hydrocarbons (measured as individual compounds): Naphthalene, Acenaphthylene, Acenaphthene, Fluorene,Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(ah)anthracene, Benzo(ghi)perylene, Indeno(123-cd)pyrene.

Based on the results, all sediment samples, except at sampling station 1, can be placed into Class 2. Class 2 sediments hold contaminant concentrations between Level 1 and Level 2 and are considered marginally contaminated (Cronin *et al*., 2006). Due to an elevated concentration of copper at sampling station 1 (263 mg kg^{-1}), which exceeds the upper Irish guidance level, this sediment can be categorized as Class 3. Class 3 sediments are those above Level 2 and are considered heavily contaminated and very likely to cause biological effects (Cronin *et al*., 2006). However, sampling station 1 is located outside the proposed dredge area, as shown in Figure 1, and so will not be subject to dredging activity carried out as part of the proposal.

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4.3.5 Benthic Ecology at Dredge Site

In 2009 Aqua-Fact undertook benthic survey work at 10 sampling stations in and around Fenit Harbour to inform the Fenit Harbour and Marina Expansion project. The western part of the inner harbour area (grab Stations S1 and S2) was dominated by fine muds (>98% silt-clay content). Only three species were recorded in any appreciable numbers in this area but numbers were still low when compared to the stations outside the harbour. *Nepthys hombergii* and nemerteans dominated here. The harbour entrance area (grab Stations S3) was dominated by silt-clay, with Stations S4 and S6 dominated by sandy mud. All stations had a poor species assemblage with *Nepthys hombergii* dominated each site.

The area east of the harbour was relatively homogenous consisting of sandy mud formed into small wavelets by the action of the tidal currents. Further east, areas of compact clay formed large shallow mounds on the bottom. Apart from drift algae, no flora or fauna was observed. Faunal grab station S4 revealed the dominance of the infaunal polychaete *Nephtys hombergii* in this location along with the bivalve molluscs *Abra nitida* and *Nucula nucleus*. The community here was consistent with the SS.SMU Sub-littoral cohesive mud and sandy mud community biotope.

4.4 DESCRIPTION OF THE DUMPSITE

4.4.1 Site Location and Land Use

The dumpsite is located approximately 3km west of the coast at Carrahane Lower townland and approximately 1.5km north-northwest of Fenit Island in the outer part of Tralee Bay. It lies between 1.5km to 2.5km south and southeast of Illaunnabarnagh and Mucklaghmore Islands, which are essentially small rocky outcrops. The seabed in the general surrounds is classified as sand and muddy sand with reefs located over 1km to the northwest.

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The boundary extents of the dumpsite are square in shape with each side measuring 1km giving a total area of 100ha (see Figure 6 below). Tidal currents are generally low at the dump site. The current largest velocities occur at mid ebb and mid flood with magnitudes ranging from 0.2 to 0.3 m/s. The proposed dump site was selected as a suitable location after consultation with a number of stakeholders in the area as well as conforming to navigational safety of the port authority.

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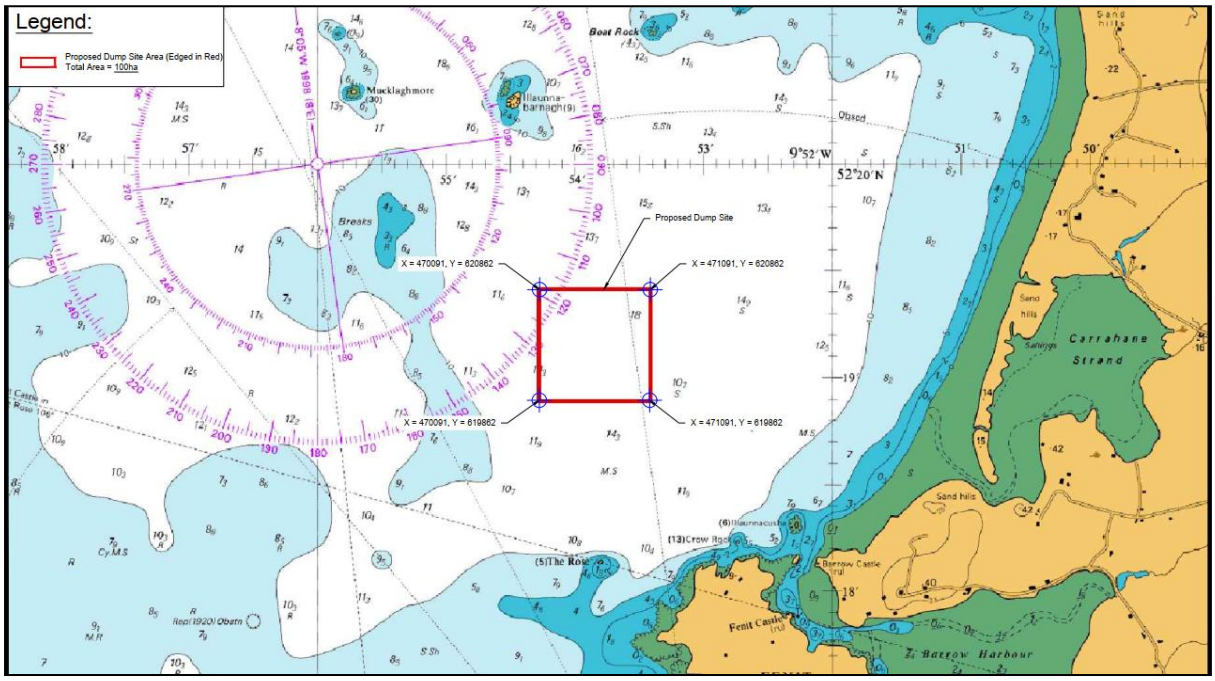


Figure 6. Dumpsite location in outer Tralee Bay

4.4.2 Bedrock geology at Dumpsite

The GSI map indicates that Tralee Bay is underlain with Carboniferous Limestone as is the Tralee area.

4.4.3 Bathymetry at Dumpsite

The bathymetry survey conducted by Hydrographic Services Ltd indicates that depths in the dumpsite range between 16.4m and 19.6m and outside the dumpsite range from 13.7m to 19.1m.

4.4.4 Marine Sediments at Dumpsite

The sediment type in the disposal site consists of fine/medium sand, coarse/medium sand, gravelly coarse sand and sandy gravel. Areas of hard ground occur in the western half. Very fine sand dominate just over 1km south of the dumpsite. Fine/very fine sand dominates to the east of the dumpsite and a gravelly coarse/very coarse sand dominates to the north. All sediments were classified as sand, gravelly sand or sandy gravel by Folk (1954). Silt-clay fractions were low throughout (<10%).

4.4.5 Benthic Ecology at Dumpsite

The habitat in the area of the dumpsite can be described (according to Fossitt, 2000) as SS1 Infralittoral gravels and sands. Variation in community type and dominant species between the stations was evident. These local variations are common in the natural environment. All species observed are typically of the gravelly/sandy habitat in the area and the species present represent a balanced mix of longer lived deeper burrowing equilibrium species and smaller shorter lived opportunistic species. Some of the main dominants of the assemblage include the bivalve *Spisula subtruncata* and the polychaetes *Magelona johnstoni*, *Nephtys* sp. and *Syllis pontxioi* (AquaFact, 2018).

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4.5 CHARACTERISTICS OF THE PROJECT

4.5.1 Requirement for Maintenance Dredging

Fenit Harbour acts as a barrier within the bay, reducing and impeding flow, thus interrupting the natural hydrodynamics of the area. This contributes to an ongoing accumulation of material within the commercial berth and the inner harbour area and hence the requirement for routine maintenance dredging. Historically, this has been done in a 3 or 5 year cycle depending on whether dredging is required in the commercial shipping berth or inner marina harbour area. The first and only capital dredging operation was undertaken in 1995/6 to develop the new marina, spring pier and breakwater, and to provide sufficient navigation depth for fishing vessels, yachts and commercial shipping during all tides. The volume of capital dredging in 1996 amounted to 200,000m^3 of material. Following this dredging operation the optimum design depths were a minimum of -3.5mCD for the inner harbour and marina area, -7.5mCD for the commercial shipping berth and -5mCD for the shipping manoeuvre area. Since 1996 maintenance dredging of the commercial berth was undertaken in 2000, 2003, 2008 and 2016. Material from these dredging campaigns was disposed of in the licensed site to the north of Tralee Bay.

The previous DaS licence (EPA Dumping at Sea permit no. S0007-02 and Foreshore licence no. FS 6474 issued by the Foreshore unit of the Department of Environment) covered the period of 20th October 2015 to 20th October 2016. Within that period, over 130,000 tonnes of material were dredged from the harbour over the course of ten days in April 2016. Since the area was last dredged in 2016, the area has silted up and safe navigation and berthing of commercial ships is compromised based on recent bathymetry data. Recent assessments have highlighted the need for annual dredging to avoid having to deal with excessive accumulation.

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Currently, the commercial berth, which is actively used by Liebherr Crane shipping activities, is depositing sediment at a rate of approximately 2m over a 3 year period. This is considered to be a relatively rapid deposition rate. One of the reasons for such a relatively rapid accumulation rate with the commercial berth in recent years is believed to be related to the accumulation of sediment adjacent to the eastern breakwater leg. As a result it is believed that the accumulated sediment outside the breakwater at the harbour mouth is directing flow and material into the berth at faster rate than in the past. Inadequate navigation depth leads to reduced control of ship movement and resulting safety and navigation issues. Admiralty chart shows the optimum design depths for navigation and berthing safely, however, the site as evident from the recent bathymetry data currently does not meet these.

The current application is for an eight year period for an ongoing maintenance dredging campaign requirement. The proposed works aim to remove approximately 1,000,000m^3 of sediment over the 8 year period. Within this period, dredging will take place on an annual basis. The volume of material to be removed will be approximately 250,000 tonnes in 2020, decreasing to between 75,000 and 150,000 tonnes per year thereafter (see Table 2 below). These figures are the maximum dredge volumes, where actual volumes will be determined at the time by funding availability. The increase in volume of material to be removed relative to the 2015/2016 dredge campaign can be attributed to the larger dredge area which is proposed, encompassing almost the entire harbour area, as well as turning area and part of the approach channel outside the harbour. It is envisaged that works in 2020 will take place over a 4-6 week period between February and the end of May and annually thereafter over a 3-4 week period.

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Table 2. Approximate annual estimates of material to be removed on an annual basis (2019-2026)

Year	Area	(Tonnes)
1	B,C	250,000
2	A,B,C	100,000
3	A,B,C	150,000
4	A,B,C	75,000
5	A,B,C	150,000
6	A,B,C	75,000
7	A,B,C	100,000
8	A,B,C	100,000

As part of the proposal, material will be removed from three main areas; the inner harbour and marina area (Area A), the commercial shipping berth and navigational channel (Area B) and the outer shipping manoeuvre area (Area C) located just east of the harbour (see Figure 7 below). Area A, the inner harbour and marina, covers an area of 25,495m^2. Area B, the commercial shipping berth which encompasses the harbour mouth, covers an area of 44,875m^2. Area C which lies east of the harbour mouth comprises the shipping manoeuvre area. This area encompasses approximately 47,040m^2. The maintenance dredging footprint will take place within zones that have been subject to previous dredging and also in zones where dredging has not yet occurred.

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Figure 7. Proposed dredge areas within Fenit Harbour

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The maintenance dredging project will prioritise dredging adjacent to the commercial berth. The total maximum area or footprint to be dredged is 11.8ha and the total maximum volume is 1,000,000m^3. These figures are the maximum dredge areas and volumes because in reality it will be funding and financial constraints that will determine the actual area and volume of maintenance dredging. Deposition rates in the marina and fishing berth are relatively slower than the commercial berth and manoeuvring area. Once the conditioned DaS licence is in place, KCC will have to notify EPA of the next planned campaign as well as documenting and notifying OSPAR of all dredged quantities. Furthermore, KCC will have to notify the EPA of the selected dredger that will be used for the each dredging event. The FL applies to singular dredging events; therefore, KCC will need to apply to the DHPLG for each proposed dredging event.

4.5.2 Dredging Operation

A suction hopper dredger is the proposed primary dredging method to be used. In conjunction with the suction dredger, a plough dredger or a mechanical dredger such as a grab or backhoe may also be used where limited access for large dredging plant occurs. The suction hopper dredge will be on site for a maximum of six weeks, subject to weather and tides. The suction hopper dredger enables removal of material from the bed in a controlled fashion. This type of dredger has greater controls in terms of the accuracy of dredging and minimisation of any plumes within the water column in comparison to a back-hoe dredger. The suction hopper dredger moves in a linear defined corridor and dredges in stages. In effect it does so by a series of passes over a defined footprint area until it reaches its design depth.

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One of two suction pipes descends to the bottom of the seabed with a trailing head at the end, which also serves to loosen material on the seabed. The trailing head moves across the dredge area sucking up the sediment, comparable to a large vacuum cleaner. Material is then discharged to the hopper and the material will sink while the seawater is discharged overboard.

Dredging pumps suck water through the pipes to prime them and once this is complete the pipe then begins to suck sediment. The dredging operation is fully automated and linked to satellite GPS. The area and volume of dredging is pre-programmed to an automated computerised system. Sensors estimate the area and volume of dredge material. Furthermore, cameras are placed on the boat and suction dredge. Depth is determined using sounders. The crew visually monitor during the dredging operation for any plumes or any rubbish that might damage the dredge equipment. The harbour also provides good shelter against poor weather conditions. In summary, much of the dredge operation is automated through a computer management system and thus the operation is well controlled within harbour. The use of the suction hopper dredger method and associated automation of the dredging operation is relatively clean, fast and efficient and is thus the most suitable method for sensitive sites and this is the method of maintenance dredging used in sensitive marine environments such as the Shannon Estuary, Port of Cork and Dublin Port, and has also been used in past dredging campaigns at Fenit.

As the dredger progresses it fills its on-board storage bay. When full the dredger then steams to the dumpsite location. Once there the location within the footprint of the dumpsite is recorded and the dredger opens it sea doors that close the hopper and deposit the excavated silt material onto the sea bed. The position over which the dredger deposits each load and the deposited volume is recorded. Once the dredger is finished the disposal process it then steams back to port and recommences the dredging operation. This process is repeated until such time as all material is

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removed and the design depths are achieved. A bathymetry survey is then undertaken to confirm dredge depths. Deposition is undertaken at optimum times of the tide, within good weather windows. Visual monitoring of the plume at the deposition site is undertaken as part of normal good practice.

	
Sample image of suction hopper dredger with single suction tube (source: IHC Holland, www.theartofdredging.com)	**Sample image of suction hopper dredger filling its storage area (source: www.mining-technology.com)**

The dredging period is limited to February-May and will take place over a four to six week period in the initial year, reducing to a three to four week period in each subsequent year of the campaign. The inner Tralee Bay area due east of the harbour has an area designated for shellfish, which in this case is the native oyster. Accordingly, any potential impact on the shellfish areas has to be avoided or minimised. Therefore, the dredging must avoid the oyster spatting (settlement and recruitment of larvae) period between June and July and ideally the oyster harvesting period between November and end of January/early February due to relatively heavy use of the harbour during this time. The summer leisure period will also be avoided.

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Once dredging operations are completed a full report of the volumes removed and deposited at the dump site will be produced following a bathymetry survey. This will also include drawings and details presenting the dump footprint, its co-ordinates and the volumes deposited.

4.5.3 Dredge material

The characteristics of the dredge material have been described in Section 4.3.4 above.

4.5.4 Selection of Dumpsite

The dump site which is proposed to be used for the deposition of all material dredged under the current proposed eight year dredge campaign is the same dumpsite as previously used for the previous 2016 campaign (see Figure 6). The western half of the dumpsite overlaps with two dumpsites where dredged material was dumped between 1996 and 2003. A further historic dumpsite occurs approximately 0.5km west of Fenit Island where dredged material was dumped between 1985 and 1996.

A Dump Site Selection Report for the selected dumpsite was completed by Malachy Walsh and Partners in 2015, prior to the 2016 dredge campaign, where alternative sites were examined in a systematic manner. This report provides detail on the criteria for dumpsite selection, consultation

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and the staged and iterative process involved in the selection process. Some of the characteristics for selecting the dumpsite over other sites included:

- Avoidance of shipping lanes and main navigation routes
- Avoidance of known seabed archaeological features
- Avoidance of Natura 2000 sites
- Avoidance of fishing grounds and nursery areas for fish and aquaculture
- Avoid impacts on Blue Flag beaches
- Selection of area of sea bed with reasonable depths of water
- Selection of an area of sea bed that has a suitable profile or depression
- Location that has favourable current regime
- Location that has suitable bed characteristics for receipt of dredged material
- Minimisation of impacts on benthic communities within and surrounding the dump site
- Examination of previously used dump site locations and experience with these locations

A DaS permit is required for the deposition of dredge material. Over the years a number of DaS permits were issued by the Department of Marine and Department of Environment. The last DaS permit expired in October 2016 after the most recent dredging project was completed.

4.5.5 Sediment Transport Model

4.5.5.1 Dredge Site

Based on past models simulated, during the dredging operations there will be a localised increase in turbidity as there will be disturbance of silt/sand on the bed as it is removed and there will also be spill over from the hopper as it is filled. This in effect will generate a localised dredge plume in the immediate vicinity of the dredge vessel. Increases in suspended sediment will be greatest as a result of plough dredging at the dredge site.

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The typical re-suspension of sediment from a trailer suction ranges from 3 to 15 kg/m^3, while a back hoe dredger with an environmental bucket ranges from 5-10 kg/m^3 and without environmental bucket 12-25 kg/m^3 according to Kirby and Land (1991). A conservative estimate in previous studies assumes 3% (of 1800kg/m^3) is lost to the water column with approximately 50% of that being re-suspended (the heavier granular particles sink to the bottom) which equates to 1.5% of 1800kg/m^3 or 27kg/m^3.

Previous study modelling of the dredging location showed that the maximum tidal currents were quite low (below 0.05m/s) at max ebb (See Figure 8). Similarly, wave disturbance within the harbour, where dredging is proposed, is negligible with significant wave heights, Hs, below 0.1 of a meter, (Figure 9). Previous modelling shows that suspended sediment generated as a result of dredging activity moves east out of the harbour but at very low quantities with sediment suspensions rates ranging from 0.006kg/m^3 at high water (Figure 10) to 0.03kg/m^3 at mid flood (Figure 11).

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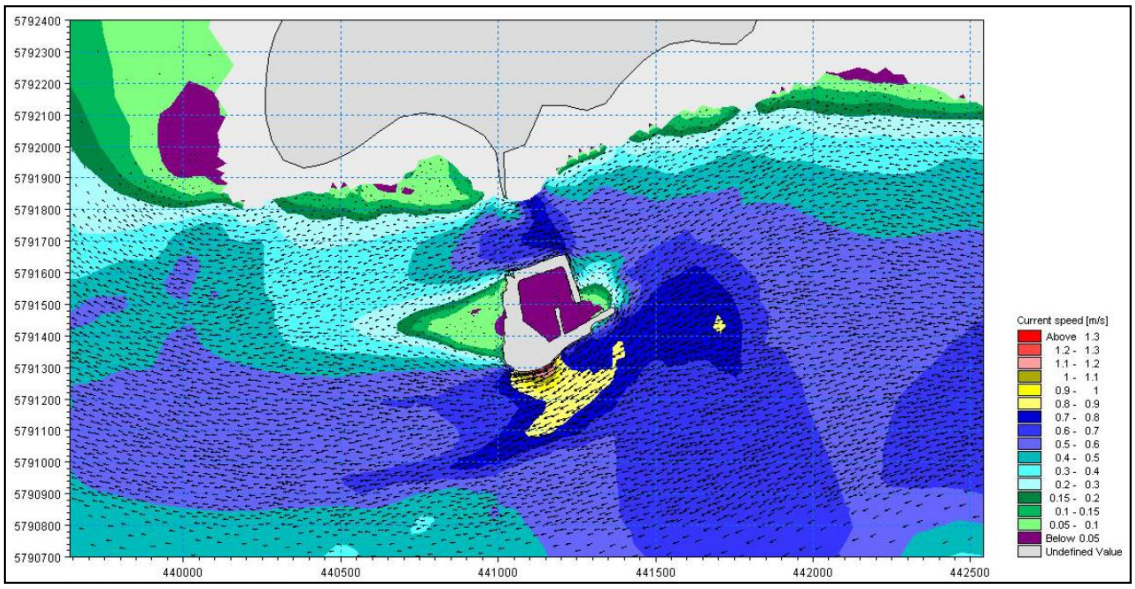
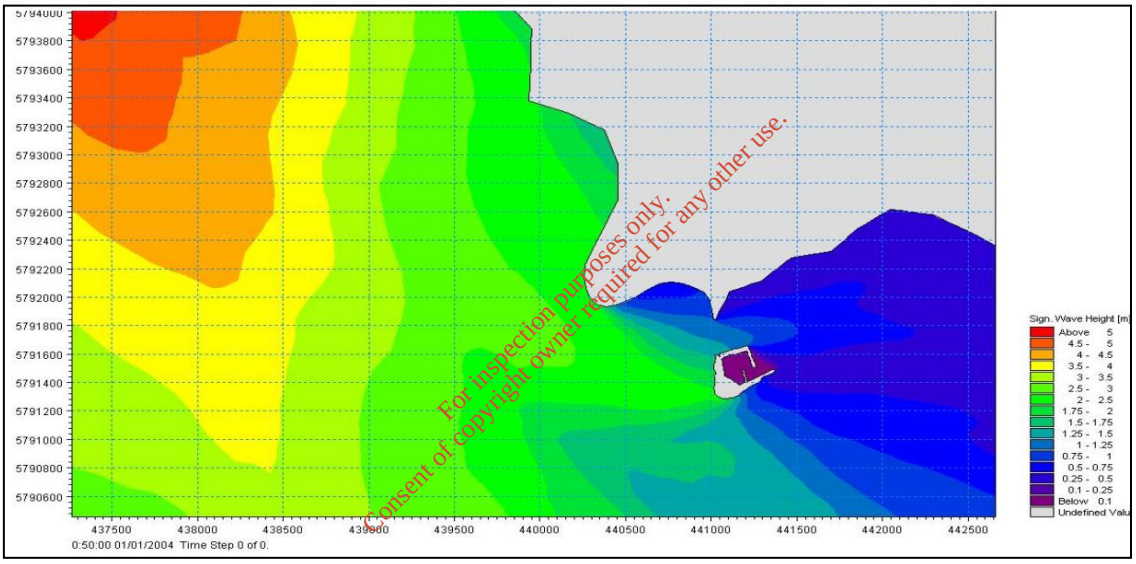


Figure 8. Tidal current modelling within the harbour at max ebb



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Figure 9. Storm wave modelling within the harbour

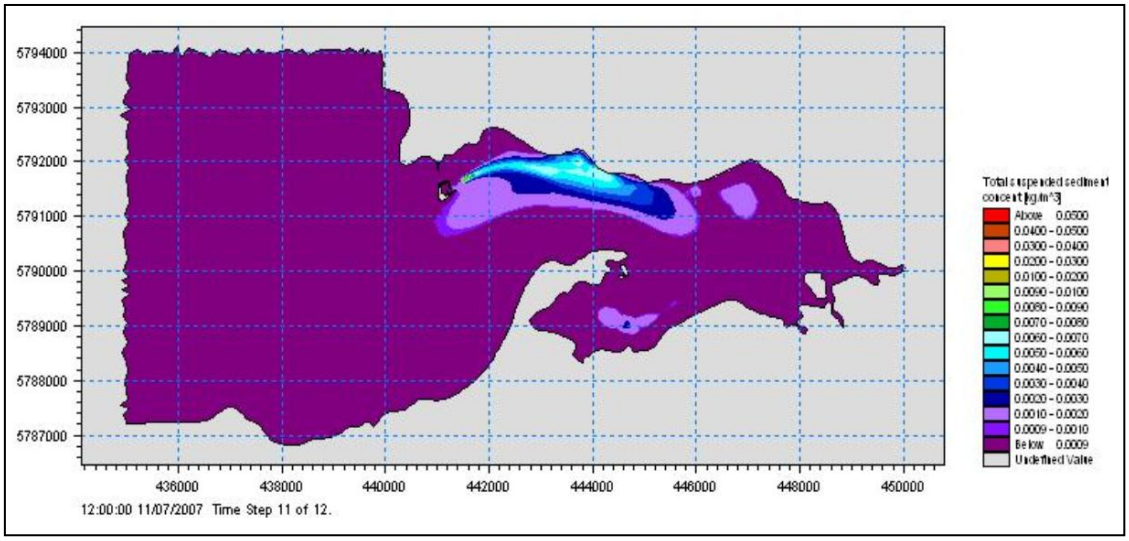


Figure 10. Suspended sediment concentration at high water after 12 days dredging

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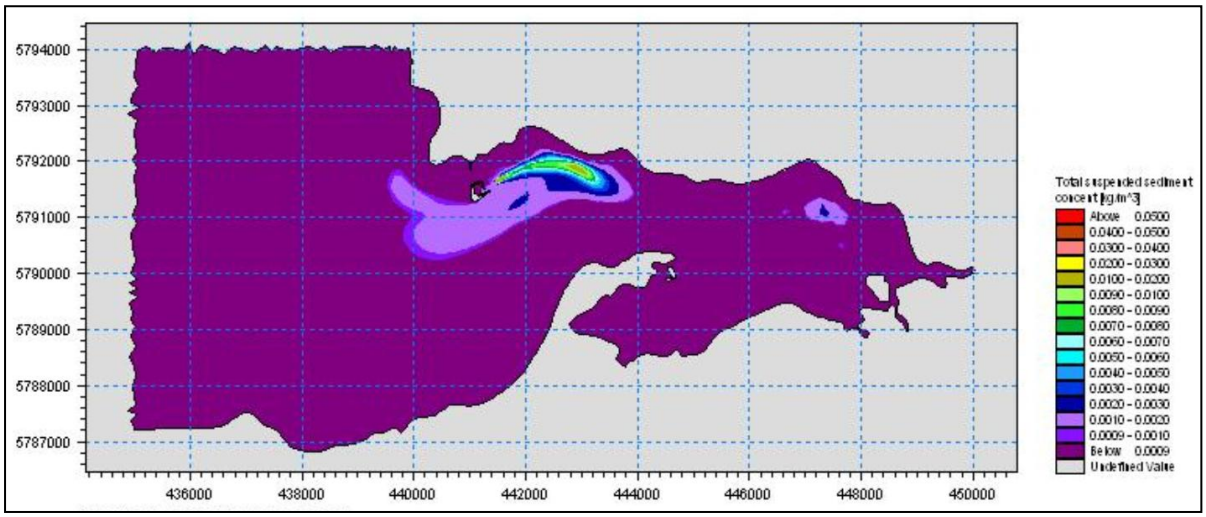


Figure 11. Suspended sediment concentration at mid flood tide after 13 days dredging

4.5.5.2 Dump Site

The dump site was also previously subject to extensive tidal and sediment transport modelling. Tidal currents are generally low at the dump site, which is shown as a red box in the Figures 12 to 15. There is no appreciable current velocity at high and low water (Figures 12 and 13). The current largest velocities are visible at mid ebb and mid flood with magnitudes ranging from 0.2 to 0.3 m/s, (Figure 14 and 15 respectively).

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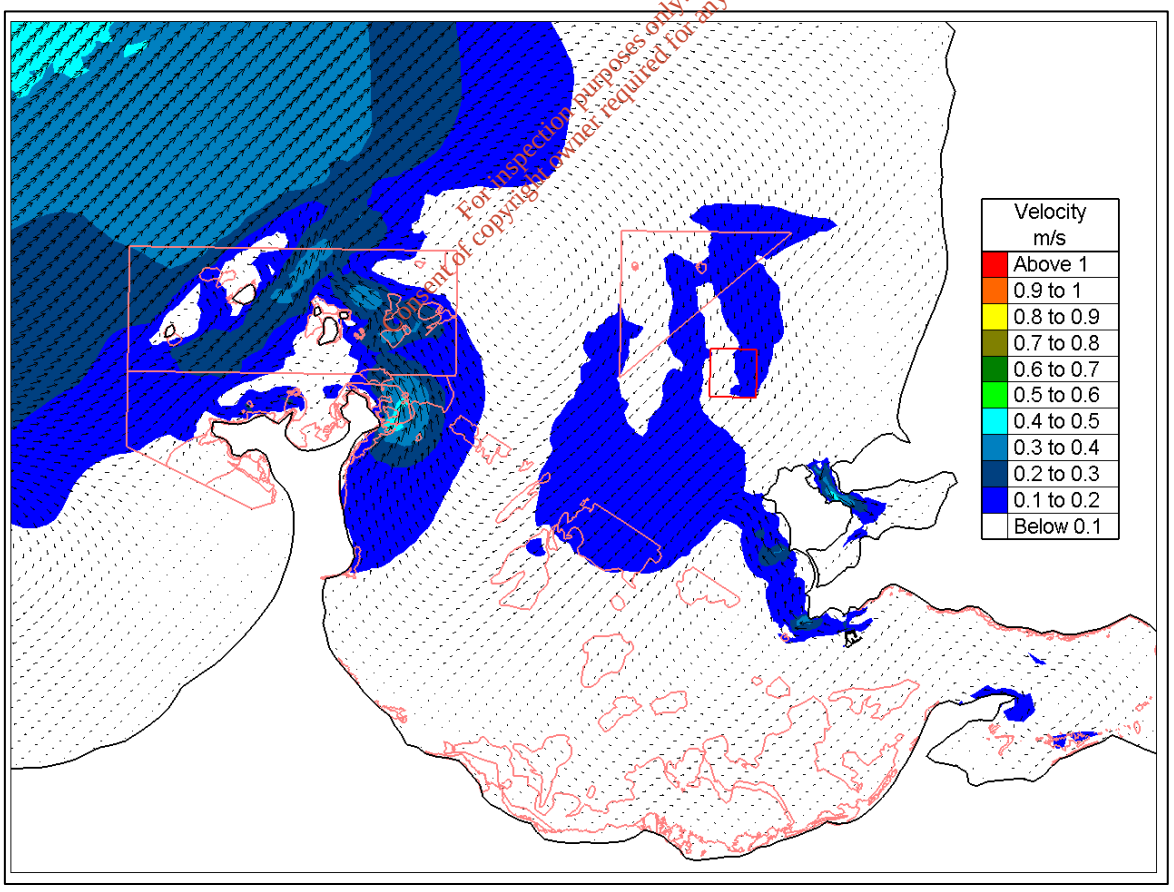


Figure 12. Computed depth averaged velocities at high water spring tide

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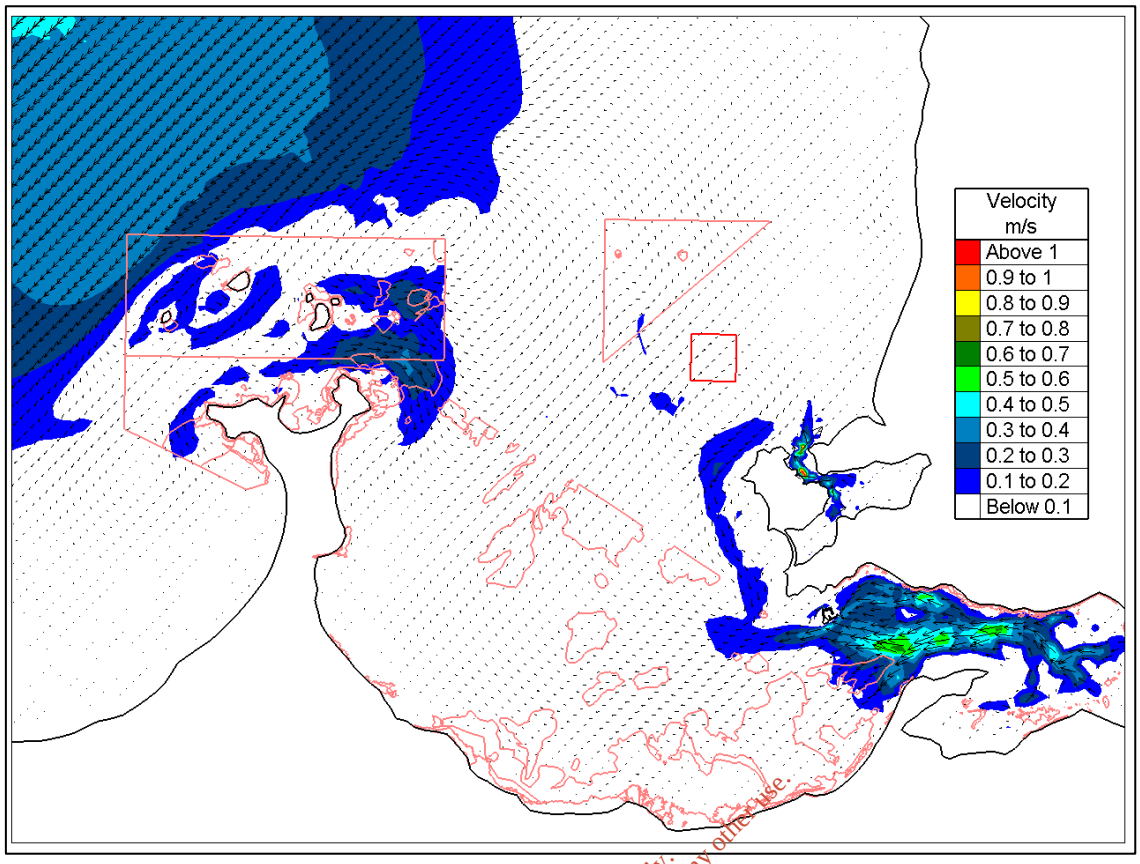


Figure 13. Computed depth averaged velocities at low water spring tide

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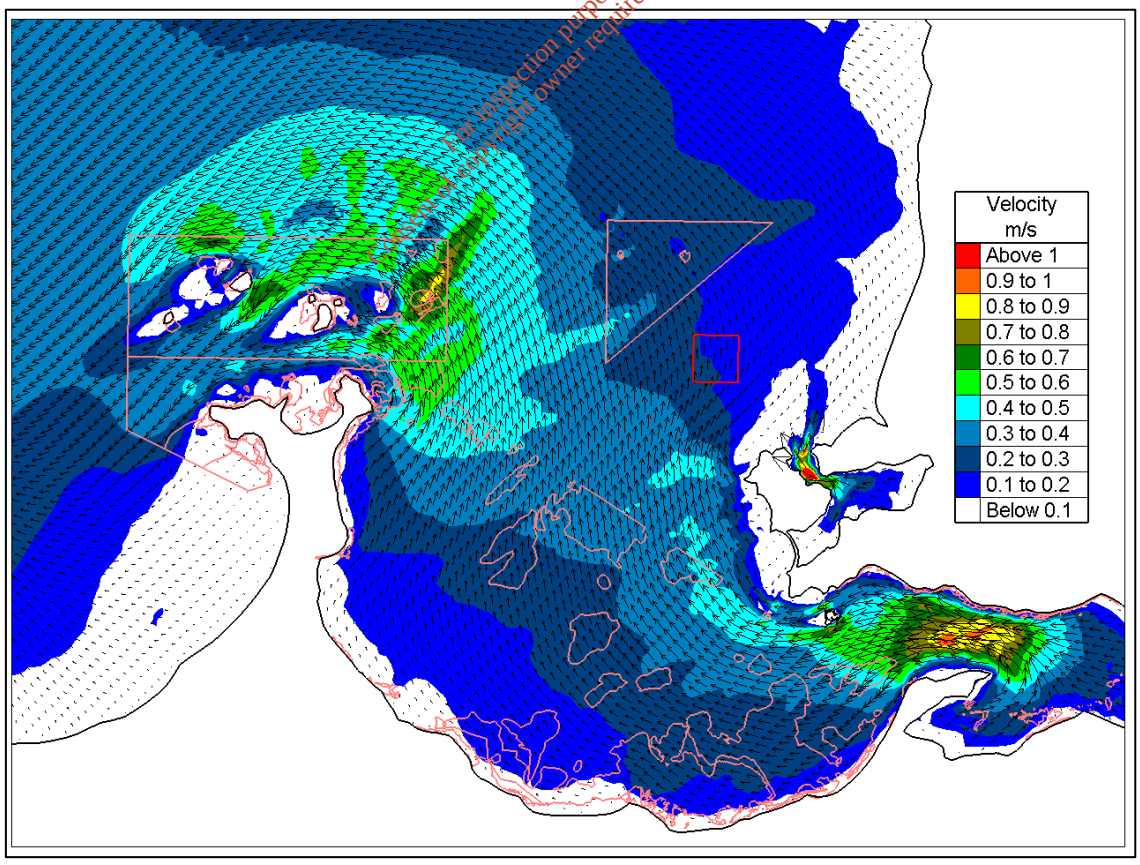


Figure 14. Computed depth averaged velocities at mid ebb spring tide

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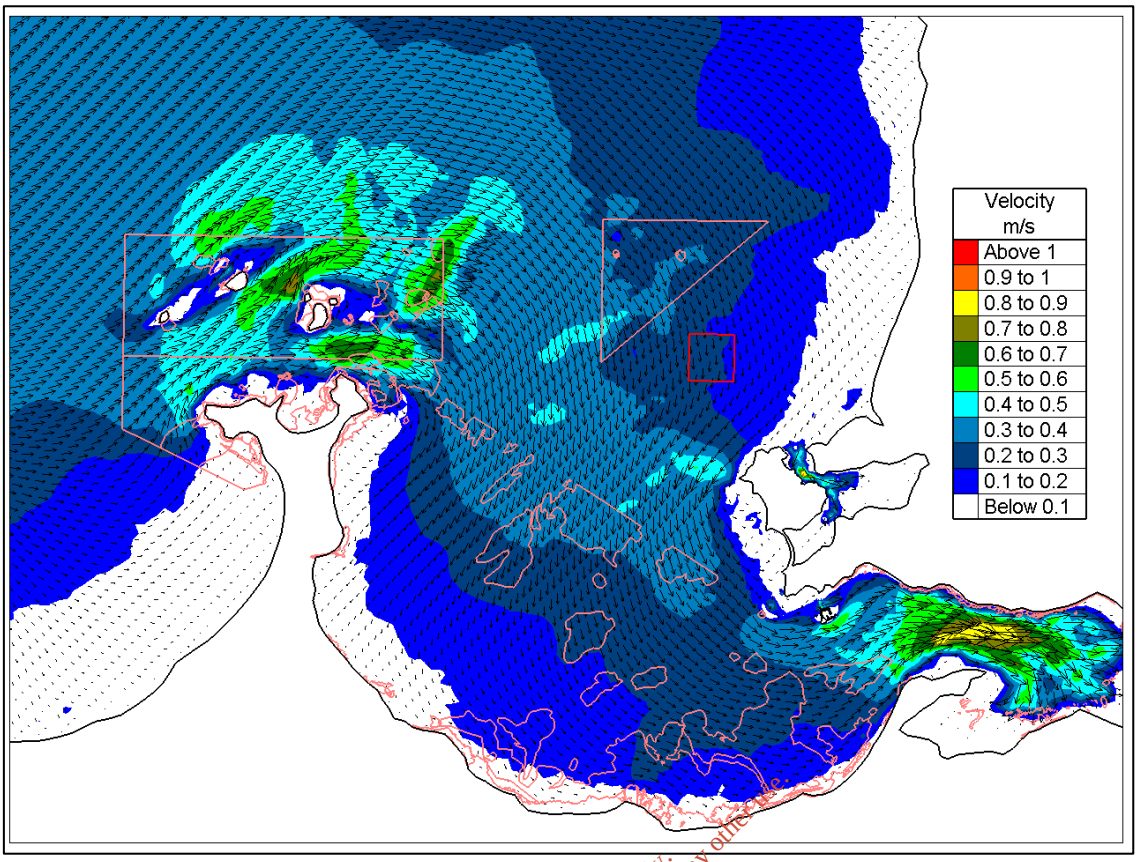


Figure 15. Computed depth averaged velocities at mid flood spring tide

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At the dump site previous modelling was undertaken to simulate the effect of dumping with a dredge disposal rate of 5,500m^3 per day (Figures 16- 23). The modelling output presented here looks at the two key indicators namely total deposition and suspended sediment resulting from the disposal. The total deposition is shown after 9, 18, 28, 38 and 49 days of disposal (Figures 16 - 20). Over the course of these simulations it is shown that at the dumpsite the total deposition reduces from a maximum of 100kg/m^2 initially to a maximum of 30kg/m^2 in within the site and local maximum of 50kg/m^2 directly south of the site, where disposed sediment has migrated, but generally the majority of the initial load is shown to remain at the site.

The suspended silt fractions released during the disposal (Figures 21 - 23) show an interesting circulation pattern of material firstly moving south similar to the 50day trend of total load, but the a migration to the north-west and west. The maximum concentrations of suspended sediment are in the 50mg/l after 50 days. Deposition rate are less than 0.2kg/m^2 with highs of 3kg/m^2 around the max concentration locations.

It should be noted that for the proposed dredging campaign the greatest amount of dredging will be a rate of 3,000m^3 per day albeit over a longer period than previously modelled. It is considered reasonable to assume that at the dumpsite approximately 2mm per m^2 of coarse sediments is likely to be deposited with the remaining finer silt fractions migrating offshore.

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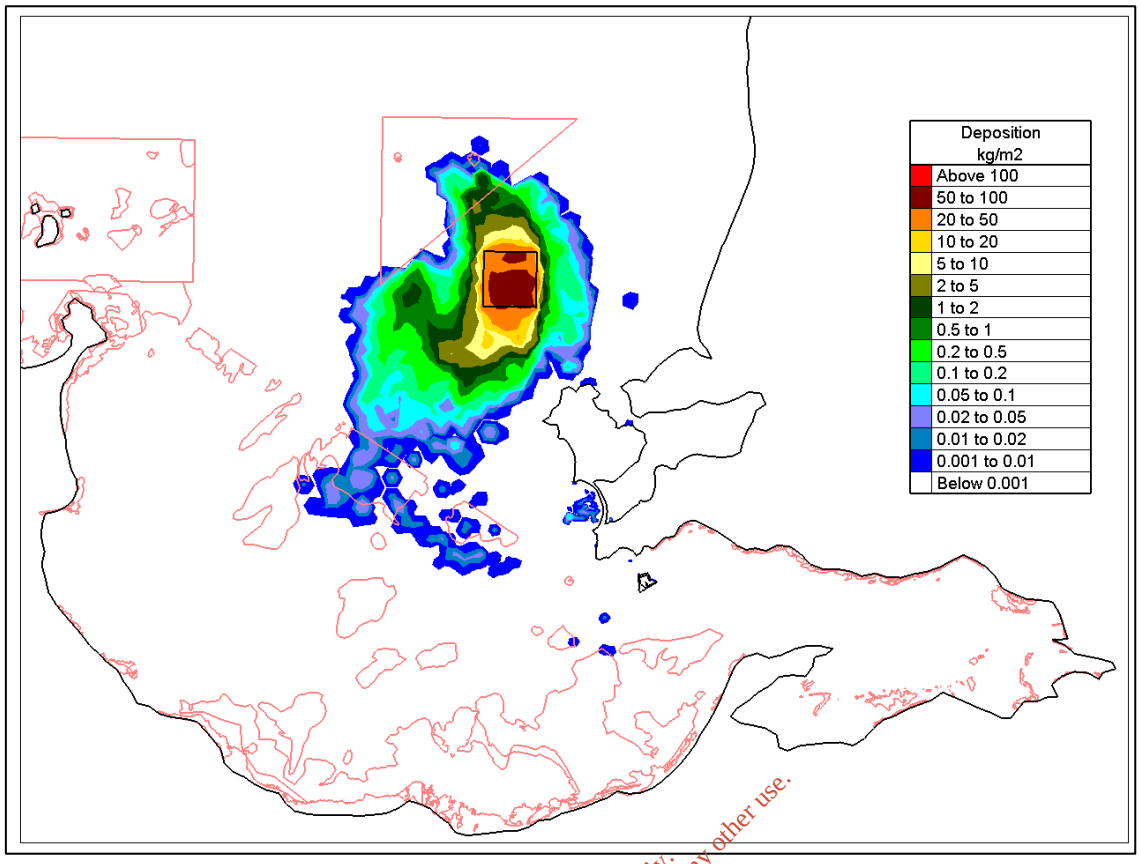


Figure 16. Total deposition of sand and silt after 9 days

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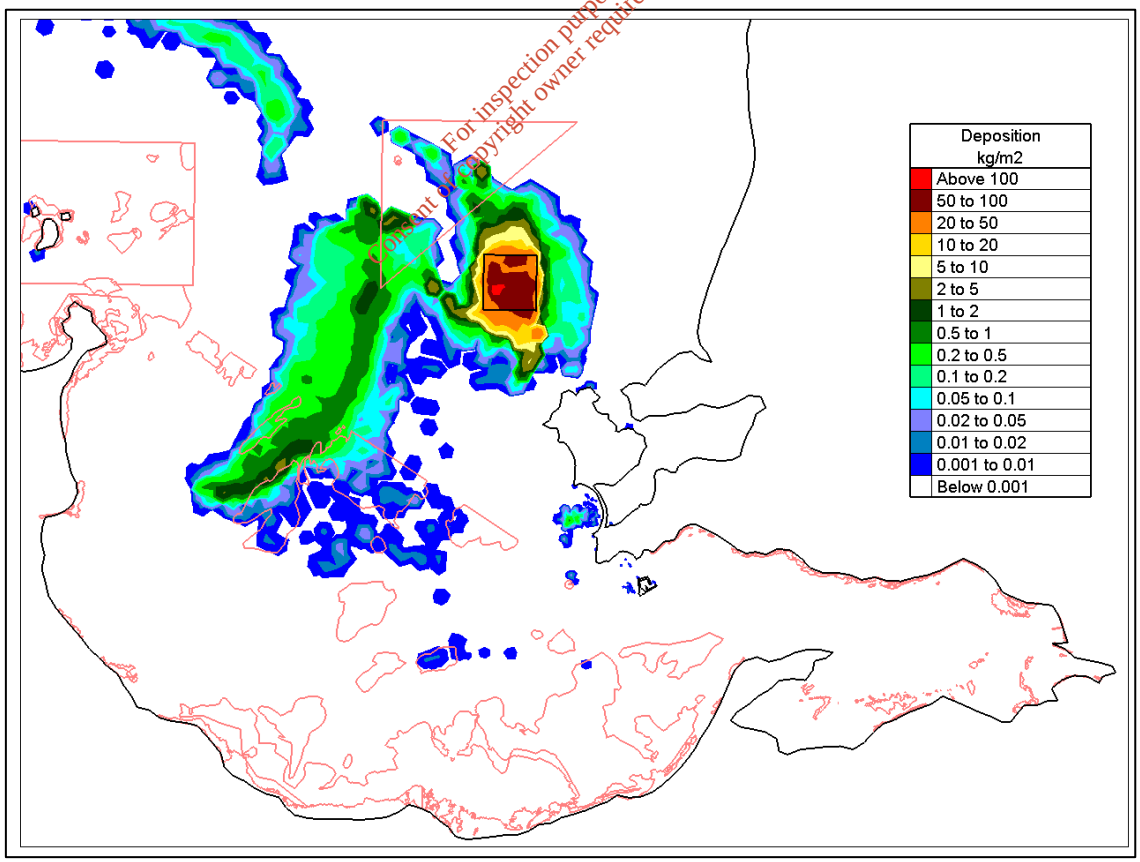


Figure 17. Total deposition of sand and silt after 18 days

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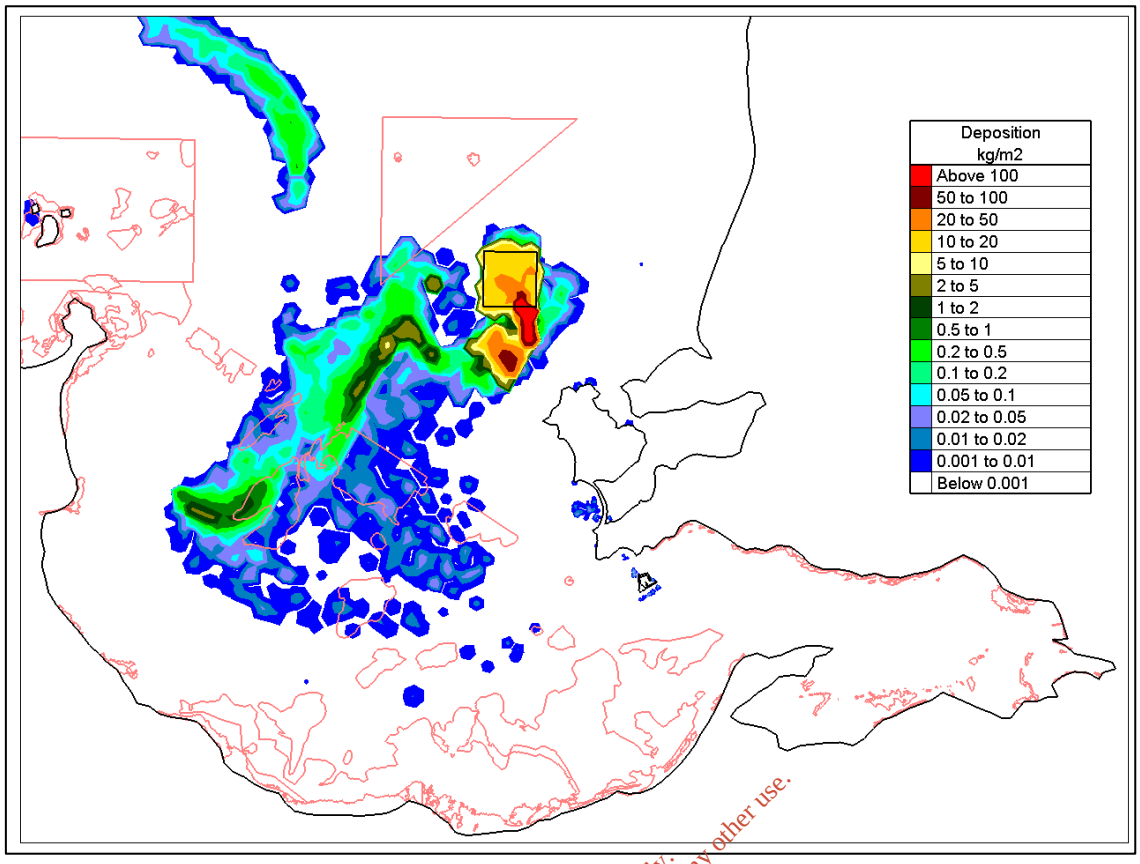


Figure 18. Total deposition of sand and silt after 28 days

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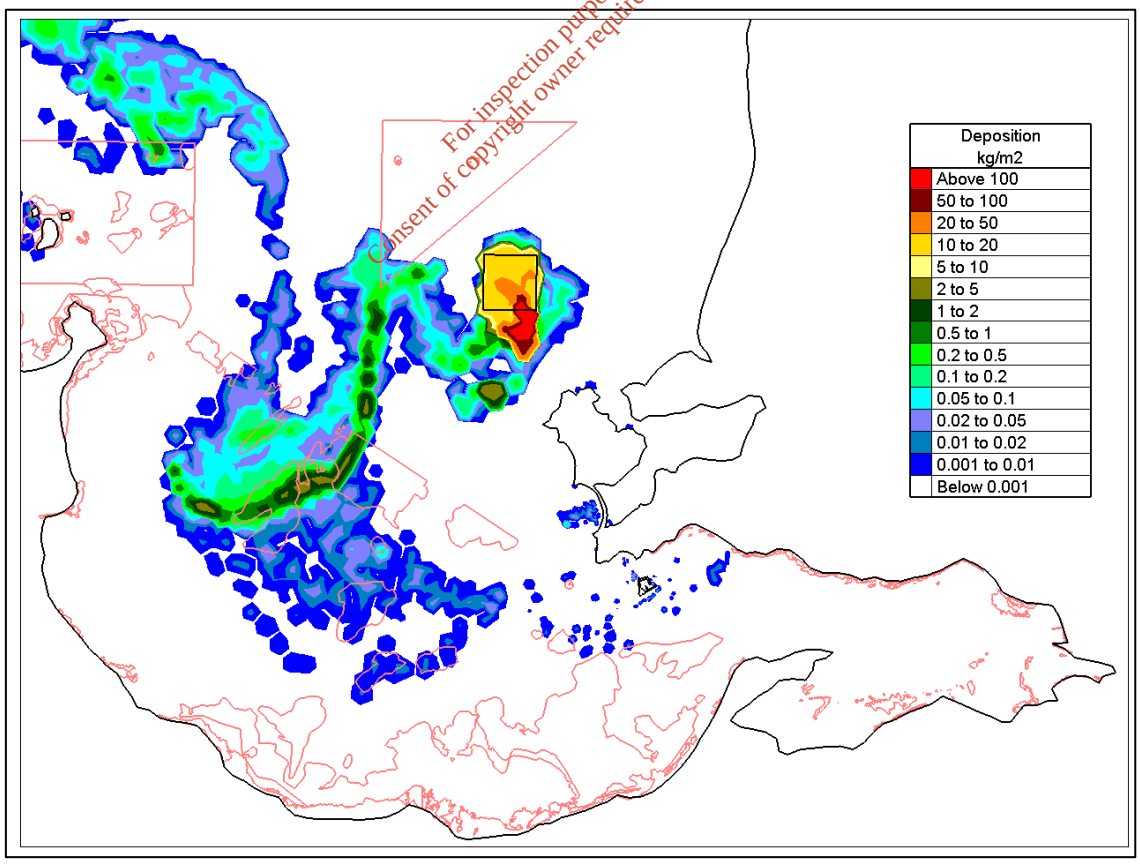


Figure 19. Total deposition of sand and silt after 38 days

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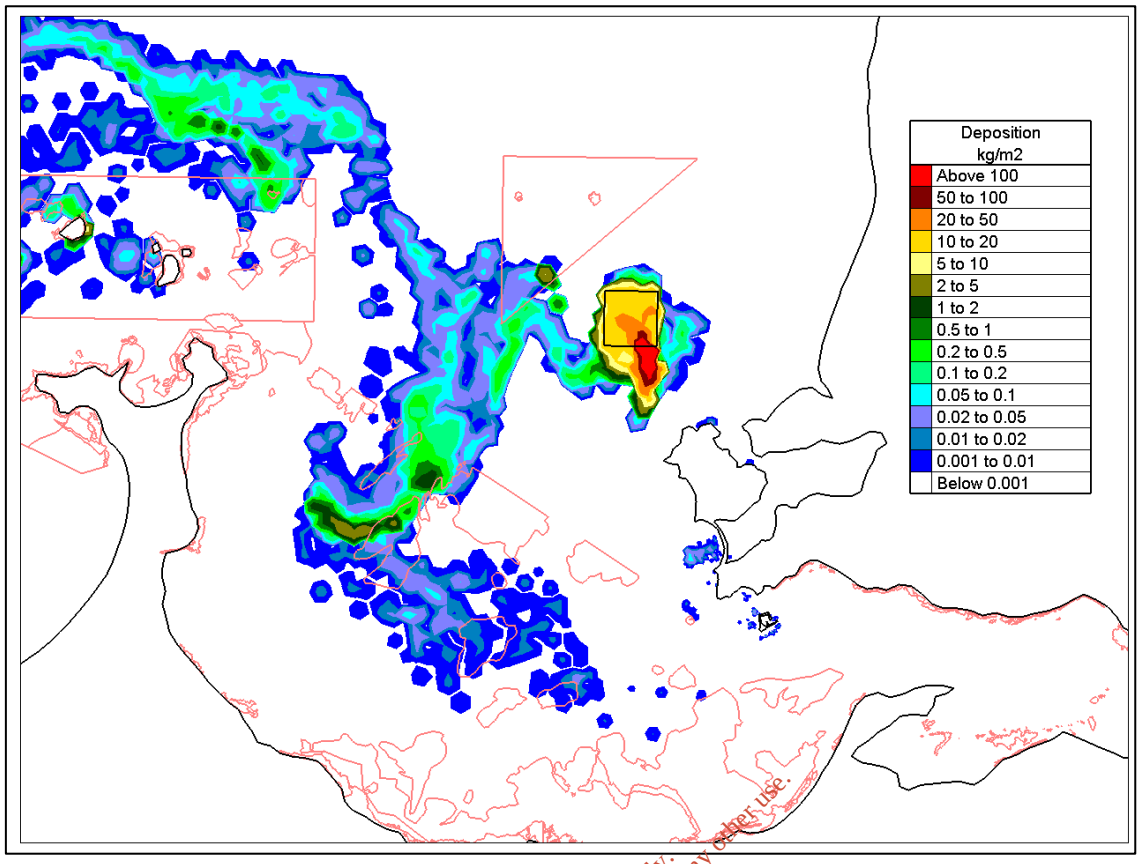


Figure 20. Total deposition of sand and silt after 49 days

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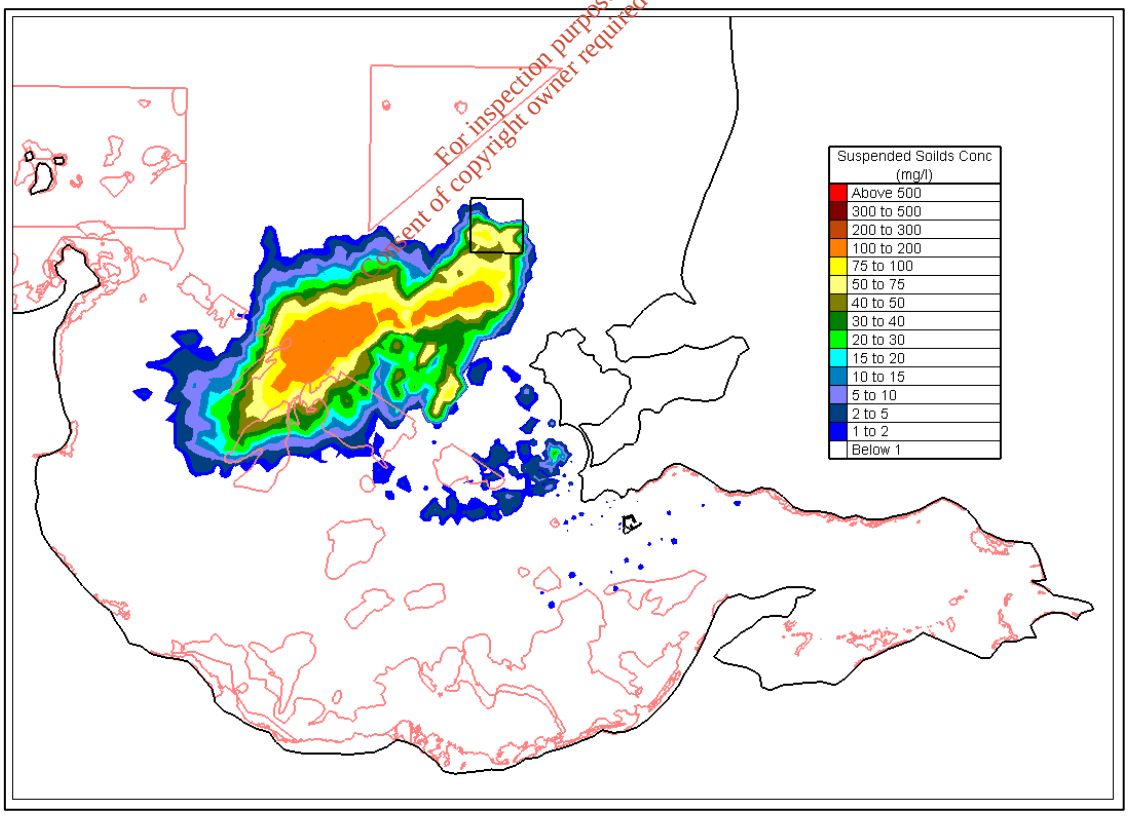


Figure 21. Silt fraction suspended solids concentration after 9 days

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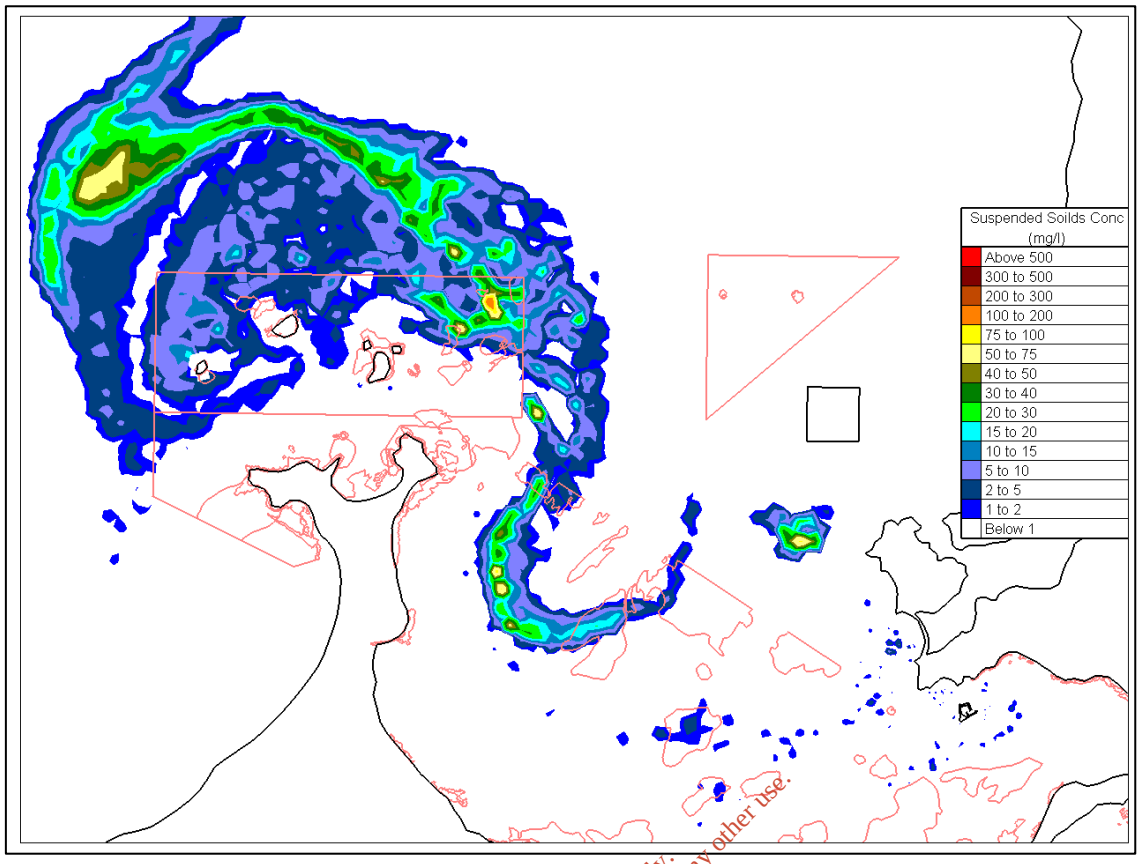


Figure 22. Silt fraction suspended solids concentration after 38 days

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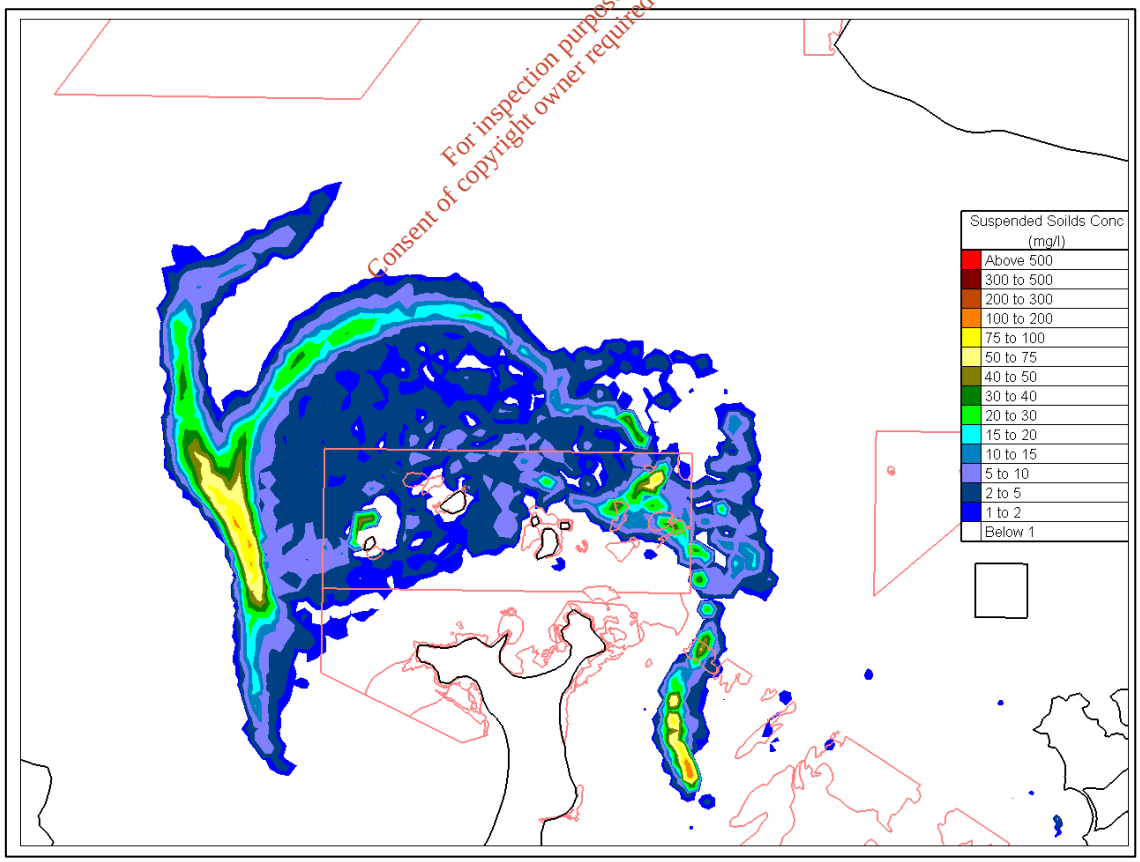


Figure 23. Silt fraction suspended solids concentration after 49 days

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4.5.6 Zone of Influence of Dredging Operation

Tidal currents filling the bay on the flood tide sweep past the harbour in a west to east direction. On the ebb relatively strong currents approach the harbour from the east. The currents are strong enough to move considerable volumes of sediment in the vicinity of the harbour which was built on Samphire Island adjacent to a channel of deeper water.

It is predicted that the greatest increase in suspended sediment concentration will occur in the vicinity of the proposed development. It is expected that concentrations will lower significantly with distance from the dredging operations. Sediment transport modelling was undertaken for the permitted Fenit Harbour and Marina Expansion project. Material coarser than the silt/ clay fraction has a relatively high fall velocity and, if stirred up into the water column, quickly falls to the seabed. Such material would therefore fall close to the dredging point. Much of the coarser fraction of dredged material would fall to the seabed within 100m of the dredge site with the fine sand likely to be carried in suspension no further than 0.5 to 1km from the dredge site within the areas of maximum currents. The silt/clay sized material can stay in suspension much longer than the coarser fraction and can therefore be transported by tidal currents far from the site. The use of a suction hopper dredger and the proposed methodology for the dredging operation (see section 4.5.2 above) limits the potential for dispersion of sediment to the water quality and is relatively clean, fast and efficient.

4.5.7 Zone of Influence of Dumping at Sea

The zone of influence of the dumping at sea operation is determined by the sediment transport simulations. According to previous models of the dumpsite there is potential for increased suspended sediments and sediment deposition within and outside of the bay. Previous modelling indicated that suspended silt fractions released during the disposal show an interesting circulation pattern of material firstly moving south but then migrating north-west and west. This material becomes well-dispersed with the tide eventually flushed out to sea in a north-westerly direction away from the mouth of the Shannon estuary.

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4.5.8 Project Characteristics Summary

The following table provides a summary of the characteristics of the project.

Size, scale, area, land-take	– The current FL is for a singular dredge event in 2020 for 250,000 tonnes of material which will be dredged from Fenit Harbour, the harbour manoeuvring area and harbour approach channel and deposited at the dumpsite. – The current DaS application is for an eight year period (2020 – 2027) for an ongoing maintenance dredging campaign requirement on an annual cycle (see table 2 above). – The dredge material currently covers an area of 11.8ha with dredge depths of up to 3m (~2m on average).
Details of physical changes that will take place during the various stages of implementing the proposal	Eight year DaS licence application: – The optimum design depths are a minimum of -3.5mCD for the inner harbour and marina area, -7.5mCD for the commercial shipping berth and -5mCD for the shipping manoeuvre area. An ongoing maintenance dredging campaign will be required on an annual cycle to maintain these depths. – This material will then be disposed of at a dumpsite approximately 3km off the coast in the outer bay in annual dredging events over the 8 year period. – The dumpsite is the same dumpsite used in the previous 2015 dredge campaign. FL application: – A FL will be required for each proposed dredging event within the eight year period. A FL will also be required for the dumpsite, which addresses a maximum volume to be deposited over an eight year period. The NIS is completed in support of the current FL application only. – The current sediment depths in Area A, the inner harbour and marina, are between –1.9mCD and -3mCD. This area will be dredged to design depth of -3.5mCD. – The current sediment depths in Area B, the commercial berth, are approximately -5mCD and this will be dredged to -7.5mCD allowing ships and boats greater draught. – The current sediment depths in Area C, the outer manoeuvring area, are approximately -3mCD and this will be dredged to -5mCD allowing ships and boats greater draught. – This material will then be disposed of at a dumpsite approximately 3km off the coast in the outer bay.
Description of resource requirements for the construction/operation and decommissioning of the proposal (water resources, construction material, human presence etc)	– Suction hopper dredger equipped with one or two rearward extending suction pipes, dredging pumps, an overflow to discharge the water – Fuel and oils
Description of timescale for the various activities that will take place as a result of implementation (including likely start and finish date)	The dredging works will take place between February and the end of May annually to avoid adversely affecting oysters in the bay and summer leisure activities. The suction hopper dredger will be on site for a 4-6 week period in the initial year (250,000T) and annually thereafter over a 2-3 week period (between 75,000 to 150,000T p/a), subject to weather and tides.
Description of wastes arising and other residues (including quantities) and their disposal	The principal waste is the dredge material, which comprises of muddy sand dominated by silt-clay and very fine sand for the most part.

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Identification of wastes arising and other residues (including quantities) that may be of particular concern in the context of the Natura 2000 network	Parameters that lie within Class 2 are considered marginally contaminated and include arsenic, nickel and zinc. With the exception of arsenic, nickel, and zinc all other parameters are below the lower Irish action limit within the proposed dredge area.
Description of any additional services required to implement the project or plan, their location and means of construction	N/A

5 IDENTIFICATION OF OTHER PROJECTS OR PLANS OR ACTIVITIES

5.1 HARBOUR OPERATIONS

Fenit harbour forms the main access point to the sea for various water based activities, including commercial shipping, fishing, sailing, casual boating and lifesaving. Land use within the existing harbour includes commercial shipping, fishing, leisure and amenity, lifesaving and maintenance dredging.

5.2 FENIT HARBOUR AND MARINA EXPANSION PROJECT

Planning permission for Fenit Harbour and Marina Expansion project was granted by KCC in 2010. The total proposed development will result in a 7ha expansion of the existing harbour and includes the following key elements:

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- Moving and extending the existing rubble-mound breakwater eastwards of its current location
- Expanding the existing Marina into the extended harbour space. Including the provision of 210 additional berths consisting of pontoons, fingers and an access bridge and bank seat
- Sheet piled wave wall
- Expansion of the landmass on the northern side of the harbour to create space for a new boatyard and boat lift, washdown area, refuse area, and oyster landing area
- Provision of additional parking to compliment the above
- Expansion of the existing commercial pier by widening it and lengthening the existing mooring length by 20m
- Upgrading of the existing site services to compliment the proposed development
- Capital Dredging Works to facilitate the above

5.3 OTHER CURRENT/OUTSTANDING GRANTS OF PLANNING PERMISSION

The Fenit Development Association is currently seeking a grant of planning permission in relation to the re-instatement of diving boards at Fenit Bathing Slip. The development comprises construction and installation of new diving boards, modification of existing concrete structures, and construction of new access platforms, railings and associated services.

Conditional planning permission was granted by Kerry County Council to Liebherr Container Cranes Ltd. on 30/09/2014 in relation to a development in Fenit Harbour. The permitted development involved the demolition of all existing buildings located on the Cross Quay, the construction of a new

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building comprising single-storey industrial hall and three-storey ancillary building, alterations to existing services and site features including relocation and integration of existing electricity sub-station[1]. This project has been completed.

5.4 OYSTER FISHING

Oysters are harvested in the months of November until the end of January/early February. Oyster fishermen harvest oysters using a dredge plough over a relatively large portion of the inner bay and within the Shellfish designated area, both of which occur approximately 0.5km east of the head of Fenit pier. The dredge is towed along the seabed by a boat and rakes up the oysters into a net causing sediment to become suspended in the water column resulting in sediment plumes. Fishermen must seek an oyster dredge licence from IFI.

5.5 DIFFUSE AND POINT SOURCES OF POLLUTION

Polluting substances from point (industrial pollutants, wastewater effluents, stormwater sewers) and diffuse (urban and agricultural runoff) sources associated with ongoing activities in the Tralee Bay catchment area enter the lower catchment and estuary. The following is a list of known point sources:

- Tralee WWTP, status: pass *(source: EPA)*
- Ballyheigue WWTP, status: pass *(source: EPA)*
- Fenit Septic Tank, status: fail due to lack of secondary treatment *(source: EPA)*
- Ardfert WWTP, status: fail due to lack of secondary treatment *(source: EPA)*
- Castlegregory Septic Tank, status: fail due to lack of secondary treatment *(source: EPA)*
- Two WWDL (Waste Water Discharge Licences or Certificates) occur within the bay hinterland *(source: North Kerry – Tralee Bay WMU, 2009-2015)*

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An application for consent for an urban WWTP at Fenit and Castlegregory has been lodged to the EPA and KCC, respectively. This has been approved for Castlegregory WWTP.

[1] http://mapping.kerrycoco.ie/PlanningEnquiryV424/MainFrames.aspx Accessed 30/04/19

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6 IDENTIFICATION OF NATURA 2000 SITES

6.1 NATURA 2000 SITES

It has been concluded that the proposed maintenance dredge campaign is likely to have a significant effect, or significant effects cannot be ruled out at this stage, on the following Natura 2000 sites:

- Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)
- Akeragh, Banna and Barrow Harbour SAC (000332)
- Tralee Bay Complex SPA (004188)
- Magharee Islands SAC (002261)
- Magharee Islands SPA (004125)
- Lower River Shannon SAC (002165)

When Natura 2000 sites are selected for stage 2 assessments, then all the qualifying features of conservation interest must be included in that stage of the assessment. However, when assessing impact, qualifying features are only considered relevant where a credible or tangible source-pathway-receptor link exists between the proposed development and a protected species or habitat type. In order for an impact to occur there must be a risk initiated by having a 'source' (e.g. nearby watercourse), a 'receptor' (e.g. a protected species associated aquatic or riparian habitats), and an impact pathway between the source and the receptor (e.g. a watercourse which connects the proposed development site to the site designated for the protection of the aforementioned species). Identifying a risk that could, in theory, cause an impact does not automatically mean that the risk event will occur, or that it will cause or create an adverse impact.

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However, identification of the risk does mean that there is a latent possibility of ecological or environmental damage occurring, with the level and significance of the impact depending upon the nature of the risk, the extent of the exposure to the risk and the characteristics of the receptor. Therefore, bearing in mind the scope, scale, nature and size of the project, its location relative to the distribution of the species and habitats listed and the degree of connectedness that exists between the project and the potential receptors, it is considered that not all of them are within the zone of potential impact of the proposal. An evaluation based on these factors to determine which species and habitats are the plausible ecological receptors for potential impacts of the unmitigated proposal has been conducted in Sections 6.1.1 to 6.1.6 below. This evaluation determined that certain habitats and species should be selected for further assessment as plausible ecological receptors.

6.1.1 Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)

6.1.1.1 Description of the Natura 2000 site

This large site in Co. Kerry stretches from Tralee town westwards to Fenit Harbour and Cloghane, encompassing Tralee Bay, Brandon Bay and the Magharees Peninsula. It includes extensive mudflats at the eastern end, the beaches of Derrymore Island, the sand dunes and lagoons of the Magharees Peninsula, as well as the rocky headlands at its end. The site is mostly underlain by limestone, but significant parts of this are covered with glacial drift or windblown sand. Both the Tralee and Brandon (Owenmore) estuaries feature wide expanses of sheltered intertidal flats.

The majority of Tralee Bay is shallow and composed of sublittoral sediments. In the more sheltered areas of the bay, there is a variety of important sublittoral sediment communities in which a number

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of rare species occur. Seagrass beds occur on sandy substrates in the bay. The native oyster, *Ostrea edulis*, occurs in sediment communities throughout the bay. Maerl beds, composed of the free-living coralline algae *Lithothamnion corallioides* and *Phymatolithon calcareum*, and characterized by anemones (*Anthopleura balli*) and oysters, occur in the middle of the bay. The rare anemone *Halcampa chrysanthellum* has been recorded here.

Saltmarsh vegetation frequently fringes the mudflats, with the most extensive areas being found at Blennerville, Derrymore Island and Fermoyle in Brandon Bay. The dominant type of saltmarsh present is Atlantic salt meadow. The main dune area on this southern shore occurs on the Magharees Peninsula - a tombolo which joins a number of the Magharees Islands with the mainland. Here there are extensive areas of fixed 'grey' dunes, which feature a number of damp hollows or dune slacks. Lough Gill, a natural sedimentary lagoon, is located at the base of the Magharees Peninsula. The dune complex supports the largest Irish breeding population of natterjack toads. The lagoon is only slightly brackish and therefore contains freshwater species along with lagoon specialists. Other coastal habitats that occur within the site include shingle beaches, rocky shores and vegetated sea-cliffs (NPWS site synopsis[2]).

6.1.1.2 Identification of Potentially Significant Impacts to Qualifying Features

The following table (Table 3) lists the qualifying features of the Tralee Bay and Magharees Peninsula, West to Cloghane SAC and evaluates through a scientific examination of evidence and data whether or not these features should or should not be selected for further assessment in the NIS. The qualifying features that are selected for further assessment are discussed further in the section followed by an assessment of potentially significant effects arising from the proposal to dredge Fenit harbour and dispose of the dredge materials at a dumpsite in Tralee Bay.

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[2] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002070.pdf Accessed 11/04/2018

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Table 3. Identification of potentially significant impacts to qualifying features of Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)

Qualifying Feature	Potential for Significant Impacts	Rationale
Estuaries	No	The COS 002070 has mapped the extent of the estuary from the bridge at Blennerville and including the canal west as far as Curraheen townland but stops short of where Curraheen River enters the bay. The estuary lies approximately 6km east of the Fenit Harbour. Considering the use of the suction hopper dredger and the dredging methodology, the zone of influence of the dredge material and the shallow and dynamic nature of the sub-littoral sediments, it is considered that the estuary habitat type will not be significantly affected by the proposed dredging at Fenit Harbour. Therefore, estuary habitat type will not be considered further in the NIS.
Mudflats and sandflats not covered by seawater at low tide	No	Mudlfats predominantly occur in inner Tralee Bay, which is relatively sheltered. Sandy beaches line the coast of Tralee and Brandon Bay as well as Scraggane Bay on the northern shore of the Magharees Peninsula. The impact from the dredging and dumping operation will be limited to the marine sub-littoral environment; significant intertidal impacts to this habitat type are not expected to occur. Therefore, this habitat type, mudflats and sandflats not covered by seawater at low tide, is not considered further in the NIS.
Coastal lagoons	No	Lough Gill, east of Castlegregory village, is the only mapped coastal lagoon (COS 002070). This drains into Tralee Bay north of Castlegregory village through sluice gates at Magherabeg. The lagoon is only slightly brackish as only a minor volume of seawater enters the lagoon and there is no tidal fluctuation (Healy et al., 1997)). As this habitat type is confined to coastline above the high tide mark and outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to coastal lagoons. Therefore, this habitat type, coastal lagoons, is not considered further in the NIS.
Large shallow inlets and bays	Yes	The entire of Tralee Bay as far as the northern shore of the Magharees Peninsula as well as the inner waters of Brandon Bay (which itself is not shallow) are mapped as large shallow inlets and bays (COS 002070). The increased suspended sediments in the water column will result in water quality impacts.
Reefs	Yes	Reef habitats are widespread marine features with immobile hard substrate available for colonisation by epifauna (NPWS, 2013). Reef habitat types include gravels, cobbles, boulders and bedrock as well as biogenic conglomerations. Significant areas of reef habitat are mapped along the southern side of Tralee Bay (Derrymore spit west to Castlegregory village), scattered though the middle of the Tralee Bay and off the northern part of the Magharee Peninsula. The nearest mapped reef (COS 002070) lies approximately 1km south of the dredge area and northwest of the dumpsite. The increased suspended sediments in the water column will either deposit on the seabed within and outside of the bay, while the finer fractions may remain in suspension. There is a risk of disturbance or displacement of fauna from deposition of sediment on reef habitat.
Annual vegetation of drift	No	This type of vegetation occurs on sandy, shingle or stony substrate at the upper part of the strand, around the high tide mark.

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Qualifying Feature	Potential for Significant Impacts	Rationale
lines		It is mapped as occurring in sections of the coastline of Tralee Bay and to a lesser extent along Brandon Bay. The impact from the dredging and dumping operation will be limited to the marine sub-littoral environment; significant intertidal impacts to annual vegetation of drift lines are not expected to occur. Therefore, this habitat type, annual vegetation of drift lines, is not considered further in the NIS.
Perennial vegetation of stony banks	No	This habitat type occurs along the coast where shingle (cobbles and pebbles) and gravel have accumulated to form elevated ridges or banks above the high tide mark (NPWS, 2013); it is mapped as occurring along the northern shore of Derrymore spit. As this habitat type is confined to coastline above the high tide mark and outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to perennial vegetation of stony banks. Therefore, this habitat type, perennial vegetation of stony banks, is not considered further in the NIS.
Salicornia and other annuals colonizing mud and sand	No	*Salicornia* and other annuals colonizing mud and sand is classified by Fossitt (2000) as lower salt marsh. This habitat type is a pioneer saltmarsh community that may occur on muddy sediment seaward of established saltmarsh or form patches within other saltmarsh communities where the elevation is suitable and there is regular tidal inundation (NPWS, 2013). This habitat type is not mapped in the COS 002070, however, it is recorded at Derrymore Island. The impact from the dredging and dumping operation will be limited to the marine sub-littoral environment; significant intertidal impacts to this habitat type are not expected to occur. Therefore, this habitat type, *Salicornia* and other annuals colonizing mud and sand, is not considered further in the NIS.
Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	No	Atlantic salt meadows are classified by Fossitt (2000) as lower salt marsh. The COS 002070 has mapped its occurrence along the inner shore of Derrymore spit, inner Tralee Bay just west of Blennerville village and a small extent in the western part of Brandon Bay south of Fermoyle tombolo. The impact from the dredging and dumping operation will be limited to the marine sub-littoral environment; significant intertidal impacts to this habitat type are not expected to occur. Therefore, this habitat type, Atlantic salt meadows, is not considered further in the NIS.
Mediterranean salt meadows (Juncetalia maritimi)	No	Mediterranean salt meadows are classified by Fossitt (2000) as upper salt marsh. The COS 002070 has mapped its occurrence along the shore southeast of Castlegregory village, inner Tralee Bay at Curraheen townland and a very small extent in the western part of Brandon Bay south of Fermoyle tombolo. The impact from the dredging and dumping operation will be limited to the marine sub-littoral environment; significant intertidal impacts to this habitat type are not expected to occur. Therefore, this habitat type, Mediterranean salt meadows, is not considered further in the NIS.
Shifting dunes along the shoreline with	No	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) are dunes which are partly stabilised and are dominated by *Ammophila arenaria* (NPWS, 2013). This habitat type is confined to the coastline above the high tide mark at

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Qualifying Feature	Potential for Significant Impacts	Rationale
***Ammophila arenaria* (white dunes)**		Tralee and Brandon Bay (COS 002070). As this habitat type is confined to coastline above the high tide mark and outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to shifting dunes along the shoreline with *Ammophila arenaria*. Therefore, this habitat type, shifting dunes along the shoreline with *Ammophila arenaria*, is not considered further in the NIS.
Fixed coastal dunes with herbaceous vegetation (grey dunes)	No	The main sand dune complex occurs along the middle of Magharee Peninsula extending in a southwest manner along the northern shore of Lough Gill (COS 002070). Fixed dune also occurs along the coastline of Brandon and Tralee Bay. As this habitat type is confined to terrestrial locations above the high tide mark and outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to fixed coastal dunes with herbaceous vegetation. Therefore, this habitat type, fixed coastal dunes with herbaceous vegetation, is not considered further in the NIS.
Dunes with *Salix repens ssp.argentea* (Salix arenariae)	No	This habitat type is confined to the dune complex in the Magharee Peninsula (COS 002070). As this habitat type is confined to terrestrial locations above the high tide mark and outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to dunes with *Salix repens* ssp.*argentea* (*Salix arenariae*). Therefore, this habitat type, dunes with *Salix repens* ssp.*argentea* (*Salix arenariae*), is not considered further in the NIS.
Humid dune slacks	No	This habitat is associated with the well developed sand dune complex at the Magharee Peninsula and along the northern shore of Lough Gill (COS 002070). As this habitat type is confined to terrestrial locations above the high tide mark and outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to humid dune slacks. Therefore, this habitat type, humid dune slacks, is not considered further in the NIS.
Molinia meadows on calcareous, peaty or clavey-silt-laden soils (Molinion caeruleae)	No	The current full extent of this habitat within the SAC is unknown. Good examples of this habitat have been recorded at Cappaclough East on the southern margins of the SAC between Camp and Castlegregory (COS 002070). As this habitat type is confined to terrestrial locations above the high tide mark and outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to *Molinia* meadows on calcareous, peaty or clavey-silt-laden soils. Therefore, this habitat type, *Molinia* meadows on calcareous, peaty or clavey-silt-laden soils, is not considered further in the NIS.
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae,	No	This habitat type is mapped in two locations at Farrandalouge, overlooking Brandon Bay. As this habitat type is confined to terrestrial locations above the high tide mark and outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*. Therefore, this habitat type, alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*, is not

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Qualifying Feature	Potential for Significant Impacts	Rationale
Salicion albae)		considered further in the NIS.
Otter (*Lutra lutra*)	Yes	Otter occur along the coastline of the SAC and the critical habitat includes shoreline and watercourses. There is potential for significant effects to water quality. There is potential for significant indirect impacts to fish species, which are a food source for otters. Therefore, there is potential for significant indirect impacts to otter.
Petalwort (Petalophyllum ralfsii)	No	Petalwort (*Petalophyllum ralfsii*) is a small, pale green thallose liverwort with erect lamellae on its upper surface (NPWS, 2013a). It occurs in three locations on the Magharee Peninsula (COS 002070). As this species is confined to terrestrial locations above the high tide mark and outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to petalwort. Therefore, this species, petalwort (*Petalophyllum ralfsii*), is not considered further in the NIS.

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6.1.1.2.1 Large shallow inlets and bays

The extent of the large shallow inlets and bays habitat type covers the marine environs of the site excluding the estuary in inner Tralee Bay. It comprises of the following marine community types, some of which are keystone communities (presented in bolded text) i.e. integral to the structure and function of the Annex I habitat type, large shallow inlets and bays, and other communities, which are the remaining constituent communities that are of structural importance:

- Sand to sandy mud with polychaetes and bivalves community complex
- Sand with *Nephtys cirrosa* community complex
- Mixed sediment with crustaceans, bivalves and polychaetes community complex
- ***Zostera*-dominated community complex**
- ***Mytilus*-dominated community**
- ***Sabellaria*-dominated community complex**
- *Ostrea edulis*-dominated community
- Intertidal reef community complex
- Subtidal reef community complex
- *Laminaria*-dominated reef community complex

Zostera, *Mytilus*, and *Sabellaria*-dominated communities are considered to be keystone communities that are of considerable importance to the overall ecology and biodiversity of a habitat by virtue of their physical complexity. *Zostera* meadows serve as important nursery grounds for fish species. *Mytilus* communities are a considerable food source for a number of bird species and along with *Sabellaria* communities provide a diversity of habitats for a large number of other species (NPWS, 2014). The proposed dredge areas comprise of Sand with *Nephtys cirrosa* community complex. *Ostrea edulis*-dominated community occurs to the east of the pier while Sub-tidal reef community complex occurs approximately 1km to the south of the harbour.

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The favourable conservation condition for 'Large shallow inlets and bays' within Tralee Bay and Magharees Peninsula, West to Cloghane SAC is defined by the following list of Attributes and Targets outlined in Table 4 below:

Table 4. Attributes and Targets for 'Large shallow inlets and bays' in Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)

Attribute	Measure	Target
Habitat Area	Hectares	The permanent habitat area is stable or increasing subject to natural processes
Community extent	Hectares	Maintain the extent of the *Mytilus*-dominated community and the *Zostera*-dominated and *Sabellaria*-dominated community complexes, subject to natural processes.
Community structure: *Zostera* density	Shoots per m^2	Conserve the high quality of the *Zostera*-dominated community complex, subject to natural processes
Community structure: *Mytilus edulis* density	Individuals/m^2	Conserve the high quality of the *Mytilus*-dominated community, subject to natural processes
Community structure: *Sabellaria* density	Individuals/m^2	Conserve the high quality of the *Sabellaria* dominated community complex, subject to natural processes
Community distribution	Hectares	Conserve the following community types in a natural

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Attribute	Measure	Target
		condition: Sand to sandy mud with polychaetes and bivalves community complex; Sand with *Nephtys cirrosa* community complex; Mixed sediment with crustaceans, bivalves and polychaetes community complex; *Ostrea edulis*-dominated community; Intertidal reef community complex; Subtidal reef community complex; *Laminaria* dominated reef community complex.

6.1.1.2.2 Reefs

This community complex occurs within Tralee Bay from Derrymore west to Aughacasla Point and in the centre of the bay from Little Samphire Island to Kilshannig Point. The substrate is that of flat or sloping bedrock, cobble/boulder flat or field or a mosaic of the two. It occurs in exposure regimes from sheltered to exposed reefs, in depths of between 0m and 30m. The species associated with this community include a variety of red foliose algae including *Delesseria sanguinea*, *Callophyllis laciniata* and *Plocamium cartilagineum* as well as the brown algae *Dictyota dichotoma*, the coralline algae, the sponge *Cliona celata* and the echinoderms *Echinus esculentus* and *Marthasterias glacialis*. P. *cartilagineum* is recorded throughout the complex while D. *sanguinea* along with *Heterosiphonia plumosa* are more abundant in deeper waters (14m to 25m). The hermit crab *Pagurus bernhardus* is also recorded within the complex. In areas subjected to sand scour the red algae *Furcellaria lumbricalis* and *Polyides rotundus* are common. Where sand occurs amongst boulders the anthozoan *Anthopleura balli* and the hydroid *Sertularia cupressina* are recorded. The red alga *Chondrus crispus* is recorded east of Kilshannig Point (NPWS, 2014).

The favourable conservation condition for 'Reefs' within Tralee Bay and Magharees Peninsula, West to Cloghane SAC is defined by the following list of Attributes and Targets outlined in Table 5 below:

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Table 5. Attributes and Targets for 'Reefs' in Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)

Attribute	Measure	Target
Habitat Area	Hectares	The permanent habitat area is stable or increasing subject to natural processes
Distribution	Occurrence	The distribution of reefs is stable or increasing subject to natural processes
Community distribution	Hectares	Maintain the extent of the *Mytilus*-dominated community and the *Sabellaria*-dominated community complexes, subject to natural processes
Community structure: *Mytilus edulis* density	Individuals/m^2	Conserve the high quality of the *Mytilus*-dominated community, subject to natural processes
Community structure: *Sabellaria* density	Individuals/m^2	Conserve the high quality of the *Sabellaria* dominated community complex, subject to natural processes
Community structure	Biological composition	Conserve the following community types in a natural condition: Intertidal reef community complex; Subtidal reef community complex; *Laminaria* dominated reef community complex

6.1.1.2.3 Otter

Otter has a widespread distribution throughout Ireland being found in a wide variety of aquatic habitats such as lakes, rivers, streams, estuaries, marshland, canals and along the coast. They are

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largely solitary animals which prey on a wide variety of vertebrate and invertebrate species, although the diet primarily comprises fish. In broad terms the diet of otter varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006) and wrasse and rockling in coastal waters. The amount of time spent within different parts of an individual's home range is related to prey abundance. Due to a high metabolic rate - important for generating body heat – otters require plenty of prey. Therefore, for a territory to be viable there needs to be high potential prey biomass available. Otters are highly territorial and this behaviour, which itself is related to the availability of essential resources, has implications on how many otters can reside along a given stretch of river or coastline. Territories are only held against members of the same sex, so those of males and females may overlap (Erlinge, 1968). The breeding season is variable, with a peak of births from May to August – though cubs may be born at any time of year.

Their preferred habitat has good cover of vegetation, such as scrub with a herbaceous under layer. Because otters are mainly nocturnal they require access to safe refuges to use as denning sites, known as holts, within which they remain for most of the day. Holts are the main den locations used by otters and these are most commonly situated underground along a river's bank or among the root systems of trees. Several holts will be located within an individual's territory and daytime lying up sites known as couches will also be used at ground level within vegetated areas. Couches are often linked to waterways by regularly used paths. Otter are known to occur and breed within the site.

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The favourable conservation condition for 'Otter' within Tralee Bay and Magharees Peninsula, West to Cloghane SAC is defined by the following list of Attributes and Targets outlined in Table 6 below:

Table 6. Attributes and Targets for 'Otter' in the Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)

Attribute	Measure	Target
Distribution	Percentage positive survey sites	No significant decline
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 82.3ha above high water mark (HWM); 50.4ha along river banks/around lakes and ponds
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 702.2ha
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 19.5km
Extent of freshwater (lake/lagoon) habitat	Hectares	No significant decline. Area mapped and calculated as 53.8ha
Couching sites and holts	Number	No significant decline
Fish biomass available	Kilograms	No significant decline
Barriers to connectivity	Number	No significant increase

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6.1.2 Akeragh, Banna and Barrow Harbour SAC (000332)

6.1.2.1 Description of the Natura 2000 site

Akeragh, Banna and Barrow Harbour SAC is a large coastal site covering a 10 km section of coastline in Co. Kerry, and including a wide diversity of habitats. The underlying rock is limestone, which outcrops only in the southern part of the site, in the impressive columns and hillsides north of Fenit. Elsewhere shell sand is predominant with occasional development of peat. Sand dunes run southwards from Ballyheigue and they become especially interesting south of the Akeragh outflow where they show great variety in both physiography and vegetation. The largest proportion of the sand dune system is fixed dune grassland. Mobile Marram dunes occur as a narrow band running along the seaward side of the entire coastal strip. There is a slight increase in dune mobility towards the growing tip at Carrahane. The site contains a number of dune slack areas, these being best developed on the landward side of Carrahane dunes. Of particular ecological interest is the gradation from fixed dune and dune slack to saltmarsh at Carrahane. Saltmarsh here is particularly well-developed but also occurs at Barrow Harbour. The harbour is surrounded by low hills of limestone which support an interesting grassland community where they remain unfertilised. This is best seen at the entrance to Carrahane Bay but recurs sporadically elsewhere. Coastal heath occurs scattered on limestone rocky areas in the southern part of the site. Akeragh Lough now supports extensive areas of brackish vegetation. It was formerly richer in birdlife, but the lake level has been controlled by a sluice on the outflow, the total water area has declined (NPWS site synopsis)[3].

6.1.2.2 Identification of Potentially Significant Impacts to Qualifying Features

The following table (Table 7) lists the qualifying features of the Akeragh, Banna and Barrow Harbour SAC and evaluates through a scientific examination of evidence and data whether or not these features should or should not be selected for further assessment in the NIS. The qualifying features that are selected for further assessment are discussed further in the section followed by an assessment of potentially significant effects arising from the proposal to dredge Fenit harbour and dispose of the dredge materials at a dumpsite in Tralee Bay.

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The Akeragh, Banna and Barrow Harbour SAC is located approximately 2km to the east of the dumpsite, however, the results of sediment transport modelling simulations indicate that suspended silt fractions released during the disposal firstly move south but then migrate north-west and west becoming well-dispersed with the tide and eventually flushing out to sea in a north-westerly direction.

[3] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY000332.pdf Accessed 11/04/2018

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Table 7.Identification of potentially significant impacts to qualifying features of the Akeragh, Banna and Barrow Harbour SAC (000332)

Qualifying Feature	Potential for Significant Impacts	Rationale
Annual vegetation of drift lines	No	This type of vegetation occurs on sandy, shingle or stony substrate at the upper part of the strand, around the high tide mark. The impact from the dredging and dumping operation will be limited to the marine sub-littoral environment; significant intertidal impacts to annual vegetation of drift lines are not expected to occur. Therefore, this habitat type, annual vegetation of drift lines, is not considered further in the NIS.
Salicornia and other annuals colonizing mud and sand	No	*Salicornia* and other annuals colonizing mud and sand is classified by Fossitt (2000) as lower salt marsh. The main saltmarsh habitat is located at Barrow Harbour and Carrahane Strand where it is particularly well developed. The impact from the dredging and dumping operation will be limited to the marine sub-littoral environment; significant intertidal impacts to this habitat type are not expected to occur. Therefore, this habitat type, *Salicornia* and other annuals colonizing mud and sand, is not considered further in the NIS.
Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	No	Atlantic salt meadows are classified by Fossitt (2000) as lower salt marsh. The main saltmarsh habitat is located at Barrow Harbour and Carrahane Strand where it is particularly well developed. The impact from the dredging and dumping operation will be limited to the marine sub-littoral environment; significant intertidal impacts to this habitat type are not expected to occur. Therefore, this habitat type, Atlantic salt meadows, is not considered further in the NIS.
Mediterranean salt meadows (Juncetalia maritimi)	No	Mediterranean salt meadows are classified by Fossitt (2000) as upper salt marsh. The main saltmarsh habitat is located at Barrow Harbour and Carrahane Strand where it is particularly well developed. The impact from the dredging and dumping operation will be limited to the marine sub-littoral environment; significant intertidal impacts to this habitat type are not expected to occur. Therefore, this habitat type, Mediterranean salt meadows, is not considered further in the NIS.
Embryonic shifting dunes	No	Embryonic shifting dunes are low sand mounds (generally less than a metre high) occurring between the high tide mark and shifting dunes along the shoreline with *Ammophila arenaria* (white dunes). They are unstable habitats where wind-blown sand is common and they are still vulnerable to saltwater intrusion. (NPWS, 2013) As this habitat type is confined to coastline above the high tide mark and outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to embryonic shifting dunes. Therefore, this habitat type, embryonic shifting dunes, is not considered further in the NIS.
Shifting dunes along the shoreline with Ammophila arenaria (white dunes)	No	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) are dunes which are partly stabilised and are dominated by *Ammophila arenaria* (NPWS, 2013). This habitat type is confined to the coastline above the high tide mark at Banna. As this habitat type is confined to coastline above the high tide mark and outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to shifting dunes along the shoreline with *Ammophila arenaria*. Therefore, this habitat type, shifting dunes along the shoreline

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Qualifying Feature	Potential for Significant Impacts	Rationale
		with *Ammophila arenaria*, is not considered further in the NIS.
Fixed coastal dunes with herbaceous vegetation (grey dunes)	No	The main sand dune complex occurs along the coastline at Banna. As this habitat type is confined to terrestrial locations above the high tide mark and outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to fixed coastal dunes with herbaceous vegetation. Therefore, this habitat type, fixed coastal dunes with herbaceous vegetation, is not considered further in the NIS.
Humid dune slacks	No	This habitat is associated with the well developed sand dune complex at Banna. As this habitat type is confined to terrestrial locations above the high tide mark and outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to humid dune slacks. Therefore, this habitat type, humid dune slacks, is not considered further in the NIS.
European dry heaths	No	Dry heath occurs scattered on limestone rocky areas in the southern part of the site. It generally occurs in association with dry grassland. As this habitat type is confined to terrestrial locations above the high tide mark and outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to European dry heaths. Therefore, this habitat type, European dry heaths, is not considered further in the NIS.

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6.1.3 Tralee Bay Complex SPA (004188)

6.1.3.1 Description of the Natura 2000 site

The Tralee Bay Complex SPA is located along the coast of north Co. Kerry between Ballyheige in the north, Tralee in the east and Stradbally in the west. The site includes the inner part of Tralee Bay, including Derrymore Island, the inlets of Barrow Harbour and Carrahane Strand, Akeragh Lough, Lough Gill, and much of the intertidal habitat from Scraggane Point at the northern end of the Magharees Peninsula around the coast to c.2 km south of Ballyheige. Inner Tralee Bay is well sheltered by the Derrymore Island peninsula. The intertidal sediments vary from muddy sands on the upper shore to firm rippled sands on the lower, more exposed shore. The intertidal flats have extensive beds of Eelgrass (*Zostera* spp.). The site is of special conservation interest for holding internationally and nationally important waders and waterbird populations, and holds an assemblage of over 20,000 wintering waterbirds. Other species that occur in Tralee Bay but are not qualifying features include red-throated diver, great northern diver, common scoter, red-breasted merganser, grebes and black guillemot (NPWS site synopsis)[4].

6.1.3.2 Identification of Potentially Significant Impacts to Qualifying Features

The following table (Table 8) lists the qualifying features of the Tralee Bay Complex SPA and evaluates through a scientific examination of evidence and data whether or not these features should or should not be selected for further assessment in the NIS. The qualifying features that are selected for further assessment are discussed further in the section followed by an assessment of potentially significant effects arising from the proposal to dredge Fenit harbour and dispose of the dredge materials at a dumpsite in Tralee Bay.

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Most of the bird species below are coastal in nature confining themselves to coastlands and intertidal areas of the Natura 2000 site. The SPA supports various shoreline habitats such as beaches at Banna and Castlegregory, estuary in inner Tralee Bay and intertidal mudflats mainly within the estuary but also at Barrow Harbour, as well as sand dune complex and lagoon on the Magharees Peninsula, and saltmarsh at Carrahane Strand and Derrymore. The site is designated for wintering Annex I species including whooper swan, golden plover and bar-tailed godwit and for a host of regularly occurring migratory birds not listed on Annex I. The period for dredging will be February-May.

[4] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004188.pdf Accessed 11/04/2018

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Table 8.Idenitification of potentially significant impact to qualifying features of the Tralee Bay Complex SPA (004188)

Qualifying Feature	Potential for Significant Impacts	Rationale
Whooper Swan (*Cygnus cygnus*)	No	Whooper swan is amber-listed as Ireland hosts more than 20% of the European wintering population. The site is designated for wintering whooper swan that visit lakes and marshes and can be found grazing in fields and sloblands. Birds arrive in Ireland in late autumn and leave by mid-April and a few may remain throughout the summer. Those few birds that remain over the summer are young or sick birds while some are known to breed in County Donegal. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. Whooper swan is found on lakes, marshes and sloblands feeding on grasses, roots and water plants. Whooper swan is a common visitor to Lough Gill. Thus whooper swan is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering whooper swan. Therefore, whooper swan is not considered further in the NIS.
Light-bellied Brent Goose (*Branta bernicla hrota*)	No	The site is designated for wintering light-bellied brent goose, which are amber-listed as the majority winter at less than ten sites and the Irish population is also internationally significant. It winters on coastal estuaries during the autumn and early winter as well as on grasslands from mid-winter before departing to breeding grounds in Canada in late April. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. Light-bellied brent goose is found on the intertidal areas and grazes on coastal grasslands, estuaries and mudflats taking a wide variety of plan material, especially *Zostera* spp. Thus brent goose is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering light-bellied brent goose. Therefore, light-bellied brent goose is not considered further in the NIS.
Shelduck (*Tadorna tadorna*)	No	Shelduck is amber-listed as the majority of the wintering population occurs at less than ten sites. The site is designated for wintering shelduck. Breeding birds have declined in Kerry generally. In July the adults departs to the Waddenzee to moult returning to the Shannon estuary in November. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. Shelduck mainly confines itself the intertidal area and coastlands of the SPA and feeds on mudflats. Thus shelduck is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering shelduck. Therefore, shelduck is not considered further in the NIS.
Wigeon (*Anas penelope*)	No	Wigeon is red-listed due to a decline in its non-breeding (wintering) population. The site is designated for wintering wigeon. The birds arrive in Ireland in August and September and winter on the coast on estuaries and lagoons and further inland on lakes, marshes and grassland close to water. On the Dingle Peninsula it is a common winter visitor to estuaries and wetlands. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral

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Qualifying Feature	Potential for Significant Impacts	Rationale
		marine environment. At coastal locations wigeon are found on the intertidal areas feeding on *Zostera* spp. or coastal grasslands. Thus the wigeon is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering wigeon. Therefore, wigeon is not considered further in the NIS.
Teal (*Anas crecca*)	No	Teal is amber-listed due to a decline in the breeding population. The site is designated for wintering teal. Small numbers of teal breed near small freshwater lakes or pools or small upland streams away from the coast. Teal winter on lakes, marshes and estuaries and feed on seeds, *Enteromorpha* sp. and molluscs. On the Dingle Peninsula it is a common winter visitor to estuaries and freshwater lakes and there has been a serious decline of numbers in winter on Lough Gill. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. At coastal locations teal are found on the intertidal areas. Thus teal is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering teal. Therefore, teal is not considered further in the NIS.
Mallard (*Anas platyrhynchos*)	No	Mallard is a green-listed species and the site is designated for wintering populations. Mallard is found on lakes, ponds, marshes and estuaries and feeds on aquatic plants and seeds. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. There appears to have been an increase in population on the Dingle Peninsula in recent years. At coastal locations mallard are found on the intertidal areas feeding molluscs and crustaceans, as well as plant material. Thus mallard is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering mallard. Therefore, mallard is not considered further in the NIS.
Pintail (*Anas acuta*)	No	Pintail is red-listed due to a decline in its non-breeding (wintering) population. It is an extremely rare breeding species with records from the midlands and north. The site is designated for wintering pintail. In winter it is found on freshwater lakes, lagoons and estuaries and feeds on a variety of aquatic plants, seeds and other plant material. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. At coastal locations pintail are found on the intertidal areas feeding invertebrates and plant material. Thus pintail is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering pintail. Therefore, pintail is not considered further in the NIS.
Scaup (*Aythya marila*)	Yes	Greater scaup is amber-listed for its small breeding population and its localised wintering range. The site is designated for wintering scaup. Greater scaup is found on open coastal waters, bays and also on freshwater lakes close to coastal localities and feeds by diving for molluscs and crustaceans as well as feeding on marine plants. Greater scaup are usually found in areas less than 10m in depth. As greater scaup feed on small molluscs at coastal sites and dive for their prey, they may be

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Qualifying Feature	Potential for Significant Impacts	Rationale
		temporarily displaced from feeding areas as a result of water quality impacts.
Oystercatcher (*Haematopus ostralegus*)	No	Oystercatcher is amber-listed for breeding and wintering birds for localised wintering population. The site is designated for wintering oystercatcher. It breeds on undisturbed rocky beaches and on islands. It feeds on intertidal mudflats or fields. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. They are mainly found in the intertidal areas feeding on molluscs and bivalves. Thus oystercatcher is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering pintail. Therefore, oystercatcher is not considered further in the NIS.
Ringed Plover (*Charadrius hiaticula*)	No	Ringed plover is amber-listed as internationally important numbers winter in Ireland. The site is designated for wintering ringed plover. They are found in the outer estuary on intertidal mudflats feeding on a variety of insects, molluscs and other invertebrates. On the Dingle Peninsula it breeds in small numbers on undisturbed shingle beaches and stony patches on the coast. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. Ringed plover are found on the intertidal mudflats in the SPA. Thus ringed plover is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering ringed plover. Therefore, ringed plover is not considered further in the NIS.
Golden Plover (*Pluvialis apricaria*)	No	Golden plover is red-listed as a breeding species due to a decline in the breeding and non-breeding (wintering) population. The site is designated for wintering golden plover. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. Golden plover are found on the intertidal mudflats in the SPA. Thus golden plover is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering golden plover. Therefore, golden plover is not considered further in the NIS.
Grey Plover (*Pluvialis squatarola*)	No	Grey plover is amber-listed as the majority winter at less than ten sites. The site is designated for wintering grey plover. They are found on intertidal mudflats in the estuary and also on beaches and feed on marine molluscs, crustaceans and worms. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. Grey plover are found on the intertidal areas in the SPA. Thus grey plover is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering grey plover. Therefore, grey plover is not considered further in the NIS.
Lapwing (*Vanellus vanellus*)	No	Lapwing is red-listed due to a decline in the breeding and non-breeding population. The site is designated for wintering lapwing. Numbers move in from the east during particularly cold winters. They winter on mudflats and estuaries as well as inland on open grasslands or ploughed fields and breed on grasslands and grassy wetlands. While the project will take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. Lapwing is

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Qualifying Feature	Potential for Significant Impacts	Rationale
		mainly found on the intertidal areas in the SPA. Thus lapwing is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering lapwing. Therefore, lapwing is not considered further in the NIS.
Sanderling (Calidris alba)	No	The wintering population of sanderling is green-listed. The site is designated for wintering sanderling. Sanderling are mainly found on beaches but also occur on mudflats and feed on small invertebrates and are a common winter visitor at Tralee Bay and the Dingle Peninsula. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. Sanderling is mainly found on the beaches in the SPA. Thus sanderling is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering sanderling. Therefore, sanderling is not considered further in the NIS.
Dunlin (*Calidris alpina*)	No	Dunlin is amber-listed in Ireland as the majority winter at less than ten sites. The site is designated for wintering dunlin. Dunlin mainly occurs in the estuary along mudflats feeding on small invertebrates. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. Dunlin is mainly found on the intertidal areas in the SPA. Thus, dunlin is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering dunlin. Therefore, dunlin is not considered further in the NIS.
Black-tailed Godwit (Limosa limosa)	No	Black-tailed godwit is amber-listed in Ireland as the majority winter at less than ten sites. The site is designated for wintering black-tailed godwit. Birds feed on intertidal mudflats, brackish pools and rough grassland. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. Black-tailed godwit is mainly found on the intertidal areas in the SPA. Thus, black-tailed godwit is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering black-tailed godwit. Therefore, black-tailed godwit is not considered further in the NIS.
Bar-tailed Godwit (*Limosa lapponica*)	No	Bar-tailed godwit is amber-listed in Ireland as the majority winter at less than ten sites. The site is designated for wintering bar-tailed godwit. Bar-tailed godwit feed on intertidal mudlfats. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. Bar-tailed godwit is mainly found on the intertidal areas in the SPA. Thus, bar-tailed godwit is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering bar-tailed godwit. Therefore, bar-tailed godwit is not considered further in the NIS.
Curlew (*Numenius arquata*)	No	Curlew is red-listed due to a long-term decline in its breeding and wintering population and its breeding range. The site is designated for wintering curlew. There are no recent records of breeding on the Dingle Peninsula. Curlew winter in the

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Qualifying Feature	Potential for Significant Impacts	Rationale
		estuary and coastal grasslands and feed on intertidal mudlfats. They nest in bogs, damp meadows and farmland. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. Curlew is mainly found on the intertidal areas in the SPA. Thus, curlew is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering curlew. Therefore, curlew is not considered further in the NIS.
Redshank (*Tringa totanus*)	No	Redshank is red-listed due to a long-term decline in its breeding population. The site is designated for wintering redshank. Very small numbers of redshank breed in the midlands. Redshank feed along the shore of estuaries and along muddy river channels. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. Redshank is mainly found on the intertidal areas in the SPA. Thus, redshank is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering redshank. Therefore, redshank is not considered further in the NIS.
Turnstone (*Arenaria interpres*)	No	Turnstone is green-listed. The site is designated for wintering turnstone. It is found on rocky coasts, shorelines with stones and seaweed, harbours and piers and feeds by turning over stones or tossing seaweed aside in search of food items. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. Turnstone is mainly found on the intertidal areas in the SPA. Thus, turnstone is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering turnstone. Therefore, turnstone is not considered further in the NIS.
Black-headed Gull (*Chroicocephalus ridibundus*)	No	Black-headed gull is red-listed due to a long term decline in its breeding population. The site is designated for wintering black-headed gull. Black-headed gull are widespread during the winter along the coast and inland. They are a very common widespread breeding species nesting in colonies in sand dunes, coastal islands, moorland polls, bogs and on freshwater lake islands and takes a wide variety of food items including fish, worms, molluscs, insects and plant material. While the project may take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. In winter it is found on inland pastures and ploughed fields, reservoirs, and on coastal estuaries and mudflats. Thus, the black-headed gull is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering black-headed gull. Therefore, black-headed gull is not considered further in the NIS.
Common Gull (*Larus canus*)	No	Common-gull is amber-listed for a decline in its breeding range. The site is designated for wintering common gull. Common gull is widespread along the coast in winter and found on estuaries, mudflats, coastal fields and on inland lakes and pastures and feeds on a wide range of insects, molluscs, worms and fish. While the project may take place during the wintering

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Qualifying Feature	Potential for Significant Impacts	Rationale
		season, any water quality impacts will be confined to the sub-littoral marine environment. Common gull is mainly found on the intertidal areas in the SPA. Thus, common gull is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering common gull. Therefore, wintering common gull is not considered further in the NIS.
Wetlands	No	The proposed works will not result in any habitat loss of wetlands supporting waterbirds. Therefore, it is considered that the project will not significantly affect wetlands and waterbirds.

6.1.3.2.1 Scaup

Scaup, often referred to as the greater scaup, is a common winter visitor to Tralee Bay and to Lough Gill and Sandy Bay on the Dingle Peninsula. Scaup is a common winter visitor from breeding grounds in Iceland and Scandinavia. It is found on open coastal water, bays and also on freshwater lakes close to coastal localities. Scaup are amber-listed for localised wintering populations; where more than half of the wintering population is also limited to ten or fewer sites then the non-breeding population is considered localised.

The favourable conservation condition for 'Scaup' within Tralee Bay Complex SPA is defined by the following list of Attributes and Targets outlined in Table 9 below:

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Table 9. Attributes and Targets for 'Scaup' in the Tralee Bay Complex SPA (004188)

Attribute	Measure	Target
Population trend	Percentage change	Long term population trend stable or increasing
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing and intensity of use of areas by scaup, other than that occurring from natural patterns of variation

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6.1.4 Magharee Islands SAC (002261)

6.1.4.1 Description of the Natura 2000 site

This marine site is centred around the Magharee Islands, which lie about 2km north of the Magharee Peninsula in Co. Kerry. The site includes two of the smaller islands, Illaunnabarnagh and Mucklaghmore, which lie about 5km to the northeast of the main group. The islands are exposed on their west coasts and more sheltered on their east coasts with moderately strong currents between them. The islands are composed of Carboniferous limestone. The site is a Special Area of Conservation (SAC) selected for Reefs (NPWS site synopsis)[5].

6.1.4.2 Identification of Potentially Significant Impacts to Qualifying Features

The following table (Table 10) lists the qualifying features of the Magharee Islands SAC and evaluates through a scientific examination of evidence and data whether or not these features should or should not be selected for further assessment in the NIS. The qualifying features that are selected for further assessment are discussed further in the section followed by an assessment of potentially significant effects arising from the proposal to dredge Fenit harbour and dispose of the dredge materials at a dumpsite in Tralee Bay.

Table 10.Identification of potentially significant impacts to qualifying features within the Magharee Islands SAC (002261)

Qualifying Feature	Potential for Significant Impacts	Rationale
Reefs	Yes	Reef habitats are widespread marine features with immobile hard substrate available for colonisation by epifauna (NPWS, 2013). Shallow water reefs occur around and between the islands. The closest islands to the dumpsite are Illaunnabarnagh and Mucklaghmore, which are separated from the main Magharee Islands north of the Maghareee Peninsula by a distance of 4.9km. The increased suspended sediments in the water column will either deposit on the seabed within and outside of the bay, while the finer fractions may remain in suspension. There is a risk of disturbance or displacement of epifauna from deposition of sediment.

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6.1.4.2.1 Reef

The shallow water reefs around and between the Magharee Islands consist of areas that are exposed to wave action on the west coasts of the islands, more sheltered on the east coasts and subject to weak or moderate tidal streams. For the most part, the reefs are a mixture of boulders, cobbles, pebbles and sand, but in some areas comprise solid bedrock. In shallow water areas that are sheltered from wave action, mixed kelp forests of *Laminaria hyperborea*, *Saccorhiza polyschides* and *L. saccharina* colonize larger boulders and bedrock.

In areas exposed to wave action the reefs at depths of 19-28m are generally characterised by a community of foliose red algae, in particular *Callophyllis laciniata*, *Schottera nicaeensis*, *Plocamium cartilagineum* and *Delesseria sanguinea* and the hydroid *Sertularia argentia*, indicating the tide-swept nature of the habitats. Branching and cushion sponge may also be common in this

[5] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002261.pdf Accessed 11/04/2018

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community. This site is of conservation significance in particular for the reefs and associated communities which it hosts. The fact that the site supports important bird colonies adds further to its value (NPWS site synopsis).

The favourable conservation condition for 'Reefs' within Magharee Islands SAC is defined by the following list of Attributes and Targets outlined in Table 11 below:

Table 11. Attributes and Targets for 'Reefs' in the Magharee Islands SAC (002261)

Attribute	Measure	Target
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes
Distribution	Occurrence	The distribution of reefs is stable or increasing, subject to natural processes
Community structure	Biological composition	Conserve the following community types in a natural condition: Intertidal reef community complex; *Laminaria*-dominated community complex; Sub-tidal reef community complex

6.1.5 Magharee Islands SPA (004125)

6.1.5.1 Description of the Natura 2000 site

The Magharee Islands lie about 2km north of the Maghareees Peninsula on the north side of the Dingle Peninsula, Co. Kerry. The site includes the main Magharee Islands ("Seven Hogs"), the islands of Mucklaghmore and Illaunnabarnagh to the east, Illaunnanoon and Doonagaun Island to the south and several smaller rocky islets. Illaunimmill and Illauntannig are the largest of the islands included in the site. The islands are most exposed on their west coasts, and there are moderately strong sea currents between them. The Magharee Islands are of national importance for breeding seabirds and also for wintering geese. It is of note that five of the species that occur, i.e. Barnacle Goose, Chough, Common Tern, Arctic Tern and Little Tern are listed on Annex I of the E.U. Birds Directive (NPWS Site Synopsis[6]).

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6.1.5.2 Identification of Potentially Significant Impacts to Qualifying Features

The following table (Table 12) lists the qualifying features of the Magharee Islands SPA and evaluates through a scientific examination of evidence and data whether or not these features should or should not be selected for further assessment in the NIS. The qualifying features that are selected for further assessment are discussed further in the section followed by an assessment of potentially significant effects arising from the proposal to dredge Fenit harbour and dispose of the dredge materials at a dumpsite in Tralee Bay.

[6] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004125.pdf Accessed 11/04/2018

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Table 12. Identification of potentially significant impacts to qualifying features within the Magharee Islands SPA (004125)

Qualifying Feature	Potential for Significant Impacts	Rationale
Storm petrel (*Hydrobates pelagicus*)	No	Storm petrel is red-listed because of its localised breeding. The site is designated for breeding storm petrel. It nests in crevices in walls, under rocks and in burrows. The Blasket Islands is the largest colony in the UK and Ireland and the second largest in the world. Numbers on the Magharee Islands numbered 1,244 in 2007. Following breeding the species disperses to the open sea. Storm petrel feeds on a wide variety of marine food items, including small fish and plankton. The project may take place during the wintering season but dredging may take place in March/April/May in the breeding season. Breeding storm petrel leave the nests during the day to feed out at sea, beyond the dumpsite. Once suspended silt is transported out of the bay it is present at very low levels. Thus, the project will not significantly affect the population trend or distribution of breeding storm petrel. Therefore, storm petrel is not considered further in the NIS.
Shag (*Phalacrocorax aristotelis*)	No	Shag is amber-listed because the breeding population is considered to be of international importance. The site is designated for a breeding population. A total of 271-284 pairs nested on six islands in 2007. Shags are predominantly marine in nature, rarely found inland, and in winter occur on open coastal waters. They feed on a wide variety of small fish and some crustaceans. The project will take place during the wintering/early breeding season. Once suspended silt is transported out of the bay it is present at very low levels. Thus, the project will not significantly affect the population trend or distribution of breeding shag. Therefore, shag is not considered further in the NIS.
Common gull (*Larus canus*)	No	Common-gull is amber-listed for a decline in its breeding range. The site is designated for breeding common gull. Common gull is widespread along the coast in winter and found on estuaries, mudflats, coastal fields and on inland lakes and pastures and feeds on a wide range of insects, molluscs, worms and fish. Common gull breeds in colonies on small lakes or coastal islands, usually nesting on the ground. A survey of the Magharees in 2007 found 178-187 breeding pairs on six islands. The project will take place during the wintering/early breeding season. Any water quality impacts will be confined to the sub-littoral marine environment. The project will not significantly affect the population trend or distribution of wintering common gull. Therefore, breeding common gull is not considered further in the NIS.
Common tern (*Sterna hirundo*)	Yes	Common tern is amber-listed for a decline in its breeding population as well as localised breeding. The site is designated for breeding common tern. Breeding usually takes place in colonies on small coastal and lake islands. Twelve pairs have been recorded breeding in the site in the NPWS Natura 2000 Form. In 2013 the colony on Illauntannig was abandoned though breeding did take place on other islands, though numbers were unknown. Common tern feed on a variety of small fish, sand eel and sprat, which are caught by diving from a height. Birds arrive from mid-March and begin breeding in April. Were the dredging operation to take place in breeding season, there is potential for a temporary increase in turbidity from an increase in suspended solids in the water column to temporarily affect feeding success of common tern. Therefore, based on this and the

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Qualifying Feature	Potential for Significant Impacts	Rationale
		precautionary principle, there is potential for significant impact to common tern.
Arctic tern (*Sterna paradisaea*)	Yes	Arctic tern is amber-listed for a decline in its breeding population as well as localised breeding. The site is designated for breeding arctic tern. Breeding usually takes place on small islands and undisturbed shorelines. A total of 164 pairs have been recorded breeding in the site in the NPWS Natura 2000 Form. Arctic tern feed on a variety of small fish, sand eel and sprat, which are caught by diving from a height. Birds arrive from mid-March and begin breeding in April. Were the dredging operation to extend into the month of April/May, there is potential for increased turbidity to temporarily affect feeding success of arctic tern. Therefore, based on this and the precautionary principle, there is potential for significant impact to arctic tern.
Little tern (*Sterna albifrons*)	Yes	Little tern is amber-listed for a decline in its breeding population as well as localised breeding. The site is designated for breeding little tern. Breeding usually takes place in small colonies on shingle and sandy beaches. Thirty-six pairs have been recorded breeding in the site in the NPWS Natura 2000 Form. Arctic tern feed on a variety of crustaceans and small fish, sand eel and sprat, which are caught by diving from a height. Birds arrive from mid-March and begin breeding in April. Were the dredging operation to extend into the month of April/May, there is potential for increased turbidity in the water column to temporarily affect feeding success of little tern. Therefore, based on this and the precautionary principle, there is potential for significant impact to little tern.
Barnacle goose (*Branta leucopsis*)	No	Barnacle goose is amber listed because of its local breeding population and the wintering population is considered to be of international importance. The site is designated for wintering birds. Barnacle geese arrive from Greenland and the main population is almost exclusively on the west coast. It is found on quiet, undisturbed grazing areas, especially favouring uninhabited islands and feeds on grass, rushes and other plant material. While the project will take place during the wintering season, any water quality impacts will be confined to the sub-littoral marine environment. Barnacle goose is mainly found on the intertidal areas in the SPA. Thus, barnacle goose is outside of the zone of influence of the project. The project will not significantly affect the population trend or distribution of wintering barnacle goose. Therefore, wintering barnacle goose is not considered further in the NIS.

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6.1.5.2.1 Common Tern

Common tern is an uncommon visitor from April to October, mainly around breeding sites on the Magharees. It has also bred on the Blasket Islands in the past. There has been a serious decline from about 200 pairs on the Magahree Islands in 1967. Common tern is amber-listed for both moderate and long-term declines as well as localised breeding with 50% or more of the total Irish breeding population concentrated into ten or fewer sites.

Specific conservation objectives for common tern are not available for the Magharee Islands SPA. Therefore, the Attributes and Targets which have been set for common tern elsewhere namely Cork Harbour SPA (004030) have been used to define the favourable conservation condition for this species. The favourable conservation condition for 'Common tern' within Cork Harbour SPA (004030) is defined by the following list of Attributes and Targets outlined in Table 13 below:

Table 13. Attributes and Targets for 'Common tern' within Cork Harbour SPA (004030)

Attribute	Measure	Target
Breeding population: abundance apparently occupied nests (AONs)	Number	No significant decline
Productivity rate: fledged young per breeding pair	Mean number	No significant decline
Distribution: breeding colonies	Number; location; area (hectares)	No significant decline
Prey biomass available	Kilograms	No significant decline
Barriers to connectivity	Number; location; shape; area (hectares)	No significant decline
Disturbance at the breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the breeding common tern population

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6.1.5.2.2 Arctic Tern

Arctic tern is a common summer visitor and passage migrant between April and October and breeds on the Blasket Islands and the Magharee Islands. Arctic tern is amber-listed for both moderate and long-term declines as well as localised breeding with 50% or more of the total Irish breeding population concentrated into ten or fewer sites.

Specific conservation objectives for Arctic tern are not available for any designated site. Therefore, the Attributes and Targets which have been set for common tern in Cork Harbour SPA (004030) have been used to define the favourable conservation condition for this species (see Table 13 above).

6.1.5.2.3 Little Tern

Little tern is a scarce summer visitor and rare passage migrant. There is only one colony in Kerry on the Magharee Islands. Little tern is amber-listed for both moderate and long-term declines as well as localised breeding with 50% or more of the total Irish breeding population concentrated into ten or fewer sites.

Specific conservation objectives for little tern are not available for the Magharee Islands SPA. Therefore, the Attributes and Targets which have been set for little tern elsewhere namely Wexford

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Harbour and Slobs SPA (004076) have been used to define the favourable conservation condition for this species. The favourable conservation condition for 'Little tern' within Wexford Harbour and Slobs SPA (004076) is defined by the following list of Attributes and Targets outlined in Table 14 below:

Table 14.Attributes and Targets for 'Little tern' within the Wexford Harbour and Slobs SPA (004076)

Attribute	Measure	Target
Breeding population: abundance apparently occupied nests (AONs)	Number	No significant decline
Productivity rate: fledged young per breeding pair	Mean number	No significant decline
Distribution: breeding colonies	Number; location; area (hectares)	No significant decline
Prey biomass available	Kilograms	No significant decline
Barriers to connectivity	Number; location; shape; area (hectares)	No significant decline
Disturbance at the breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the breeding common tern population

6.1.6 Lower River Shannon SAC (002165)

6.1.6.1 Description of the Natura 2000 site

This very large site stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head/ Kerry Head, a distance of some 120km. The site thus encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. Rivers within the sub-catchment of the Feale include the Galey, Smearlagh, Oolagh, Allaughaun, Owveg, Clydagh, Caher, Breanagh and Glenacarney. Rivers within the sub-catchment of the Mulkear include the Killeenagarriff, Annagh, Newport, the Dead River, the Bilboa, Glashacloonaraveela, Gortnageragh and Cahernahallia.

The Shannon and Fergus Estuaries form the largest estuarine complex in Ireland. They form a unit stretching from the upper tidal limits of the Shannon and Fergus Rivers to the mouth of the Shannon Estuary. This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitats lagoon and alluvial woodland, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. A good number of Red Data Book species are also present, perhaps most notably the thriving populations of Triangular Club-rush. A number of species listed on Annex I of the E.U. Birds Directive are also present, either wintering or breeding (NPWS site synopsis)[7].

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[7] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002165.pdf Accessed 11/04/2018

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6.1.6.2 Identification of Potentially Significant Impacts to Qualifying Features

The following table (Table 15) lists the qualifying features of the Lower River Shannon SAC and evaluates through a scientific examination of evidence and data whether or not these features should or should not be selected for further assessment in the NIS. The qualifying features that are selected for further assessment are discussed further in the section followed by an assessment of potentially significant effects arising from the proposal to dredge Fenit harbour and dispose of the dredge materials at a dumpsite in Tralee Bay.

Table 15. Identification of potentially significant impacts to qualifying features within the Lower River Shannon SAC (002165)

Qualifying Feature	Potential for Significant Impacts	Rationale
Sandbanks which are slightly covered by sea water all the time	No	The likely extent of sandbanks within the SAC has been mapped as occurring south of the coastline between Kilcloher Head and Cloonconeen Point and west-northwest of Ballybunnion in the mouth of the Shannon Estuary (COS 002165), at a remove of in excess of 30km from the dumpsite. According to the STM, finer silt and sand fractions, which do not settle out at or in the vicinity of the dumpsite, will be flushed out to sea in a northwest direction away from the mouth of the Shannon Estuary. Considering the use of the suction hopper dredger and the dredging methodology, the zone of influence of the dredge material and the shallow and dynamic nature of the sub-littoral sediments, it is considered that the sandbank habitat type will not be significantly affected by the proposed dredging at Fenit Harbour. Therefore, sandbank habitat type will not be considered further in the NIS.
Estuaries	No	The COS 002165 has mapped the extent of the estuary eastwards from Carrig Island on the southern shores of the Shannon Estuary to Aylevarroo Point on the northern shore. According to the STM, finer silt and sand fractions, which do not settle out at or in the vicinity of the dumpsite, will be flushed out to sea in a northwest direction away from the mouth of the Shannon Estuary. Considering the use of the suction hopper dredger and the dredging methodology, the zone of influence of the dredge material and the shallow and dynamic nature of the sub-littoral sediments, it is considered that the estuary habitat type will not be significantly affected by the proposed dredging at Fenit Harbour. Therefore, estuary habitat type will not be considered further in the NIS.
Mudflats and sandflats not covered by seawater at low tide	No	Both the Fergus and inner Shannon Estuaries feature vast expanses of intertidal mudflats. Within the SAC, mudflats are mapped as occurring south of Ballybunnion, at Bunaclugga Bay, Querrin Point and Poulnasherry Bay. Other areas of mudflats occur further east within the estuary channel. The closest area of mudflats within the COS 2165 is located at a remove of approximately 30km from the dumpsite. The impact from the dredging and dumping operation will be limited to the marine sub-littoral environment; significant intertidal impacts to this habitat type are not expected to occur. Therefore, this habitat type, mudflats and sandflats not covered by seawater at low tide, is not considered further in the NIS.
Coastal lagoons	No	There are four coastal lagoons mapped within the COS 002165, two of which have been surveyed as part of a National

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Qualifying Feature	Potential for Significant Impacts	Rationale
		Inventory of Lagoons. Cloonconeen Pool (4-5ha) is a natural sedimentary lagoon impounded by a low cobble barrier. Seawater enters by percolation through the barrier and by overwash. The substrate is composed almost entirely of peat. In contrast, Shannon Airport Lagoon (2ha) is an artificial saline lake with an artificial barrier and sluiced outlet (COS 002165). The remaining two coastal lagoons are Scattery Lagoon, located on Scattery Island, and Quayfield and Poulaweala Loughs, located east of Aughinish Island, within the Shannon Estuary. As this habitat type is confined to coastline above the high tide mark and outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to coastal lagoons. Therefore, this habitat type, coastal lagoons, is not considered further in the NIS.
Large shallow inlets and bays	No	The site supports an excellent example of a large shallow inlet and bay. Littoral sediment communities in the mouth of the Shannon Estuary occur in areas that are exposed to wave action and also in areas extremely sheltered from wave action (COS 002165). The entire mouth of the Shannon Estuary extending eastwards as far as Carrig Island is mapped within the COS 002165 as large shallow inlets and bays. According to the STM, finer silt and sand fractions, which do not settle out at or in the vicinity of the dumpsite, will be flushed out to sea in a northwest direction away from the mouth of the Shannon Estuary. Considering the use of the suction hopper dredger and the dredging methodology, the zone of influence of the dredge material and the shallow and dynamic nature of the sub-littoral sediments, it is considered that the large shallow inlets and bays habitat type will not be significantly affected by the proposed dredging at Fenit Harbour. Therefore, large shallow inlets and bays habitat type will not be considered further in the NIS.
Reefs	No	The intertidal reefs in the Shannon Estuary are exposed or moderately exposed to wave action and subject to moderate tidal streams. The infralittoral reefs range from sloping platforms with some vertical steps, to ridged bedrock with gullies of sand between the ridges, to ridged bedrock with boulders or a mixture of cobbles, gravel and sand. The communities found are tolerant to sand scour and tidal streams (COS 002165). According to the COS 002165, reef habitats covers an extensive area within the mouth of the Shannon Estuary, with additional areas extending eastwards into the channel. According to the STM, finer silt and sand fractions, which do not settle out at or in the vicinity of the dumpsite, will be flushed out to sea in a northwest direction away from the mouth of the Shannon Estuary. Considering the use of the suction hopper dredger and the dredging methodology, the zone of influence of the dredge material and the shallow and dynamic nature of the sub-littoral sediments, it is considered that the large shallow inlets and bays habitat type will not be significantly affected by the proposed dredging at Fenit Harbour. Therefore, large shallow inlets and bays habitat type will not be considered further in the NIS.
Perennial vegetation of stony banks	No	This habitat type occurs along the coast where shingle (cobbles and pebbles) and gravel have accumulated to form elevated ridges or banks above the high tide mark (NPWS, 2013). The closest area of this habitat-type is mapped as occurring at Ballybunnion with other areas occurring further north along the coastline at Bromore, Corcas and Sandhills and other locations

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Qualifying Feature	Potential for Significant Impacts	Rationale
		(COS 002165). As this habitat type is confined to coastline above the high tide mark and outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to perennial vegetation of stony banks. Therefore, this habitat type, perennial vegetation of stony banks, is not considered further in the NIS.
Vegetated sea cliffs of the Atlantic and Baltic coasts	No	Most of the site west of Kilcredaun Point/Kilconly Point is bounded by high rocky sea cliffs, including Kilclogher, Loop Head, Ballybunnion and Kerry Head. Cliff-top vegetation usually consists of either grassland or maritime heath. The boulder clay cliffs further up the estuary tend to be more densely vegetated (COS 002165). A sea cliff is a steep or vertical slope located on the coast, the base of which is in either the intertidal (littoral) or sub-tidal (sub-littoral) zone (NPWS, 2013). As this habitat type is outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to vegetated sea cliffs. Therefore, this habitat type, vegetated sea cliffs, is not considered further in the NIS.
***Salicornia* and other annuals colonizing mud and sand**	No	*Salicornia* and other annuals colonizing mud and sand is classified by Fossitt (2000) as lower salt marsh. This habitat type is a pioneer saltmarsh community that may occur on muddy sediment seaward of established saltmarsh or form patches within other saltmarsh communities where the elevation is suitable and there is regular tidal inundation (NPWS, 2013). Within Lower River Shannon SAC the areas of *Salicornia* habitat are limited. This habitat-type has been recorded at Carrigafoyle, Aughinish, Owenshere, Knock, Querin and Rinevilla Bay (McCorry & Ryle, 2009). The impact from the dredging and dumping operation will be limited to the marine sub-littoral environment; significant intertidal impacts to this habitat type are not expected to occur. Therefore, this habitat type, *Salicornia* and other annuals colonizing mud and sand, is not considered further in the NIS.
Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	No	Atlantic salt meadows are classified by Fossitt (2000) as lower salt marsh. Atlantic salt meadows is the dominant saltmarsh habitat at the site, and has been recorded at ten sub-sites throughout the SAC as part of a national saltmarsh monitoring project (McCorry & Ryle, 2009). The closest mapped area of Atlantic salt meadow is located at Cloonconeen Point, with potential Atlantic salt meadow habitat located adjacent to the Cashen River estuary, south of Ballybunnion (COS 002165). The impact from the dredging and dumping operation will be limited to the marine sub-littoral environment; significant intertidal impacts to this habitat type are not expected to occur. Therefore, this habitat type, Atlantic salt meadows, is not considered further in the NIS.
Mediterranean salt meadows (Juncetalia maritimi)	No	Mediterranean salt meadows are classified by Fossitt (2000) as upper salt marsh. Mediterranean salt meadows are more restricted in their distribution and size, being recorded from eight of the ten sub-sites surveyed under the SMP 2007-2009 (McCorry & Ryle, 2009). The closest mapped area of Mediterranean salt meadow is located at Cloonconeen Point, with potential Mediterranean salt meadow habitat located adjacent to the Cashen River estuary, south of Ballybunnion (COS

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Qualifying Feature	Potential for Significant Impacts	Rationale
		002165). The impact from the dredging and dumping operation will be limited to the marine sub-littoral environment; significant intertidal impacts to this habitat type are not expected to occur. Therefore, this habitat type, Mediterranean salt meadows, is not considered further in the NIS.
Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	No	The most notable freshwater rivers encompassed within the site include the Feale and Mulkear catchments, the Shannon from Killaloe to Limerick, the Fergus up as far as Ennis, and the Cloon River (Site synopsis 02165). Floating river vegetation characterised by species of water-crowfoot (*Ranunculus* spp.), pondweeds (*Potamogeton* spp.) and the moss *Fontinalius antipyretica* are present throughout the major river systems within the site. The impact from the dredging and dumping operation will be limited to the marine sub-littoral environment; significant freshwater impacts to this habitat type are not expected to occur. Therefore, this habitat type, water courses of plain to montane levels, is not considered further in the NIS.
***Molinia* meadows on calcareous, peaty or clavey-silt-laden soils (Molinion caeruleae)**	No	The current full extent of this habitat within the SAC is not mapped within the conservation objectives mapping; however, the site synopsis states that *Molinia* meadows occur in several part of the site with an especially noteworthy example at Worldsend on the River Shannon. As this habitat type is confined to terrestrial locations above the high tide mark and outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to *Molinia* meadows on calcareous, peaty or clavey-silt-laden soils. Therefore, this habitat type, *Molinia* meadows on calcareous, peaty or clavey-silt-laden soils, is not considered further in the NIS.
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)	No	Alluvial woodland occurs on the banks of the Shannon, in the valley bottoms of the tributaries and on seepage zones on valley sides within the site (NPWS, 2012a). The most prominent woodland type is gallery woodland where White Willow (*Salix alba*) dominates the tree layer with occasional Alder (*Alnus glutinosa*). As this habitat type is confined to terrestrial locations above the high tide mark and outside of the zone of influence of any potential impact arising from the dredge works and associated disposal activities, there will not be a significant impact to alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*. Therefore, this habitat type, alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*, is not considered further in the NIS.
Freshwater pearl mussel (*Margaritifera margaritifera*)	No	Freshwater pearl mussels are relatively large, long-lived bivalve molluscs which occur in rivers, streams and lakes. They typically occur in clean, fast-flowing, well-oxygenated rivers, which have unconsolidated substrates. Freshwater pearl mussel occurs abundantly in parts of the Cloon River which empties into Clonderalaw Bay in the Shannon Estuary. The impact from the dredging and dumping operation will be limited to the marine sub-littoral environment; significant impacts to freshwater river systems which could result in either direct or indirect impacts to freshwater pearl mussel will not occur. Therefore, this species, freshwater pearl mussel, is not considered further in the NIS.
Sea lamprey (*Petromyzon marinus*)	No	Sea lamprey and river lamprey have a similar life history spending their adult life in marine and estuarine waters living as external parasites on other fish species. Both species migrate upriver to spawn in areas of clean gravel after which they die. Sea

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Qualifying Feature	Potential for Significant Impacts	Rationale
		lamprey is known to spawn within the lower Shannon and its tributaries (site synopsis 002165). The STM results indicate that finer silt and sand fractions, which do not settle out at or in the vicinity of the dumpsite, will be flushed out to sea in a northwest direction away from the mouth of the Shannon Estuary. Due to the intervening distance between the subject area and the SAC and the outputs of the STM, significant effects on the conservation objectives of sea lamprey are not expected as a result of the dredge works and associated disposal activities. Therefore, this species, sea lamprey, is not considered further in the NIS.
Brook lamprey (*Lampetra planeri*)	No	Brook lamprey is the smallest of the three lamprey species native to Ireland. Unlike sea and river lamprey it is not parasitic and is non-migratory, spending its entire life in freshwater. Brook lamprey is known to spawn within the lower Shannon and its tributaries (site synopsis 002165). The impact from the dredging and dumping operation will be limited to the marine sub-littoral environment; significant impacts to freshwater river systems which could result in either direct or indirect impacts to brook lamprey will not occur. Therefore, this species, brook lamprey, is not considered further in the NIS.
River lamprey (*Lampetra fluviatilis*)	No	Sea lamprey and river lamprey have a similar life history spending their adult life in marine and estuarine waters living as external parasites on other fish species. Both species migrate upriver to spawn in areas of clean gravel after which they die. River lamprey is known to spawn within the lower Shannon and its tributaries (site synopsis 002165). The STM results indicate that finer silt and sand fractions, which do not settle out at or in the vicinity of the dumpsite, will be flushed out to sea in a northwest direction away from the mouth of the Shannon Estuary. Due to the intervening distance between the subject area and the SAC and the outputs of the STM, significant effects on the conservation objectives of river lamprey are not expected as a result of the dredge works and associated disposal activities. Therefore, this species, sea lamprey, is not considered further in the NIS.
Salmon (*Salmo salar*)	No	Salmon are an anadromous species, living in freshwater for at least the first two or three years of life before migrating to sea. Because salmon migrate upriver to spawn they are potentially ubiquitous within any river system where they are present. Salmon is afforded full legal protection during the freshwater phase of its life cycle. Salmon have been observed spawning in the lower Shannon or its tributaries. The Fergus is important in its lower reaches for spring salmon, while the Mulkear catchment excels as a grilse fishery, though spring fish are caught on the actual Mulkear River. The Feale is important for both types (site synopsis 002165). The STM results indicate that finer silt and sand fractions, which do not settle out at or in the vicinity of the dumpsite, will be flushed out to sea in a northwest direction away from the mouth of the Shannon Estuary. Due to the intervening distance between the subject area and the SAC and the outputs of the STM, significant effects on the conservation objectives of sea lamprey are not expected as a result of the dredge works and associated disposal activities. Therefore, this species, sea lamprey, is not considered further in the NIS.

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Qualifying Feature	Potential for Significant Impacts	Rationale
Bottle-nosed dolphin (*Tursiops truncatus*)	Yes	Bottle-nosed dolphins are medium-sized cetaceans which commonly occur in Irish waters. They are widespread along the coastal waters of western Ireland with the largest resident population of dolphins in Irish waters found in the Shannon Estuary, a critical habitat for this species. Bottle-nosed dolphin was the most commonly sighted marine mammal species during the last maintenance dredging campaign (2016) at Fenit Harbour (O'Dwyer, 2016). Given the close proximity of Tralee Bay to the Shannon Estuary SAC, it is likely that these sightings are of the Shannon population who has been previously recorded in the bay on a number of occasions (O'Brien & Berrow, 2017). Therefore, based on this and the precautionary principle, there is potential for significant disturbance/displacement impacts to bottle-nosed dolphins.
Otter (*Lutra lutra*)	No	Otter has a widespread distribution throughout Ireland being found in a wide variety of aquatic habitats such as lakes, rivers, streams, estuaries, marshland, canals and along the coast. They are largely solitary animals which prey on a wide variety of vertebrate and invertebrate species, although the diet primarily comprises fish. The amount of time spent within different parts of an individual's home range is related to prey abundance. Safe refuges where they can rest are also essential. Otters are highly territorial. The size of an otter's territory is related to prey abundance. In low-lying rivers and lakes where plenty of prey is available an otter's territory may only extend to 1-2km. On smaller rivers and in upland areas, where prey is less abundant, otters may maintain territories of up to 10-15km[8]. The STM results indicate that finer silt and sand fractions, which do not settle out at or in the vicinity of the dumpsite, will be flushed out to sea in a northwest direction away from the mouth of the Shannon Estuary. Due to the intervening distance between the subject area and the Lower River Shannon SAC and the outputs of the STM, significant effects on the conservation objectives of otter are not expected as a result of the dredge works and associated disposal activities. Therefore, this species, otter, is not considered further in the NIS.

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[8] https://www.npws.ie/sites/default/files/publications/pdf/Otter_leaflet.pdf (Accessed 11/04/2018)

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6.1.6.2.1 Bottle-nosed Dolphin

Bottle-nosed dolphins are medium-sized cetaceans which commonly occur in Irish waters. They are widespread along the coastal waters of western Ireland with the largest resident population of dolphins in Irish waters found in the Shannon Estuary, a critical habitat for this species. The species has been assessed as having a Conservation Status of 'Favourable' (NPWS, 2013a). Bottlenose dolphin is listed as an Annex II species under the EU Habitats Directive and the Shannon Estuary is one of only two Special Areas of Conservation designated for this species in Irish waters. The dolphins show long term site fidelity in the Shannon. Research since 1993 has shown that the dolphins are resident within the area occurring throughout the year. The same individuals are recorded repeatedly over many years (NPWS, 2012). The site is also an important calving area (*Ingram, 2000* cited in Berrow *et al*. 2010) with calves mainly being born in the summer months (May-Sept) (NPWS, 2012). Historical references suggest that dolphins have been in the estuary since at least 1835 (Knott, 1997 cited in Berrow *et al*. 2010) and probably much longer. Indeed, the Shannon Estuary population is considered to be genetically distinct from other populations (NPWS, 2012). Areas within the estuary in which dolphins are frequently recorded are classified as 'Critical habitat' for the species, although the vast majority of the estuary is considered to be suitable habitat and within the species range (NPWS, 2012).

A review of the IWDGs online database of cetacean sightings (2000-2017), carried out as part of a Marine Mammal Risk Assessment in support of this proposal, determined that bottle-nosed dolphins were the most frequently recorded species in Tralee Bay over this time period with a total of 19 sightings (constituting 58% of total sightings) (O'Brien & Berrow, 2017). Group sizes recorded in Tralee Bay ranged from 2 to 55 individuals. Given the close proximity of Tralee Bay to the Shannon Estuary SAC, it is likely that these sightings are of the Shannon population who has been previously recorded at the site on a number of occasions (*Levesque et al. 2016* as cited in O'Brien & Berrow, 2017).

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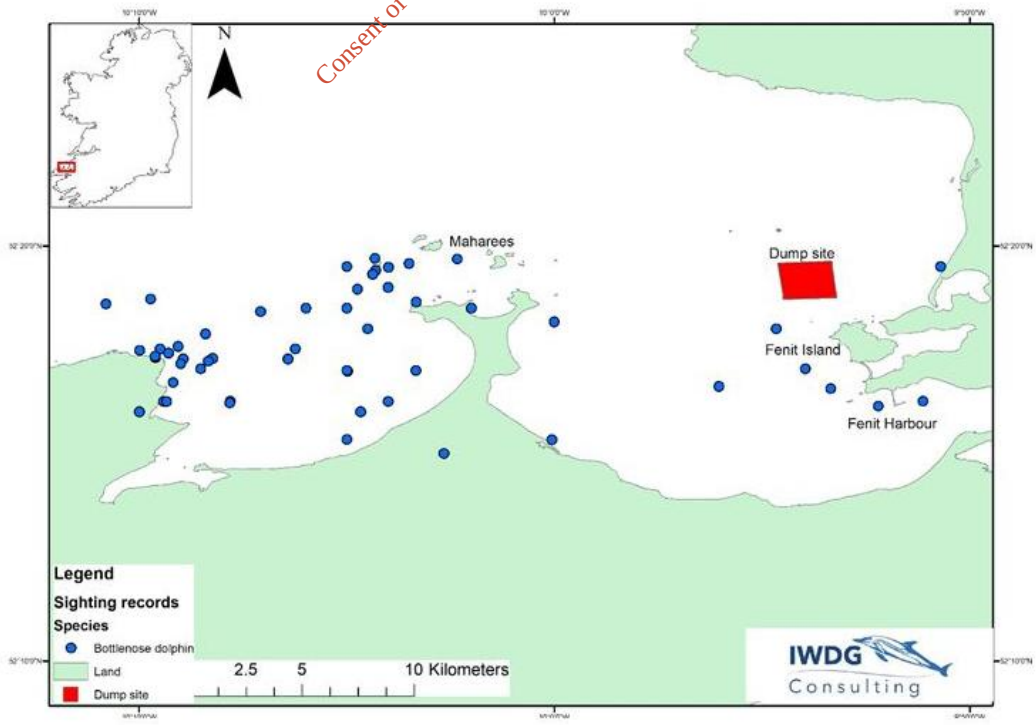


Figure 24. Map of bottle-nosed dolphin distribution in Tralee Bay 2000-2017 (O'Brien and Berrow, 2017)

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The favourable conservation condition for 'Bottle-nosed dolphin' within the Lower River Shannon SAC is defined by the following list of Attributes and Targets outlined in Table 16 below:

Table 16. Attributes and Targets of 'Bottle-nosed dolphin' in Lower River Shannon SAC (002165)

Attribute	Measure	Target
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use
Habitat use: critical areas	Location and hectares	Critical areas, representing habitat used preferentially by bottlenose dolphin, should be maintained in a natural condition
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the bottlenose dolphin population at the site

7 ASSESSMENT OF POTENTIALLY SIGNIFICANT EFFECTS TO NATURA 2000 SITES

7.1 HABITAT LOSS

7.1.1 Tralee Bay and Magharees Peninsula, West to Cloghane SAC

There will be a loss of sub-littoral sediment habitat and associated species within the dredge areas. During the 2009 benthic survey, the sub-littoral communities within the existing inner harbour (marina, fishing and commercial berths) were species poor, containing a low number of species and individuals. In addition, Stations S4 (immediately east of the eastern breakwater) and S6 (manoeuvring area 6) were also species poor. The common polychaete *Nephtys hombergii* dominated all of these sites, except S1 (fishing berth) where nemerteans narrowly dominated ahead of *Nephtys hombergii* (Fenit Harbour and Marina Expansion EIS, MWP (2011)).

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While *Nephtys hombergii* will be completely removed from the dredged areas, it is common in all surrounding areas. It can move very quickly through the substratum, downwards on the ebb tide and up again on the flood tide (Clay, 1967). It is also capable of swimming short distances with an undulatory movement. It releases planktotrophic (planktonic-dispersing larva that derives its nourishment by feeding in the plankton) and lecithotrophic (a planktonic-dispersing larva that lives off yolk supplied via the egg) larvae. All of these biological traits will ensure that this species will recolonise the dredged area over time (<1 year) and the existing communities, although species poor, will be re-established (Fenit Harbour and Marina Expansion EIS, MWP (2011)).

In addition to the infaunal animals present, the anemones, sponges, hydroids and oysters will also be removed from the dredged areas. The oysters present were small in number and did not constitute oyster beds proper. All of these species have the ability to re-establish themselves from surrounding populations through the colonisation of larvae (Fenit Harbour and Marina Expansion EIS, MWP (2011)).

Anthropogenic disturbance may be considered significant when it causes a change in biotic and/or abiotic variables in excess of what could reasonably be envisaged under natural processes. The capacity of the habitat to recover from this change is obviously an important consideration (i.e. habitat resilience) thereafter (NPWS, 2014). There will be a loss of approximately 11.8ha of the Sand with *Nephtys cirrosa* community complex within Tralee Bay and Magharees Peninsula, West to

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Cloghane SAC, which lies within the shallow inlet and bay Annex I habitat type. It is not considered to be a key contributor to the structure and/or function i.e. keystone community, of the site. Rather, it is considered to be a structurally important community type within an Annex I marine habitat.

The loss of approximately 11.8ha of the Sand with *Nephtys cirrosa* community complex is considered a temporary to short-term impact as it will likely recover again in time as larvae and sediment recolonise the dredge areas. The current area of this community type within the Natura 2000 site is considered to be 2,435ha[9]. The target of the conservation objective for the non-keystone community types is to conserve them in a natural condition. Significant continuous or ongoing disturbance of these communities should not exceed an approximate area of 15% of the interpolated area of each community type, at which point an inter-Departmental management review is recommended prior to further licensing of such activities (NPWS, 2014). Proposed activities or operations that cause significant disturbance to communities but may not necessarily represent a continuous or ongoing source of disturbance over time and space may be assessed in a context specific manner giving due consideration to the proposed nature and scale of activities during the reporting cycle and the particular resilience of the receiving habitat in combination with other activities within the designated site (NPWS, 2014).

The loss of Sand with *Nephtys cirrosa* community complex will be 0.5% of the estimated total area of this community complex within the site. As large shallow bays and inlet habitat type comprise 60% or 6,979ha of the overall Natura 2000 site, there will be a loss of 0.17% of the Annex I habitat type, a tiny fraction of the overall area and less than the significance threshold of 15%; thus it is considered that temporary to short-term loss of habitat within this community is not a significant impact to the qualifying feature, large shallow inlet and bays, and will not adversely affect the integrity of Tralee Bay and Magharees Peninsula, West to Cloghane SAC.

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7.1.2 Habitat Alteration (water quality)

7.1.2.1 Tralee Bay to Magharees Peninsula, West to Cloghane SAC

Habitat alteration arising from the proposed project is considered to be intrinsically linked to water quality impacts. There are two sources of suspended and deposited dredge material during the project, which can enter the marine environment:

1. The dredging operation at Fenit Harbour can give rise to suspended and deposited sediment from the loss of dredge material from the dredge bucket and overflow of the hopper, and
2. The dumping operation at the dumpsite will give rise to suspended and deposited sediment.

Potential water quality effects to habitats and species are twofold, suspended sediment in the water column, which can cause increased turbidity, and sedimentation effects i.e. deposition of sediment over benthic habitat and is measured as overburden thickness (millimetres above the pre-existing sediment horizon). Increased turbidity can also be caused by storms, heavy rains and floods as well as oyster dredging. Sedimentation is a natural process and organisms living in estuarine environments such as oysters are adapted to tolerate conditions within the normal range (Germano and Cary, 2005). Certain species such as oysters are sensitive to increased sedimentation and

[9] https://www.npws.ie/sites/default/files/publications/pdf/002070TraleeBayandMaghareesPeninsulaWesttoCloghaneSACMarineSupportingDocV1.pdf

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turbidity arising from dredging operations. Increased turbidity can clog gill structures, interfere with particle feeding activities and reduce disease resistance.

Dredging Operation

Inner Tralee Bay is within the zone of influence of the dredge area where material that escapes or is lost during the dredging may deposit or stay in suspension in the water column. Only a small portion, approximately 3%, of the material dredged will be lost to the water column from the dredger head. A similar small portion of material is likely to be lost through overflow of the hopper. It is predicted that the greatest increase in suspended sediment concentration will occur in the vicinity of the proposed development. While the coarser gravel and sand material will likely fall out close to and within 1km of dredge area, the silt material will likely stay in suspension and could be transported far from the site.

The dredge areas and surrounds support Sand with *Nephtys cirrosa* community complex. The *Ostrea edulis*-dominated community occurs 1km east and southeast of the site. Dunnington (1968) reported preliminary results that indicated that oysters buried 1.25 cm or less could "usually clear their bills of sediment if the water was warm enough for active pumping." A thin veneer of sediment (several mm) may not be fatal but is known to affect reproduction and adversely affect settlement and recruitment of bivalve larvae (McKinney et al. 1976). Oysters require hard surfaces to settle. However, dredging will not take place within the oyster spatting season between June and July, thus avoiding any interaction or resulting significant impact with oyster spat.

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The nearest of the two *Ostrea edulis*-dominated community lies immediately east of the proposed dredge areas, the other occurs at the western side of the bay near Castlegregory. This community while an important constitutive part of the large shallow inlet and bay habitat type is not a keystone community. Therefore, significant continuous or ongoing disturbance of communities should not exceed an approximate area of 15% of the interpolated area of each community type. Considering, the extent of the zone of influence of the dredge area and the proposed methodology it is not considered that significant volumes of dredge material will deposit on the oysters. While the proposed dredging is not expected to have a significant impact on this community type, the precautionary principle is applied and water quality control mitigation has been proposed in Section 7.3 below to ensure that the water quality during the dredging operation meets the shellfish regulations. Suspended soil content in the water column must not exceed by more than 30% the content of waters not so affected in the Tralee Bay Shellfish Area in the vicinity of the capital dredging works in accordance with the (European Communicates (Quality of Shellfish Waters) Regulations 2006.

Other habitats within 1km of the dredge areas include Mixed sediment with crustaceans, bivalves and polychaetes community complex and Subtidal reef community complex. While all of these community complexes are of structural importance to the community composition of large shallow bays and inlets they are not considered to be keystone constituents. Therefore, any significant continuous or ongoing disturbance of communities should not exceed an approximate area of 15% of the interpolated area of each community type (NPWS, 2014). Considering, the extent of the zone of influence of the dredge area, the proposed dredge methodology, and the temporary nature and level of silt deposition on reef, it is not considered that significant volumes of dredge material will not deposit on Mixed sediment with crustaceans, bivalves and polychaetes community complex and

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Subtidal reef community complex community types. Therefore, the proposed dredging is not expected to have a significant impact on the Mixed sediment with crustaceans, bivalves and polychaetes community complex and the Subtidal reef community complex.

The keystone communities, those considered to be a key contributor to the structure and/or function, of the shallow inlet and bay habitat type and their associated area are:

- *Zostera*-dominated community complex (350ha)
- *Mytilus*-dominated community (11ha)
- *Sabellaria*-dominated community complex (7ha)

Any significant anthropogenic disturbance to the extent of these communities should be avoided and the extent of these communities should be maintained (NPWS, 2014). The *Zostera*-dominated community complex is located along the shore between Blennerville and Derrymore Island as well as in the vicinity of the Magharees Peninsula. The nearest point of this community to Fenit Harbour is over 3km south of Derrymore Island where it extends to the inner bay. Some very small areas of *Mytilus*-dominated community occur immediately north of the *Zostera* beds between Derrymore Island and Blennerville. *Sabellaria*-dominated community complex occurs in a linear fashion immediately south of Derrymore Island along the shoreline. While the coarser gravel and sand material will likely fall out within 1km, the silt material will likely stay in suspension and could be transported far from the site. Due to the intervening distance, the background turbid nature of the inner bay and the proposed dredge methodology, it is considered unlikely that a significant impact on the keystone communities will occur.

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Dumping Operation

A paper by Fredette and French (2004) using 35 years of research examined the environmental impacts of dredged material disposal along the eastern U.S. coast report that direct effects of disposal have been detected within only a few hundred metres of the disposal site. Farther from the disposal point, where only thin (<50cm) layers of sediment are deposited, benthic organisms can burrow through overburden. Near the disposal site recolonisation usually proceeds rapidly.

Previous sediment transport simulations have indicated that inner Tralee Bay is outside of the zone of influence of the deposited or suspended dumpsite material. Therefore, the zone of influence of the dumpsite material is in Tralee Bay west of Fenit Harbour. The qualifying features (habitat types) within the zone of influence include:

- Large shallow bays and inlets
- Reefs

The following littoral communities occur within the zone of influence of the dumpsite material within the large shallow bay and inlet habitat type:

- Sand with *Nephtys cirrosa* community complex
- Mixed sediment with crustaceans, bivalves and polychaetes community complex
- *Ostrea edulis*-dominated community
- Subtidal reef community complex

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- ***Zostera*-dominated community complex**

Of these community types the keystone *Zostera*-dominated community complex occurs on the shore northeast of Castlegregory. The STM has indicated that inner Tralee Bay where keystone and non-keystone communities occur is outside of the zone of influence of the deposited or suspended dumpsite material.

The STM for deposition over the 50-day period shows the deposition of sand in the vicinity of the dumpsite with little volumes entering the Natura 2000 site. The STM for deposition over the 50-day period shows the deposition of silt in the vicinity of the dumpsite and within lesser volumes in the Natura 2000. Most of the deposition occurs on the Mixed sediment with crustaceans, bivalves and polychaetes community complex with minimal deposition of up to 0.5kg.m^2 on the edges of the *Zostera*-dominated community complex and *Ostrea edulis*-dominated community to the west of the bay. It is considered that there is unlikely to be a significant impact on the large shallow bays and inlets, a qualifying feature of the Natura 2000 site, as a result of the dumping of dredge material during the eight year period of the dumping at sea licence.

The specific conservation objectives for reef habitat, Targets 1 and 2, aim to maintain the permanent area and distribution of this habitat and does not refer to long or short term disturbance of the biology of the site. The remaining targets refer to *Mytilus*- and *Sabellaria*-dominated communities, which lie outside of the zone of influence of the dumpsite material. It is considered that the deposition of silt on reef is a temporary impact and that the movement of tides and currents will eventually transport the sediment out of the bay in a northwest direction. It is considered that there is unlikely to be a significant permanent impact on the reefs, a qualifying feature of the Natura 2000 site, as a result of the dumping of dredge material during the course of the 8 year period of the dumping at sea licence.

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7.1.2.2 Magharee Islands SAC

While there are generic conservation objectives for the Magharee Islands SAC, there are no specific conservation objective series, thus the target attributes set out in the developed series for Tralee Bay and Magharees Peninsula, West to Cloghane SAC is referred to here.

The conservation objectives for reef habitat, Targets 1 and 2 aim to maintain the permanent area and distribution of this habitat and does not refer to long or short term disturbance of the biology of the site. The remaining targets refer to *Mytilus*- and *Sabellaria*-dominated communities, which lie outside of the zone of influence of the dumpsite material. It is considered that the deposition of silt on reef is a temporary impact and that the movement of tides and currents will eventually transport the sediment out of the bay in a northwest direction. It is considered that there is unlikely to be a significant permanent impact on the reefs, a qualifying feature of the Natura 2000 site, as a result of the dumping of dredge material during the course of the 8 year period of the dumping at sea licence.

Based on past models simulated for dredge operations, it is expected that there will be a localised increase in turbidity due to disturbance of silt/sand on the bed as it is removed and there will also be overspill from the hopper as it is filled. This will generate a localised dredge plume in the immediate vicinity of the dredge vessel. It thought that this will be a temporary impact as once each stage of dredging is completed some of the material will settle out and be deposited on the seabed while some will remain in suspension within the water column.

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Results from model simulations over a 50 day period showed that silt deposition should migrate southwards, then westward and eventually northwards out of Tralee Bay and westward to open sea.

7.1.3 Water Quality and Resource

Potential water quality effects arising as a result of the proposal include increases in the volume of sediment suspended in the water column, resulting in increased turbidity, and an increased risk of release of contaminants into the marine environment from either benthic sediments or anthropogenic sources.

At the dredging site the plough dredging activity will create the most suspended sediment. The typical re-suspension of sediment from a trailer suction ranges from 3 to 15 kg/m^3, while a back hoe dredger with an environmental bucket ranges from 5-10 kg/m^3 and without environmental bucket 12-25 kg/m^3 according to Kirby and Land (1991). A conservative estimate in previous studies assumes 3% (of 1800kg/m^3) is lost to the water column with approximately 50% of that being re-suspended (the heavier granular particles sink to the bottom) which equates to 1.5% of 1800kg/m^3 or 27kg/m^3.

The enclosed location of the Marina, the low ebb and flood currents and protection from wave action will lessen any water quality impacts which arise. The previous modelling of the dredging location showed that the maximum tidal currents were quite low (below 0.05m/s) at max ebb. Similarly, wave disturbance within the harbour where dredging is proposed is negligible with significant wave heights below 0.1 of a meter. Based on past models simulated, during the dredging operations there will be a localised increase in turbidity as there will be disturbance of silt/sand on the bed as it is removed. There will also be spill over from the hopper as it is filled.

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With regards to suspended sediment, it is noted that only a small portion, approximately 3%, of the material dredged will be lost to the water column from the dredger head with a similar small portion of material likely to be lost from the hopper. This in effect will generate a localised dredge plume in the immediate vicinity of the dredge vessel. This is a temporary impact as once each stage of dredging is completed some of the material will settle out and be deposited on the sea bed and some will remain in suspension within the water column.

The suspended sediment as a result of the dredging activity moves east out of the harbour but at very low quantities with sediment suspensions rates ranging from 0.006kg/m^3 at high water to 0.03kg/m^3 at mid flood. The maximum concentrations of suspended sediment were predicted to be 50mg/l after 50 days.

Deposition rate was less than 0.2 kg/m^2 with highs of 3kg/m^2 around the max concentration locations. It should be noted that for the proposed dredging campaign, the greatest amount of dredging will be a rate of 3,000m^3 per day albeit over a longer period than previously modelled. It is considered reasonable to assume that at the dumpsite approximately 2mm per m^2 of coarse sediments is likely to be deposited with the remaining finer silt fractions migrating offshore.

Therefore during the dumping operations it is expected that there will be a localised increase in turbidity as there will be disturbance of silt/sand on the bed as dredge spoil is deposited on the bed from the dredger. In addition there will be material in suspension in the water column while it settles out of suspension and deposits on the sea bed. Some of the material will remain in

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suspension and will move with currents and will eventually settle out within the coastal system. This in effect will generate a localised dredge plume in the immediate vicinity of the dredge vessel while it opens the bottom doors from the hopper and while the material drops to the sea bed. There will be a temporary impact on turbidity levels in the water column but this will reduce over time as the material settles out or disperses in the coastal system.

The general tendency over the 50-day simulation period is for the silt deposition to migrate southwards, then westward and eventually northwards out of Tralee Bay and westward to open sea. Given the characteristics of marine sediments in the area, and the natural tidal movements to which re-suspended sediment will be subjected to, it is expected that disturbed material will settle out quickly and evenly within the disposal zone, as indicated by the sediment transport modelling carried out. While significant water quality impacts as a result of suspended sediment are not envisaged, on the basis of the precautionary principle, some mitigation measures are recommended in Section 7.3 below.

With regards to the potential release of contaminants from sediments into the surrounding environment, it is noted that the material to be dredged has been determined, following sampling, to be largely clean although marginally contaminated with arsenic and nickel. Arsenic values were below the lower guidance level of 9 mg kg^{-1} at stations 9 and 12 while all others exceeded the lower guidance level, ranging from 9.8 mg kg^{-1} to 18.6 mg $kg^{-}1$. None of the sampling stations exceeded the upper Irish action level for arsenic. Arsenic can occur naturally within bedrock; therefore, sediments within the dredge site are not considered to pose any risk of significant adverse effects to marine water quality (Aquafact, 2018). Nickel was below the lower guidance level at four stations (4, 9, 10 and 12) while nickel levels exceeded the lower Irish action level of 21 mg kg^{-1} for the remaining eight sampling stations for sediment quality, namely F1, F2, F3, F5, F6, F7, F8 and F11. None of the sampling stations exceeded the upper Irish action level for nickel of 60 mg kg^{-1} (Aquafact, 2018). On the basis of the precautionary principle, some mitigation measures are recommended in Section 7.3 below.

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With regard to the use of fuels/oils/lubricants associated with the proposal, the hopper suction dredger is the only source of fuel and oil. In the event that the dredger needs refuelling it will be undertaken by a specialised fuel delivery truck, which regularly visits the harbour to fuel the commercial ships that frequent the port along with local vessels. The harbour has a protocol for how fuelling is undertaken and best practice measures are in place to avoid fuel spills. A spill kit is available within the harbour and harbour staff are trained in dealing with fuel and fuel spills should they occur. In addition the dredger has its own protocols and procedures to manage fuelling operations in ports. The risk of spillage is low and the process is manageable within the context of the proposed works. Standard best practice guidelines will be adhered to such that the risk posed by such substances to the marine environment is minimised, therefore, it is not expected that a fuel/oil spill will occur. Thus, the risk of significant pollution of marine waters with fuel or oils from the project is considered low. In the event of an accidental hydrocarbon spill and on the basis of the precautionary principle, the need for appropriate fuel management measures to be in place has been specified in Section 7.3.

The works will form part of on-going maintenance dredging which has been previously carried out at the location. While the proposal will result in disturbance and re-suspension of sediment within the

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dredge and dumpsite these impacts will be localised and temporary, therefore, no significant adverse water quality effects are envisaged. Bearing the above factors in mind, it is therefore objectively concluded that significant water quality impacts to any Natura 2000 site considered to be within the zone of potential impact influence are not expected to occur as a result of the proposal described in Section 4.5 above.

7.1.4 Disturbance and/or displacement of species

7.1.4.1 Tralee Bay and Magharees Peninsula, West to Cloghane SAC

Otters are highly mobile species, typically with large habitat ranges and distributions. Otters are likely to utilise watercourses and coastline within the vicinity of Fenit Harbour for foraging, resting or commuting; therefore, may potentially be subject to disturbance/displacement impacts arising from the release of fugitive noise emissions and/or increased human activity, or indirectly via water quality impacts.

In the COS 002070 the otter habitat has been mapped under the following categories:

- 10m Freshwater Terrestrial (areas include freshwater habitat such as rivers, canal, and Lough Gill and associated drains)
- 80m Freshwater Aquatic (area limited to the shoreline of Lough Gill)
- 10m Marine Terrestrial (areas limited to the immediate vicinity of the high water mark)
- 80m Marine Aquatic (this area extends from the high water onto the intertidal zone)
- Freshwater Aquatic Linear Habitat (includes rivers, streams, land drains (e.g. feeding Lough Gill)
- Otter Commuting 250m (this area extends into the sub-littoral zone beyond the Marine Aquatic area)

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The aquatic, terrestrial and intertidal otter habitat areas will not be affected by the project because they are outside of the zone of influence of the dumpsite. According to the STM the remaining habitat, the 250m Otter Commuting belt, is primarily outside of the zone of influence of the deposition of silt and sand with the exception of some very low, relatively isolated volumes of up to 0.05kg/m^2, or 0.03mm, at Samphire Island and east of Fenit Harbour. Therefore, targets for each of the attributes such as distribution, extent of terrestrial, freshwater and marine habitat and barriers to connectivity will not be significantly affected by the project and it is considered that the proposal will not result in any loss or modification of aquatic habitats which could impact on species distribution or habitat accessibility.

The proposal is not expected to result in any significant impairment of water quality which could significantly impact on the prey resource of otter. Fish biomass available may be potentially affected by a local reduction in water quality, particularly in the vicinity of the harbour, which could result in a temporary impact to foraging otter; however otters also eat crab, sea urchins and molluscs so their food source in general is unlikely to be significantly affected. Any water quality impacts arising from the proposal will be localised and will be temporary in nature.

The works will result in the release of some limited fugitive noise emissions/increased human activity for the duration of each dredge event. As otters may occasionally occur in the vicinity of the site they may, therefore, be subject to some degree of disturbance/displacement impacts as a result

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of this; however, given existing vessel operations in the area i.e. fishing vessels, lifeboat, etc., otters in the area are expected to be habituated to at least some degree of activity within the vicinity of the harbour. While the proposal may result in avoidance of the area by otters this is expected to occur only during such times as when dredging works are taking place. Bearing the above factors in mind, it is considered highly unlikely that the proposal has the potential to result in significant disturbance/displacement impacts to otter given the nature of the works, the minor scale and temporary nature of the proposal. However, in order to minimise any potential disturbance/displacement impacts in so much as reasonably possible, and on the basis of the precautionary principle, some mitigation measures are recommended in Section 7.3 below.

7.1.4.2 Tralee Bay Complex SPA

There is a risk that scaup could be temporarily displaced from feeding areas during the dredging operation and so the species has been included for further consideration in the NIS on the basis of the precautionary principle. Scaup, often referred to as the greater scaup, is a common winter visitor to Tralee Bay and to Lough Gill and Sandy Bay on the Dingle Peninsula. There has been an increase from 58 in the 1984-87 Winter Wetlands Survey to 800 recorded in November 1996, and the Tralee Bay flock as a whole is now the third largest in the UK and Ireland. There has been a significant increase in Irish scaup numbers over the period between 1994/95 and 2012/13 with shorter-term decline for the period 2008/09 to 0212/13 according to I-WeBS. I-WeBS trends for the Irish scaup population measured between 1994/95 to 2012/13 showed overall declines of at least 2%.

There is evidence from the Firth of Forth in Scotland that numbers fluctuate regularly with a crash here in the mid-1970's. These changes are widely believed to be linked to scaup's sensitivity to variations in food supply and their ability to detect and exploit temporary food sources. Scaup in the Firth of Forth were apparently attracted to a sewage outfall pipe, which held grain from a local distillery and probably high densities of marine annelids as a result of eutrophication. When sewage treatment improved scaup numbers fell dramatically. Evidence from the Solway Firth, Scotland, suggests that scaup exploited cockles rejected by fishermen and that this has influenced their substantially increased numbers and distribution here (Quinn et al., 1996)

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Dredging has been taking place on a regular basis since the capital dredge of 1996 and Tralee Bay now holds the third largest flock in the UK despite regular dredging operations. As scaup is subject to fluctuating densities and numbers it is not considered that the proposed dredging and dumpsite operations will significantly affect scaup numbers in Tralee Bay Complex SPA.

7.1.4.3 Magharee Islands SPA

The project may take place up to the month of May in the breeding season. Any water quality impacts will be confined to the sub-littoral marine environment. Were the dredging operation to take place in April/May, there is potential for increased turbidity arising from an increase in suspended solids associated with dispersal of dumpsite material in the water column to affect feeding success of tern. Tern feed on sand eels and sprat on sandy substrate and a temporary increase in turbidity may decrease their feeding ability during the breeding season. This may result in a local displacement of tern to areas not, or less, affected by increased turbidity.

In 2013, the common tern colony on Illauntannig was abandoned but breeding did take place on other islands though numbers were unknown.

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The arctic tern breeds on the Blasket and Magharee Islands on the Dingle Peninsula. In 2007, 193-170 pairs were recorded on six of the islands. In 2010, at least 70 pairs bred on Illauntannig and in 2011 at least 140 pairs bred on the Magharees.

There is one colony of little tern in Kerry on the Magharee Islands. In 2008, 11 pairs were recorded breeding, and in 2010, 12-14 pairs were recorded breeding on Illauntannig. In 2011, 17-19 pairs nested at two adjacent colonies on the Magharees, while in 2013, 20 pairs, at one colony, were recorded nesting. It appears that dredging of the harbour in 2010 (March to May), 2011 (March) and 2016 (April) didn't have a significant effect on little tern breeding numbers.

Therefore, as little tern breeding success didn't appear to be affected by past maintenance dredging operations (no accurate numbers for all the islands available for common or arctic tern) it is unlikely that tern breeding populations are significantly affected by maintenance dredging operations.

7.1.4.4 Lower River Shannon SAC

A review of the IWDGs online database of cetacean sightings (2000-2017), carried out as part of a Marine Mammal Risk Assessment in support of this proposal, determined that bottle-nosed dolphins were the most frequently recorded species in Tralee Bay over this time period with a total of 19 sightings (constituting 58% of total sightings) (O'Brien & Berrow, 2017). Given the close proximity of Tralee Bay to the Shannon Estuary SAC, it is likely that these sightings are of the Shannon population who has been previously recorded at the site on a number of occasions (Levesque et al. 2016 as cited in O'Brien & Berrow, 2017). Bottlenose dolphins from the Shannon Estuary have been found to frequent Tralee Bay during the summer months but were recorded mainly around the Magharees and Brandon Bay areas, up to 15km from Fenit Harbour. Marine mammals are generally not present within the harbour and therefore will not be impacted upon. However, bottlenose dolphins have been recorded close to the dumpsite during previous operations (O'Brien & Berrow, 2017).

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The most likely impact to bottle-nosed dolphins potentially occurring in the general area would be potential disturbance/displacement due to increased noise levels associated with the presence of the dredge vessel. A trailing suction hopper dredger (TSHD) will be used for the majority of works at Fenit, Co. Kerry, while a grab dredger may be used on hard to reach areas. TSHD's have previously been used during excavation works at Fenit. Dredge operations emit continuous low frequency sound into the marine environment, and because of this sound signature, these types of work are generally considered of lesser concern for impacts on marine mammals (O'Brien & Berrow, 2017). The dredger itself is considered to be the greatest potential source of noise and as such the increase in noise will be greatest within the immediate vicinity of the dredger, decreasing with distance.

Limited data exists on the effects of dredging, but is unlikely to cause physiological damage to marine mammal auditory systems, but more likely leading to masking, behavioural disturbances and displacement. Indirect impacts are listed as changes to their physical environment, to their prey and toxins and pollutants from dredge spoil. Effects of turbidity are often localised with minimal direct impact on marine mammals (O'Brien & Berrow, 2017). Dredging is due to take place outside of the summer months when highest numbers of dolphins have been recorded in the area. Sound exposure levels from such operations are thought to be well below that expected to cause injury to a marine mammal. However, noise generated by dredging, from the physical presence of the dredger, and possibly from the increased water turbidity in the area of operations, has the potential to cause low level disturbance such as masking or behavioural impacts such as displacement. The presence of an

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operational dredger at the site will lead to a small local increase in noise, given that Fenit is already used for commercial shipping, houses a domestic fishing fleet, as well as the presence of leisure, amenity and lifesaving vessels (O'Brien & Berrow, 2017).

The IWDG were commissioned by Malachy Walsh and Partners to provide a Marine Mammal Observer during the most recent dredging operation at Fenit Harbour which took place in 2016. Dredging took place over an eight day period (21st to 29th April). A marine mammal monitoring report was produced by Dwyer (2016) which outlined marine mammal observations over the duration of the dredging works. Marine mammals were recorded on 6 out of the 8 days on which dredging took place (O'Dwyer, 2016). Bottlenose dolphins were the most abundant species recorded with a total of 6 sightings (66%) comprising of 25 individuals (25 adults) (O'Dwyer, 2016). Group size ranged from 4-11 individuals (O'Brien & Berrow, 2017). Bottlenose dolphins were present within the mitigation zone during the pre-watch on four occasions. Bottle-nosed dolphins were observed three times during the pre-watch monitoring. In all cases the animals did not seem to be affected by dredging works as they were sighted in the area on multiple days (O'Dwyer, 2016). It was determined that the 2016 dredging works did not result in significant impacts to marine mammals in the area and that the objectives of the NPWS guidelines 'Guidance to minimise the risk to marine mammals from man-made sound sources in Irish waters' (2014) were met (O'Dwyer, 2016).

With regards to these potential impacts, the proposed works are expected to be completed within 4-6 weeks, keeping potential disturbance to a minimum. Additionally, Fenit is a busy shipping and fishing port so the presence an additional vessel for a 4-6 week period should not have a significant impact (O'Brien & Berrow, 2017). The risk of injury or mortality of a marine mammal over the course of the works is considered extremely low as the sighting rates for the area are low. If marine mammals occur with the area, they are already exposed to vessel noise on a daily basis and would be aware of their presence. The dredge vessel is relatively slow moving and thus ensuring any animals in the area would have sufficient time to avoid any collisions and thus injury or mortality (O'Brien & Berrow, 2017). It is expected that animals displaced from the vicinity of the dredging and dump site would return after the works have stopped. Displacement if evident should be short lived based on the duration of the proposed works (4-6 weeks in initial year, and 3-4 weeks annually thereafter for remaining 7 years) (O'Brien & Berrow, 2017). Bearing the above factors in mind, it is considered that significant impacts on bottle-nosed dolphins are not likely to occur; however, in order to minimise any potential disturbance/displacement impacts in so much as reasonably possible, and on the basis of the precautionary principle, some mitigation measures are recommended in Section 7.3 below.

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7.1.5 Habitat and Species Fragmentation

7.1.5.1 Tralee Bay and Magharees Peninsula, West to Cloghane SAC

There will be short-term loss of habitat and temporary alteration within this site but it is not expected to be significant. Therefore, any temporary or short-term habitat or species fragmentation impacts are not expected to be significant.

7.1.5.2 Tralee Bay Complex SPA

It is not expected that the proposed dredging and dumpsite operations will result in significant disturbance/displacement of scaup within the Tralee Bay Complex SPA. No significant habitat or species fragmentation impacts to scaup within the SPA are predicted.

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7.1.5.3 Magharee Islands SAC

There will be no loss of reef habitat within the Magharee Islands SAC and no significant alteration of reef habitat is expected to arise as a result of the proposed maintenance dredging and dumping campaign. No significant habitat fragmentation impacts to reef within the SAC are predicted.

7.1.5.4 Magharee Islands SPA

Significant disturbance or displacement of common, little or Arctic tern is not predicted as a result of the proposal. Significant loss or alteration of habitats on which any of these qualifying interest species depend is not predicted to arise. No significant habitat or species fragmentation impacts to common, little or Arctic tern within the SPA are predicted.

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7.2 ASSESSMENT OF POTENTIALLY SIGNIFICANT CUMULATIVE EFFECTS

7.2.1 Harbour Operations

Fenit harbour forms the main access point to the sea for various water based activities, including commercial shipping, fishing, sailing, casual boating and lifesaving. Due to the temporary nature of the dredging works and effects, it is not expected that the project will have significant effects in-combination with daily operations at the harbour.

7.2.2 Fenit Harbour and Marina Expansion Project

Planning permission for Fenit Harbour and Marina Expansion project was granted by KCC in 2012. The total proposed development will result in a 7ha expansion of the existing harbour and includes moving and extending the existing rubble-mound breakwater eastwards of its current location and expanding the existing marina into the extended harbour space and will require capital and ongoing maintenance dredging to accommodate the new footprint. There is potential for significant water quality affects in-combination with the permitted construction and operation of the harbour and marina extension should it proceed. However, the Fenit Harbour and Marina Expansion project is not a strategic project for harbour development at Fenit, nor is it part of the strategic development plan for the harbour for the coming years. Therefore, it is highly unlikely that it will be developed within the next number of years. Furthermore, in the unlikely event it should be developed within the next number of years, it will be subject to a separate FL and DaS licence application procedure (Eamon Scanlon[10], pers. comm.). Therefore, the Fenit Harbour and Marina Expansion project is not considered further in the cumulative impact assessment.

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7.2.3 Other Current/Outstanding Grants of PLanning permission

Current and outstanding grants of planning permission in relation to development at or in the immediate vicinity of Fenit Harbour include the potential development of new diving boards at Fenit bathing slip. Due to the nature and scale of this development and the temporary nature of the dredging works interaction between this project and the proposal which could have the potential to result in significant cumulative impacts is not predicted. Any current or future development proposals located within the vicinity of Fenit Harbour will be subject to separate environmental assessment as part of the planning process.

7.2.4 Oyster Fishing

Oysters are harvested in the months of November until the end of January/early February. Oyster fishermen harvest oysters using a dredge plough over a relatively large portion of the inner bay. The dredge is towed along the seabed by a boat and rakes up the oysters into a net causing sediment to become suspended in the water column resulting in sediment plumes. Fishermen must seek an oyster dredge licence from IFI. Given the naturally turbid nature of inner Tralee Bay, the temporary nature of the harbour dredging work, the localised and temporary nature of the oyster dredging and the fact that the project will not coincide with the oyster dredging operation, it is considered that the project will not have a significant in-combination effect with oyster fishing.

7.2.5 Point and Diffuse Pollution

Tralee Bay is subject to various point and diffuse sources of pollution arising from ongoing industrial, wastewater, agricultural and urban activities. Many of the point sources of pollution are controlled,

[10] Senior Executive Engineer, Capital Infrastructure Unit, Kerry County Council

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monitoring and/or treated through various licences (e.g. discharge licence, IEL licence). Diffuse pollution is generally less controlled and unlicensed. However, should significant temporary water quality impacts arise as a result of the proposed dredging and dumping activities, on the basis of the precautionary principle there is potential for significant temporary cumulative water quality impacts in combination to the existing various point and diffuse sources of pollution.

7.3 MITIGATION

7.3.1 Timing of Dredging

Dredging will not be undertaken during the:

- Oyster spatting (settlement and recruitment of larvae) period between June and July[11]
- Bathing water (June 1st to end of August) and monitoring season (the two weeks preceding bathing season). It is worth noting that the implementation of the new Bathing Water Quality Regulations 2008 (SI No. 79 of 2008) may alter the bathing and monitoring times and dredging should not be carried out during the new calendar period.

7.3.2 Water Quality Management

Maintenance dredging has potential to result in a temporary impact upon water quality in Tralee Bay. A Water Quality Management Programme (WQMP) will be prepared and implemented to incorporate the mitigation measures outlined in this section.

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It is proposed to undertake a programme of water quality monitoring taken at various depths, states of the tide and weather conditions prior to the commencement of and during dredging operations for the proposed 2020 - 2027 dredging campaign. Water quality monitoring prior to the dredge event will provide a baseline against which to apply the shellfish water and other environmental quality standards for suspended solids and other parameters e.g. dissolved oxygen, temperature etc. and will be incorporated in to the Water Quality Management Plan.

A WQMP is required to provide water quality measurements:

- Prior to commencement of dredging (baseline)
- During dredging
- Post dredging

The following parameters should form part of the programme:

- Turbidity
- Dissolved oxygen
- Total suspended solids

Weather conditions and vessel traffic should also form part of the WQMP.

7.3.2.1 Turbidity Monitoring Plan

The Turbidity Monitoring Plan will comprise:

[11] Tralee Oyster Fishery Society, in consultation

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- Fixed station *in situ* water quality monitoring
- Boat-based *in situ* water quality monitoring
- Visual water quality monitoring
- Laboratory water quality monitoring

A permissible level for turbidity and/or suspended solids should be agreed with the relevant authority, above which dredging **must cease** until levels drop below the permissible level.

Fixed station *in situ* water quality monitoring

In order to monitor the plume and the effects of turbidity a series of alarmed monitors will be deployed during the dredging event and these will highlight any significant increase in the plume and any directional movement. Turbidity sensors should be used to determine turbidity during the dredging operation using *in-situ* readings. Continuous, real-time, *in situ* water quality data should be collected through the use of sensors deployed on a buoy near the construction site. High-frequency data is averaged at regular intervals and uploaded via telemetry to a website. Fixed locations for turbidity sensors should be identified and agreed with the relevant authority.

Boat-based *in situ* water quality monitoring

Daily mobile manual monitoring will also take place by boat-based water quality monitoring, the frequency of which should be approved by the relevant authority.

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Visual water quality monitoring

Visual monitoring should also be carried out from the shore and suction hopper by the Contractor and Resident Engineer.

Laboratory water quality monitoring

Samples should be collected at agreed regular intervals to test for suspended solids.

The Plan should be approved by the relevant authority.

7.3.2.2 Additional Water Quality Measures

The following measures are also recommended:

- Consult with relevant stakeholders prior to dredging to inform them
- Prepare contracts which meet the requirements of all licenses, consents and agreements applicable
- Fully brief the contractor beforehand on the sensitivities of the site and any monitoring that will be taking place
- Ensure dredging is undertaken in a manner that reduces the volumes of sediment that escape into the water column and become suspended

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7.3.2.3 Fuel Management

It is recommended that appropriate fuel management measures are put in place are put in place and agreed with the Harbour Master prior to the works commencing to ensure that no significant negative impacts occur to water quality.

7.3.3 Control of Overflow

It will not be permitted to allow any water to escape or overflow from the suction hopper dredger; therefore overflow of the dredge material into the water must be strictly controlled to prevent any occurrence. Once the dredger is full it must steam out to the dumpsite and dump the material at the appropriate location.

7.3.4 Marine Mammals

To minimise the risk of permanent or temporary injury and disturbance to marine mammals in the vicinity of dredging operations, the NPWS 'Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters (NPWS, 2014) recommended that stated mitigation procedures for dredging are followed and monitored by a suitable qualified Marine Mammal Observer (MMO).

- A qualified and experienced marine mammal observer (MMO) shall be appointed to monitor for marine mammals and to log all relevant events using standardised data forms.

- A dedicated Marine Mammal Observer will conduct a 30 minute watch for marine mammals within 500m of the dredging vessel prior to start up. If a seal, cetacean, basking shark, turtle or otter is sighted within 100m of the vessel, start-up must be delayed until the animals is observed to move outside the mitigation zone or the 30 minutes has passed without the animal being sighted within the mitigation zone.

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7.3.4.1 Pre-start monitoring

- Dredging activities shall only commence in daylight hours where effective visual monitoring, as performed and determined by the MMO, has been achieved. Where effective visual monitoring, as determined by the MMO, is not possible the sound-producing activities shall be postponed until effective visual monitoring is possible.

- An agreed and clear on-site communication signal must be used between the MMO and the Works Superintendent as to whether the relevant activity may or may not proceed, or resume following a break (see below). It shall only proceed on positive confirmation with the MMO.

- In waters up to 200m deep, the MMO shall conduct pre-start-up constant effort monitoring at least 30 minutes before the sound-producing activity is due to commence. Sound-producing activity shall not commence until at least 30 minutes have elapsed with no marine mammals detected within the Monitored Zone by the MMO.

- This prescribed Pre-Start Monitoring shall subsequently be followed immediately by normal dredging operations. The delay between the end of Pre-Start Monitoring and the necessary full dredging output must be minimised.

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7.3.4.2 Dredging operations

- Once normal dredging operations commence, there is no requirement to halt or discontinue the activity at night-time, nor if weather conditions or visibility deteriorate nor if marine mammals occur within a 500m radial distance of the sound source, i.e., within the Monitored Zone.

7.3.4.3 Breaks in sound output

- If there is a break in dredging sound output for a period greater than 30 minutes (e.g., due to equipment failure, shut-down or location change) then all Pre-Start Monitoring must be undertaken in accordance with the above conditions prior to the recommencement of dredging activity.

7.3.4.4 Dumping at sea

- An MMO will ensure that no marine mammals are not within the dumpsite prior to dumping and will ensure an exclusion zone of 500m is in place.

7.3.4.5 Reporting

- Full reporting on MMO operations and mitigation undertaken must be provided to the Regulatory Authority

7.4 RESIDUAL IMPACTS

Provided that the recommended mitigation measures in Section 7.3 above are implemented in full, it is not expected that significant impacts will result to the qualifying features identified for appraisal in this NIS and thus it is not expected that the proposal will have an adverse impact on Natura 2000 sites.

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It should be noted that this type of dredging campaign has been undertaken on many occasions over the last 20 years and on each occasion control measures and adequate supervision have ensured that no negative effects on water quality were experienced. In addition the dredge material is relatively clean and reflects the general quality of the material that naturally occurs within the inner bay.

Based on good dredge methods, tight controls and monitoring it is possible to effectively manage the dredge campaign. What is important to state is that turbidity within the water body is influenced by the natural daily tidal cycle and also by weather and storm events. The inner reaches of Tralee are shallow and have significant areas of mud, sand and silt. This material is regularly agitated by the tidal cycle and so there is naturally a level of turbidity in the water column due to coastal processes.

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7.5 CONCLUSION

In conclusion, provided the recommended mitigation measures are implemented in full, it is not expected that the proposal to carry out maintenance dredging at Fenit Harbour and disposal of the dredge material to a dumpsite in Tralee Bay will result in an adverse residual impact on the Natura 2000 sites considered in this NIS, namely:

- Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)
- Akeragh, Banna and Barrow Harbour SAC (000332)
- Tralee Bay Complex SPA (004188)
- Magharee Islands SAC (002261)
- Magharee Islands SPA (004125)
- Lower River Shannon SAC (002165)

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Appendix 1

Stages of Appropriate Assessment

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Stage 1 - Screening

This is the first stage of the Appropriate Assessment process and that undertaken to determine the likelihood of significant impacts as a result of a proposed project or plan. It determines need for a full Appropriate Assessment.

If it can be concluded that no significant impacts to Natura 2000 sites are likely then the assessment can stop here. If not, it must proceed to Stage 2 for further more detailed assessment.

Stage 2 - Natura Impact Statement (NIS)

The second stage of the Appropriate Assessment process assesses the impact of the proposal (either alone or in combination with other projects or plans) on the integrity of the Natura 2000 site with respect to the conservation objectives of the site and its ecological structure and function. This is a much more detailed assessment that Stage 1. A Natura Impact Statement containing a professional scientific examination of the proposal is required and includes any mitigation measure to avoid, reduce or offset negative impacts.

If the outcome of Stage 2 is negative i.e. adverse impacts to the sites cannot be scientifically ruled out, despite mitigation, the plan or project should proceed to Stage 3 or be abandoned.

Stage 3 - Assessment of alternative solutions

A detailed assessment must be undertaken to determine whether alternative ways of achieving the objective of the project/plan exists.

Where no alternatives exist the project/plan must proceed to Stage 4.

Stage 4 - Assessment where no alternative solutions exist and where adverse impacts remain

The final stage is the main derogation process examining whether there are imperative reasons of overriding public interest (IROPI) for allowing a plan or project to adversely affect a Natura 2000 site where no less damaging solution exists.

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Appendix 2

Screening for Appropriate Assessment

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Malachy Walsh and Partners
Engineering and Environmental Consultants

Screening for Appropriate Assessment

Fenit Harbour Maintenance Dredging and Dumping at Sea (2020 – 2027)



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1 SUMMARY OF FINDINGS

1.1 SCREENING FOR APPROPRIATE ASSESSMENT

Project Title	Fenit Harbour Maintenance Dredging and Dumping at Sea (2020 – 2027)
Project Proponent	Kerry County Council
Project Location	Fenit Harbour, Fenit, Co. Kerry
Conclusion	It has been objectively concluded during the screening process that significant impacts on the following Natura 2000 sites, as a result of the proposal, are not considered likely: • Slieve Mish Mountains (002185) • Mount Brandon SAC (000375) • Ballyseedy Wood SAC (002112) • Castlemaine Harbour SAC (000343) • Castlemaine Harbour SPA (004029) • Dingle Peninsula SPA (004153) • Kerry Head SPA (004189) • Kerry Head Shoal SAC (002263) It cannot be objectively concluded, at this stage, that significant impacts to the following sites will not occur: • Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070) • Akeragh, Banna and Barrow Harbour SAC (000332) • Tralee Bay Complex SPA (004188) • Magharee Islands SAC (002261) • Magharee Islands SPA (004125) • Lower River Shannon SAC (002165) Therefore, it is necessary to proceed to Appropriate Assessment and as such a Natura Impact Statement is required for these sites.

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2 INTRODUCTION

2.1 PURPOSE OF ASSESSMENT

This Screening for Appropriate Assessment has been undertaken to determine the potential for significant impacts of a proposal to carry out proposed maintenance dredging at Fenit Harbour and disposal of dredge material to a dumpsite in Tralee Bay, County Kerry, on nearby sites with European conservation designations (i.e. Natura 2000 Sites). The proposal relates to annual dredging over an eight year dredge campaign.

A foreshore licence (FL) application for consent under the Foreshore Act for dredging at the harbour and dumping operations at the dumpsite for a single event in 2020 will be sought from the Department of Housing, Planning and Local Government (DHPLG). A Dumping at Sea (DaS) permit application to dispose of the material at the proposed dumpsite will be sought from the Environmental Protection Agency (EPA) under the Foreshore and Dumping at Sea (Amendment) Act 2009 for an eight year period (2020 – 2027). This Screening for Appropriate Assessment will accompany both these applications to allow a full assessment of the implications of the proposal on Natura 2000 sites. Any FL granted will be subject to conditions and the Marine Planning – Foreshore Unit of the DHPLG will be responsible for management and enforcement of such conditions. Similarly, a DaS licence will be subject to conditions imposed by the EPA who will be responsible for management and enforcement of such conditions.

This Screening for Appropriate Assessment has been undertaken by Malachy Walsh and Partners ecologists while additional specialist marine surveys were undertaken by AquaFact International Services, Hydrographic Surveys Ltd, and the Irish Whale and Dolphin Group Consulting (IWDG).

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2.2 LEGISLATIVE CONTEXT

The Habitats Directive (92/43/EEC) seeks to conserve natural habitats and of wild fauna and flora by the designation of Special Areas of Conservation (SACs) and the Birds Directive (79/409/EEC) seeks to protect birds of special importance by the designation of Special Protected Areas (SPAs). It is the responsibility of each member state to designate SPAs and SACs, both of which will form part of Natura 2000, a network of protected sites throughout the European Community. The Habitats Directive has been transposed into Irish law and the relevant Regulations are the European Communities (Birds and Natural Habitats) Regulations 2011. The requirement for Appropriate Assessment of the implications of plans and projects on the Natura 2000 network of sites comes from the Habitats Directive (Article 6(3)). Under the European Communities (Birds and Natural Habitats) Regulations 2011 a public authority is required to carry out a Screening for Appropriate Assessment of a proposed development prior to issuing consent. The information presented in this Screening for Appropriate Assessment will be used by the public authority to complete their screening exercise. Further information is available at:

http://ec.europa.eu/environment/nature/legislation/habitatsdirective/

http://www.npws.ie/planning/appropriateassessment/

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2.3 STAGES OF APPROPRIATE ASSESSMENT

The Appropriate Assessment process is a four-stage process with issues and tests at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required. The stages are set out in Appendix 1.

3 ASSESSMENT METHODOLOGY

3.1 APPROPRIATE ASSESSMENT GUIDANCE

This screening for Appropriate Assessment, or Stage 1, has been undertaken in accordance with the European Commission Methodological Guidance on the provision of Article 6(3) and 6(4) of the 'Habitats' Directive 92/43/EEC (EC, 2001) and the European Commission Guidance 'Managing Natura 2000 sites' (EC, 2000) and guidance prepared by the NPWS (DoEHLG, 2009).

3.2 DESK STUDY

In order to complete the screening for Appropriate Assessment certain information on the existing environment is required. A desk study was carried out to collate available information on the site's natural environment. This comprised a review of the following publications, data and datasets:

- OSI Aerial photography and 1:50000 mapping
- National Parks and Wildlife Service (NPWS)
- National Biodiversity Data Centre (NBDC) (on-line map-viewer)
- BirdWatch Ireland
- Ireland's Marine Atlas (IMA) (on-line map-viewer)
- The Dingle Peninsula Bird Reports from 2008-2010 & 2011-2013
- General ornithology literature
- Teagasc soil area maps (NBDC website)
- Geological Survey Ireland (GSI) area maps
- Environmental Protection Agency (EPA) water quality data
- Other information sources and reports footnoted in the course of the report

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3.3 FIELD SURVEYS

A number of marine surveys were completed by AquaFact International Services Ltd, Hydrographic Surveys Ltd, and IWDG (Irish Whale and Dolphin Group) Consulting, all specialist marine consultancies. These surveys, carried out in support of either the current or previous FL and DaS licence applications for dredging in Fenit Harbour, were in turn used to inform the screening for Appropriate Assessment and include:

- Bathymetric Survey Fenit Harbour - Inner Harbour (Hydrographics Survey Ltd., 2018)
- Bathymetric Survey Fenit Harbour - Dumpsite (Hydrographic Survey Ltd., 2018)
- Tidal Current Metering (Hydrographic Survey, 2014)
- Sediment Transport Model (STM)(Aquafact)
- Fenit Harbour Dredging and Disposal Operations Marine Benthic Study Report (AquaFact, 2018)
- Fenit Harbour Dredging and Disposal Operations Marine Sediment Characterisation Report (AquaFact, 2018)

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- Fenit Harbour Marine Benthic Flora and Fauna Survey (see Marine section of Chapter 4 Ecology of Fenit Harbour and Marina Extension EIS - Doc. No: 12693-6001-A (marine section authored by Aquafact, 2009, EIS produced and compiled by MWP)
- Assessment of Risk to Marine Mammals from Proposed Dredging and Dumping at Sea Activity, Fenit Harbour (O'Brien & Berrow, 2017)

The following sections summarise the methodologies employed for each of the elements listed above.

3.3.1 Bathymetry

A bathymetric survey was completed by Hydrographic Surveys Ltd. in October 2018 to map the sea floor terrain and depths within the inner harbour/marina area and approach channel to Fenit Harbour. This survey followed on from a previous bathymetric survey of the same area completed in February 2018. A bathymetric survey of the proposed dumpsite was completed by Hydrographic Surveys Ltd. in January 2018.

3.3.2 Current and Tidal Metering

A current and tidal survey was completed by Hydrographic Surveys during the summer of 2014 to characterise the hydrodynamic environment at the dumpsite. An ADCP (Acoustic Doppler Current Profiler) was deployed at grid location E70524, N120342 from 17th July 2014 to 1st Aug 2014 providing almost 15 days of records.

3.3.3 Baseline Characterisation of Dredge Area

3.3.3.1 Benthic Faunal Sampling

In 2009 Aqua-Fact undertook benthic survey work at 10 sampling stations in and around Fenit Harbour to inform the Fenit Harbour and Marina Expansion project. The aim of these surveys was to map the faunal communities in the vicinity of the harbour. The results of the 2009 surveys were used in the current assessment of the proposed dredging works at Fenit Harbour.

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3.3.3.2 Marine Sediment Characterisation Survey

Surveys to inform sediment characterisation of the proposed dredge area were conducted in November 2017. A total of 12 sampling stations within the harbour area were selected (see Figure 1 below). A grab sample was collected at each sampling station for the analysis of organics and contaminants. Once back in the laboratory, all sediment samples were sent to the SOCOTEC Laboratories in Burton on Trent (Aquafact, 2018).

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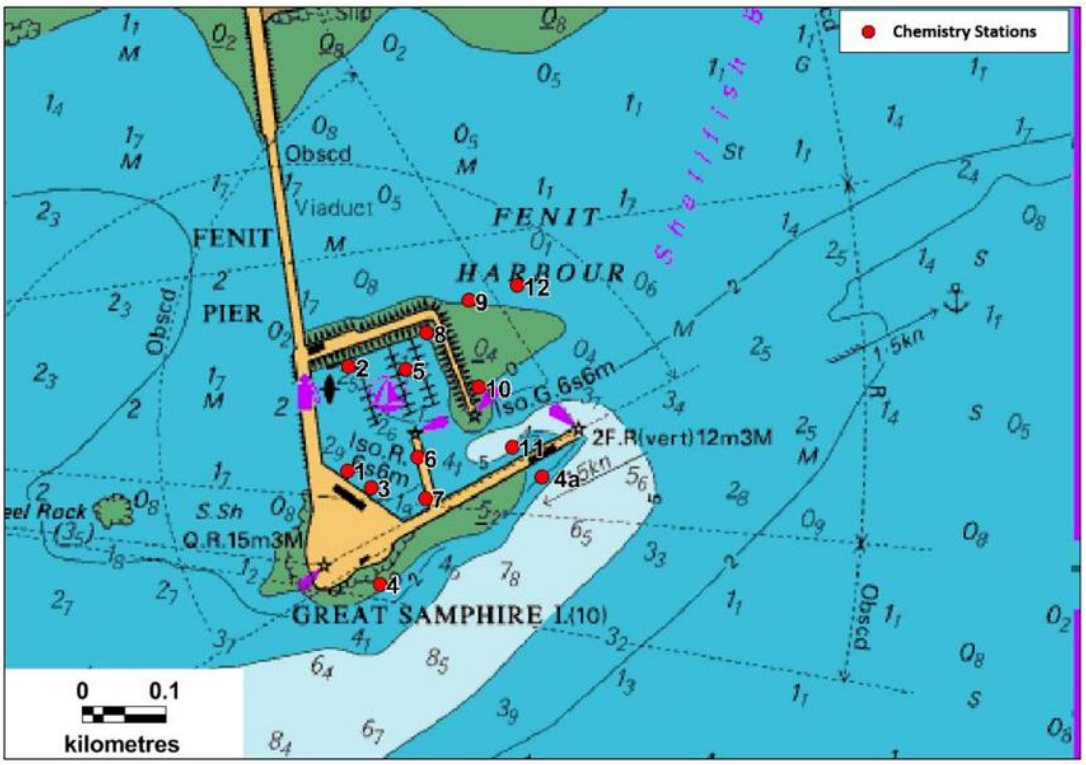


Figure 1. Location of chemistry sampling sites (Aquafact, 2018)

3.3.4 Baseline Characterisation of the Dumpsite

3.3.4.1 Benthic Faunal Sampling

To carry out the sub-tidal benthic faunal assessment of the proposed dumpsite AquaFact International Services Ltd. sampled 8 sites within and around the area in question in November 2017 (see Figure 2 below)(Aquafact, 2018).

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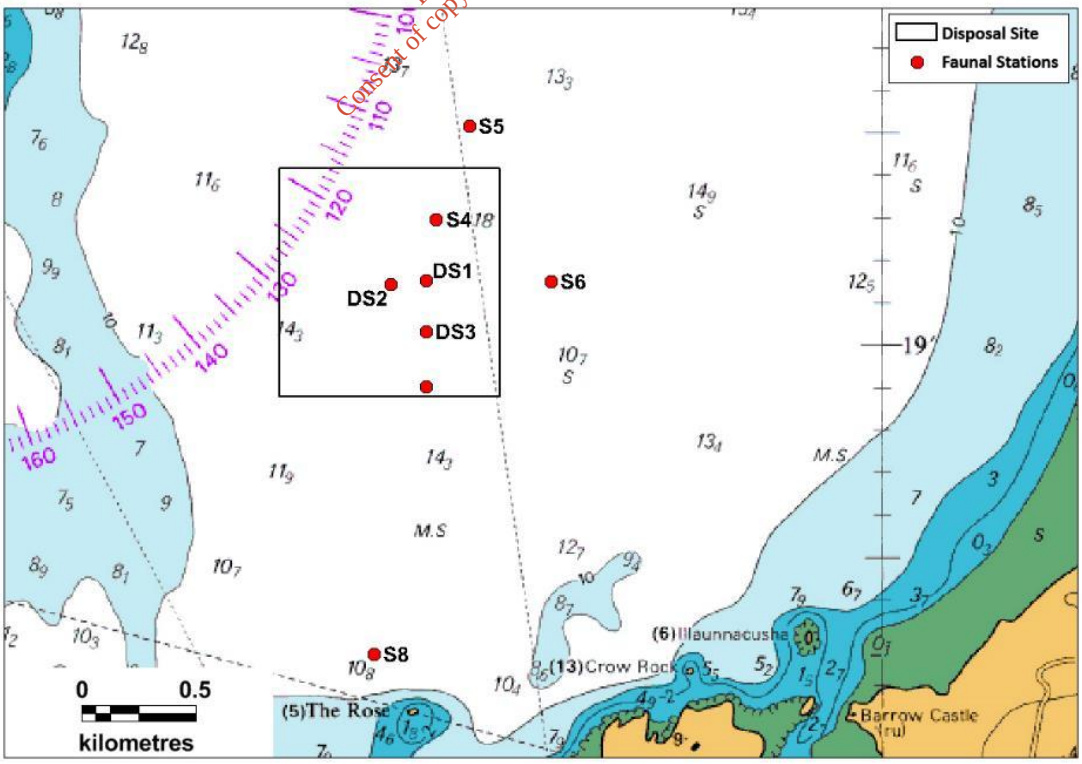


Figure 2. Location of faunal stations sampled in November 2017 (Aquafact, 2018)

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3.3.4.2 Granulometry and Organic Carbon Sampling

At the same time as benthic faunal sampling surveys conducted in November 2017, an additional sample was collected at all 8 stations for grain size analysis and organic carbon content. Organic carbon by Loss on Ignition for the faunal samples was carried out by ALS Labs in Loughrea. AquaFact carried out the particle size analysis and moisture and density content analysis (Aquafact, 2018).

With regards to baseline characterisation of the dumpsite, Aquafact International Services Ltd. carried out the baseline study for the same dumpsite for the 2015 dredging campaign. The stations sampled for the 2015 survey were revisited. Samples were retrieved using a 0.025m^2 Day grab. At the laboratory all samples were sorted and identified to species level. Statistical evaluation of the faunal data was undertaken.

3.3.5 Sediment Transport Model (STM)

Sediment transport modelling has been undertaken previously by Hydro Environmental Ltd. This investigated a proposed dredge disposal site for dredge spoil from Fenit Harbour Co. Kerry. The objective of this study was to identify where suspended dredge material would disperse to from the dredge disposal site during the disposal and thereafter (AquaFact, 2014). The software which was utilised to undertake the sediment transport modelling was the TELEMAC system and specifically the Telemac-2D hydrodynamic module, the software of choice for modelling the complicated hydrodynamics of Tralee Harbour and Approaches. TELEMAC is a software system designed to study environmental processes in free surface transient flows. It is therefore applicable to seas and coastal domains, estuaries, rivers and lakes. Its main fields of application are in hydrodynamics, water quality, sedimentology and water waves (AquaFact, 2014).

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The hydrodynamics from Telemac are determined for a 50-day period covering nearly two lunar spring and neap tidal cycles and inputted to a STM PSED. PSED is a Lagrangian particle tracking model for simulating non-cohesive sediments developed by the Canadian Hydraulics Centre. PSED simulates the transport of both suspended and bed load of a variety of non-cohesive sediment types from fine silts and sands to coarser sands and gravels. The model computes the mobility, entrainment, advection, dispersion and settling of sediments under steady and unsteady flows (AquaFact, 2014). A 2-dimensional depth averaged hydrodynamic model of Fenit Harbour, Tralee bay and the Atlantic from head of the Dingle Peninsula to Kerry Head and extending 30km offshore was developed to model the tidal hydrodynamics and sediment transport (see Figure 3 below).

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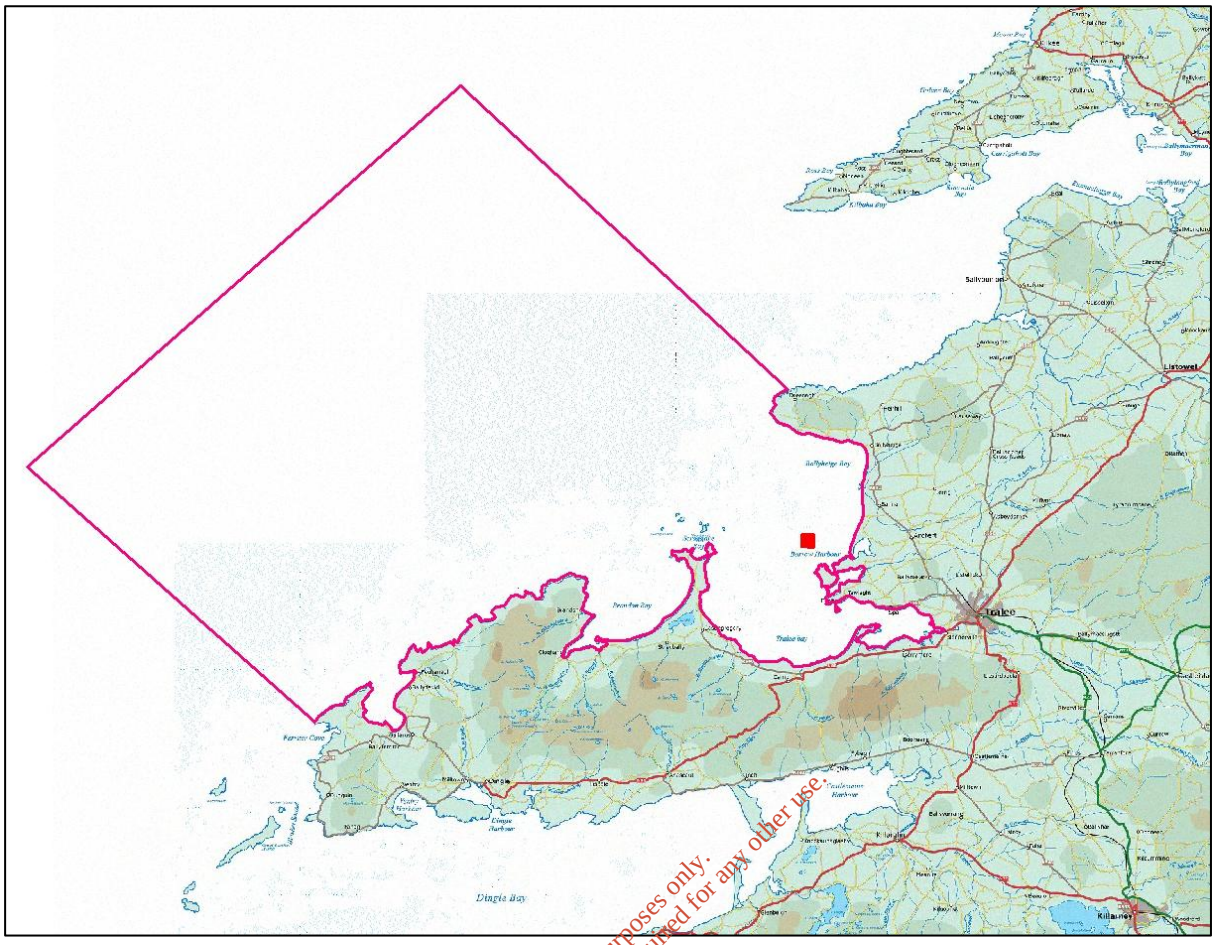


Figure 3. Extent of Hydrodynamic Model (Aquafact, 2014)

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3.3.6 Assessment of Risk to Marine Mammals

A risk assessment of the proposed works to marine mammals was carried out by the Irish Whale and Dolphin Group (IWDG) based on a review of available literature and data sources. Maps of the distribution of cetacean sightings within the Tralee Bay region were prepared using data from the IWDG sightings database (O'Brien & Berrow, 2017).

3.4 SCREENING FOR APPROPRIATE ASSESSMENT

As set out in the NPWS guidance, the task of establishing whether a plan or project is likely to have an effect on a Natura 2000 site is based on a preliminary impact assessment using available information and data, including that outlined above, and other available environmental information, supplemented as necessary by local site information and ecological surveys (DoEHLG, 2009). This is followed by a determination of whether there is a risk that the effects identified could be significant. The precautionary principle approach is required.

Once the potential impacts that may arise from the proposal are identified the significance of these is assessed through the use of key indicators:

- Habitat loss
- Habitat alteration
- Habitat or species fragmentation
- Disturbance and/or displacement of species
- Water quality and resource

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4 SCREENING FOR APPROPRIATE ASSESSMENT

Screening for Appropriate Assessment (Stage 1) determines the need for a full Appropriate Assessment (Stage 2) and consists of a number of steps, each of which is addressed in the following sections of this report:

- Establish whether the proposal is necessary for the management of a Natura 2000 site
- Description of the project (Fenit Maintenance Dredging)
- Identification of Natura 2000 sites potentially affected
- Identification and description of individual and cumulative impacts of the project
- Assessment of the significance of the impacts on the integrity of Natura 2000 sites
- Conclusion of screening stage

4.1 MANAGEMENT OF NATURA 2000 SITES

The proposal is not connected with or necessary to the conservation management of a Natura 2000 site.

4.2 DESCRIPTION OF PLAN/PROJECT

4.2.1 Brief Project Description

This project involves the excavation of sediment from the seabed, termed maintenance dredging, at Fenit Harbour, a commercial shipping port. Dredging is an activity carried out by a dredge, which removes material from the sea bed and deposits it elsewhere. Dredged material will be transported to outer Tralee Bay to a proposed dumpsite (used previously in the 2016 dredge campaign)(See Section 4.2.3 and 4.2.4 below for location of proposed dredge area and dump-site). Please refer to Planning Drawings.

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A foreshore licence (FL) application for consent under the Foreshore Act for dredging at the harbour and dumping operations at the dumpsite in 2020 will be sought from the Department of Housing, Planning and Local Government (DHPLG). A separate FL consent will be required from the DHPLG for each dredging event undertaken during the eight year dredge campaign (2020 – 2027). A Dumping at Sea (DaS) permit application to dispose of the material at the proposed dumpsite will be sought from the Environmental Protection Agency (EPA) under the Foreshore and Dumping at Sea (Amendment) Act 2009. The previous DaS licence expired in October 2016. The current DaS permit application pertains to an eight year dredge campaign (2020 – 2027) with dredging to take place on an annual basis.

4.2.2 Purpose of the Project

Maintenance dredging is required to deepen or maintain navigable channels, which are at risk of becoming silted over time due to the transport of suspended sediments into the sheltered waters of the harbour, that in turn deposit on the seabed. The project will increase the navigability of Fenit Harbour and thereby reduce the associated safety concerns for commercial ships and boats.

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4.2.3 Description of the Dredge Site (Fenit Harbour and Marina)

4.2.3.1 Site Location and Land Use

The site is located on the west coast of Ireland, in County Kerry on the northern side of Tralee Bay. The bay is sheltered from the Atlantic by the Maharee tombolo, which extends northwards from the Dingle Peninsula. Fenit Harbour and Marina is located about 10km west of Tralee Town, just south of the mouth of the Shannon Estuary (Lat 52°16'N Long 9°52'W). The village of Fenit lies north of the harbour. A location map of the site is presented in Figure 4 below.

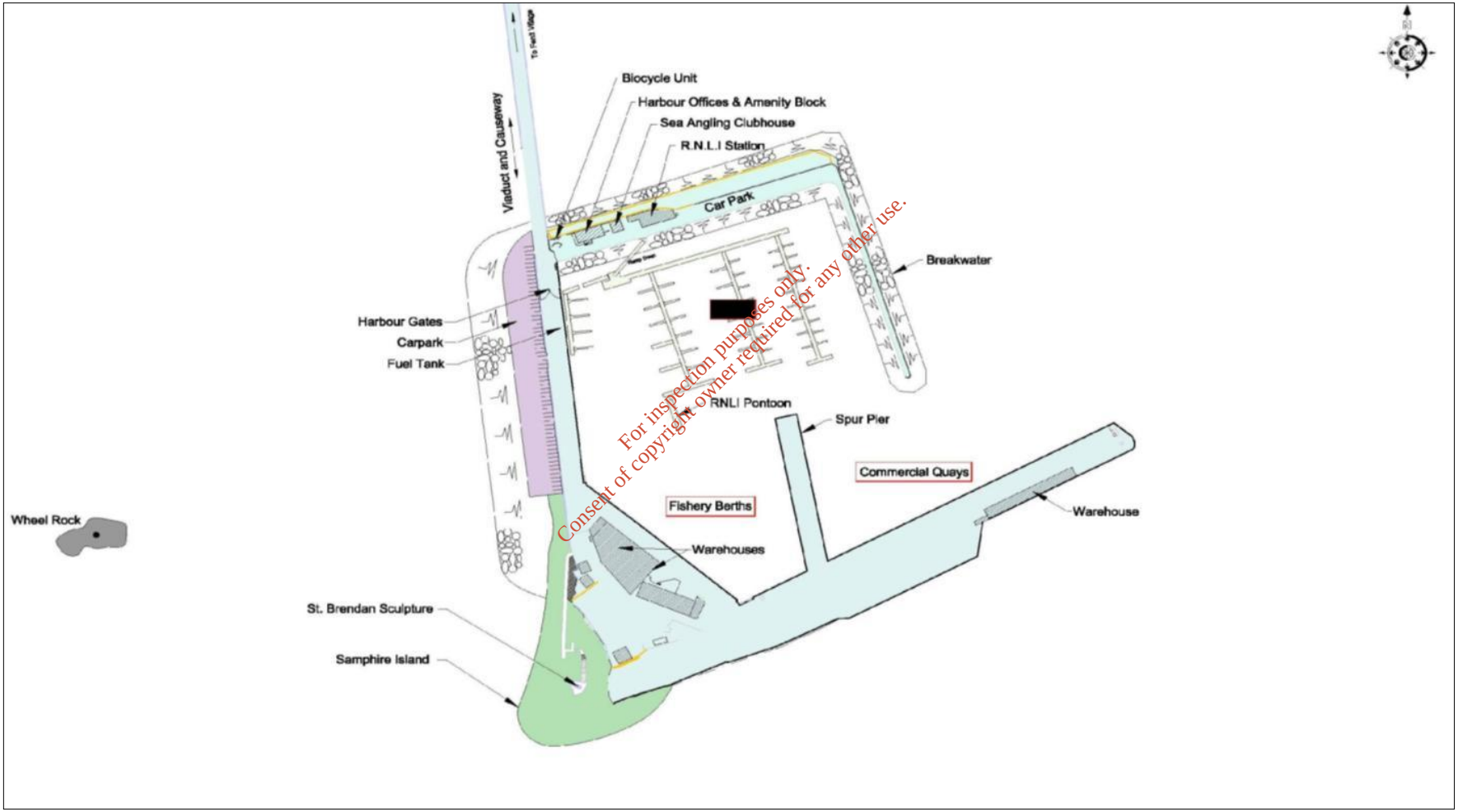


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Figure 4. Location of Fenit Harbour

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A 400 m long causeway and viaduct connects the site to the village. The footprint of the existing harbour and marina is 7ha. From the viaduct the fishing quays stretch south to the rocky outcrop that is Samphire Island and turns east to the newer commercial shipping quays and spur/spring pier. The marina area is located within the shelter of the rubble mound breakwater to the northeast of the site. A plan of the existing site is given in Figure 5 below.



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Figure 5. Plan of Fenit Harbour

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Land use in the vicinity of the harbour on the mainland includes agricultural, recreational, residential, commercial and open space. The harbour is approximately 500m south of Fenit village. The land directly to the north of the proposed expansion is primarily amenity, residential and open space. The Fenit blue flag beach is located to the northwest of the site and is an important amenity area for the local community. A further stony beach is located to the northeast of the site

Fenit is the most westerly commercial port in Ireland and is the only commercial port between Foynes and Cork. It is used for commercial shipping, servicing a domestic fishing fleet, as well as leisure, amenity and lifesaving. The main deep sea pier is 175m long with extensive storage facilities available. The landing quays have a design dredge depth of -7.5mCD. Fenit Harbour is an important logistical base for the Killarney based Liebherr cranes. The commercial shipping quays facilitate 15,000 tonne ships of container cranes of a frequency of approximately 15 to 20 per annum. Currently, the fishing fleet operating out of Fenit includes approximately 1 large trawler, 2 medium trawlers and 24 half-decker trawlers in addition to a number of charter sea angling vessels. Fenit Marina was built in 1997 and has a 130 berth marina and caters to leisure craft from 6m to 15m in length. It has a plan area of approximately 1.5ha. The marina has a design dredge depth of -3.5mCD. The existing marina berths facilitate leisure craft during the peak summer months and a mixture of both fishing and leisure in the off-season.

Tralee Bay is sheltered from Atlantic waves by the Dingle Peninsula to the south and the Maharees Peninsula to the west. Wave action and tidal currents enter the Bay from the north. Tidal currents, filling the bay under flood tide, sweep past the harbour in a west to east direction. On the ebb, relatively strong currents approach the harbour from the east. The currents are strong enough to move considerable volumes of sediment in the vicinity of the harbour. Tidal currents and the nature of the seabed result in large volumes of sediment being moved around the bay.

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Both the commercial berth and marina dredge areas are encompassed within the Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070).

4.2.3.2 Bedrock geology and coastline to the north of Dredge Site

Fenit Harbour is situated on the northern shore of Tralee Bay, north of the Dingle Peninsula. According to Geological Survey of Ireland (GSI) mapping and supporting data the Dingle Peninsula which makes up the southern shore of the bay is a syncline of Devonian Sandstone with Namurian Sandstone on its flanks. In addition, the GSI map indicates that Tralee Bay is underlain with Carboniferous Limestone as is the Tralee area with the hills to the west consisting of Namurian sandstone.

The Carboniferous Limestone outcrops within the harbour at Samphire Island. Geotechnical investigations undertaken in 1996 indicate that the rock dips away under the surrounding overburden which forms the bed of the harbour and nearby area. The existing harbour was constructed on the rock of Samphire Island with an original L-shaped pier extending north and east-northeast of the rocky outcrop. The north oriented leg of the harbour is connected to the mainland via a piled viaduct and causeway. The shore to the north of the harbour consists of a glacial till cliff to the northeast and a short sandy beach to the northwest. Further west the beach merges into a rocky foreshore. The shore immediately east of the viaduct consists of a rock cliff becoming a glacial till cliff further east. Fronting the glacial till cliff is a layer of sand, gravel and cobbles overlying an eroded

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platform in the till. The shoreline at Fenit comprises sandy beach, rocky shore and cobble and gravel shingle.

4.2.3.3 Bathymetry of Dredge Site

A bathymetry survey of the proposed dredge site was conducted by Hydrographic Services Ltd in 2018 (Refer to application drawings 18598-5003A and 18598-5007A). The bathymetry survey indicates that depths are variable throughout the dredge area and that there is an accumulation of sediment in all parts of the harbour including the navigational channel since the last maintenance dredge of this area in 2016.

The survey indicates depths within the Marina (Area A) range from -1.9mCD to-3.0mCD, which is up to 1.6mCD in places from the optimum design depth of -3.5mCD. Within the commercial shipping berth and navigational channel (Area B), water depths typically range between circa -4.5mCD and -7mCD which is between 0.5 and 3mCD from the optimum design depth of -7.5mCD. The survey shows areas in the outer manoeuvring area (Area C) drying out at 1.4mCD immediately east of the eastern breakwater and due north of the main shipping pier.

4.2.3.4 Marine Sediments at Dredge Site

Previous reports and site investigations indicate that the composition of the material to be dredged is a clean sand silt gravel mix with no rock. Sediment sampling for quality analysis was undertaken at twelve locations across the harbour area including two at the fishing berth (F1, F3) and commercial berth (F6, F7). Three sampling locations were located within the marina (F2, F5, F8), with another three immediately east of the eastern breakwater (F9, F10, F12). One sampling location was located in the maneuvering area (F11) while another was in the navigation channel (F4a, moved from F4 due to hard ground). F1-F8 and F11 stations are representative of the dredge area sediment quality while locations F9-F12 are representative of the edge of the backslope dredge areas (see Figure 1 above).

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There are no current or historic heavy industries, boat building or repair associated with Fenit Harbour. The principal sources of pollutants within the harbour would be hydrocarbons associated with vessels, machinery and equipment. The sediments from the harbour area were classified as muddy sand throughout by Folk (1954), being dominated by silt-clay and very fine sand for the most part.

Arsenic values were below the lower guidance level of 9 mg kg^{-1} at stations 9 and 12 while all others exceeded the lower guidance level, ranging from 9.8 mg kg^{-1} to 18.6 mg $kg^{-}1$. None of the sampling stations exceeded the upper Irish action level for arsenic, or the U.S. probable effects level (PEL) used for biological effects guidelines of 41.6 mg kg^{-1} (Cronin *et al*., 2006). Arsenic can be naturally present in marine sediment and in some locations natural levels of arsenic can exceed the upper value of 70 mg kg^{-1} (Aquafact, 2018).

Nickel was below the lower guidance level at four stations (4, 9, 10 and 12) while nickel levels exceeded the lower Irish action level of 21 mg kg^{-1} for the remaining eight sampling stations for sediment quality, namely F1, F2, F3, F5, F6, F7, F8 and F11. None of the sampling stations exceeded the upper Irish action level for nickel of 60 mg kg^{-1}, or the U.S. probable effects level (PEL) used for biological effects guidelines of 42.8 mg kg^{-1} (Cronin *et al*., 2006).

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Zinc was below the lower guidance level at all stations except station 1, which was above the lower guidance level of 160 mg kg^{-1}. None of the sampling stations exceeded the upper Irish action level for zinc of 410 mg kg^{-1} , or the U.S. probable effects level (PEL) used for biological effects guidelines of 271 mg kg^{-1} (Cronin *et al.*, 2006). Station 1 lies outside the proposed dredge area.

Copper was below the lower guidance level at all stations except station 1, which was above the upper guidance level. A copper concentration of 263 mg kg^{-1} was recorded for sampling station 1 which exceeds the upper Irish guidance level of 110 mg kg^{-1} (Aquafact, 2018). This also exceeds the U.S. probable effects level (PEL) used for biological effects guidelines of 108 mg kg^{-1} (Cronin *et al.*, 2006). Station 1 lies outside the proposed dredge area.

Cadmium, chromium, lead and mercury were all below the lower Irish action limit at all stations. See Table 1 below for the full list of parameters and results.

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Table 1. Results of sediment chemistry analysis, with reference to Irish Action Levels (Aquafact, 2018)

Parameter	Units (dry wt) Note 2	Lower Action Limit	Upper Action Limit	Sampling points							
				S1	S2	S3	S4	S5	S6	S7	S8
Arsenic	mg kg^{-1}	9	70	18.6	18.6	18	10.8	16.5	18.4	16.7	15.6
Cadmium	mg kg^{-1}	0.7	4.2	0.3	0.4	0.4	0.4	0.5	0.4	0.5	0.6
Chromium	mg kg^{-1}	120	370	62.6	54.9	53.6	40.1	52.1	54.7	53.8	54.9
Copper	mg kg^{-1}	40	110	263	31.4	18.2	18	19.3	20.5	30.3	18.8
Lead	mg kg^{-1}	60	218	49.8	22.9	21.6	15.9	21.8	22.9	26.1	21.9
Mercury	mg kg^{-1}	0.2	0.7	0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.05
Nickel	mg kg^{-1}	21	60	28.2	26.5	27.3	20.4	26.6	27.5	27	28.7
Zinc	mg kg^{-1}	160	410	205	118	146	68.7	82.6	87.9	106	89
Σ TBT & DBT Note 3	mg kg^{-1}	0.1	0.5	<0.002	<0.002				<0.002		<0.002
γ-HCH (Lindane) Note 4	µg kg^{-1}	0.3	1	<0.1	<0.1				<0.1		<0.1
HCB Note 5	µg kg^{-1}	0.3	1	<0.1	<0.1				<0.1		<0.1
PCB (individual congeners of ICES 7) Note 6 PCB 028	µg kg^{-1}	1	180	<0.08	<0.08				<0.08		<0.08
PCB 052	µg kg^{-1}			<0.08	<0.08				<0.08		<0.08
PCB 101	µg kg^{-1}			<0.08	<0.08				<0.08		<0.08
PCB 138	µg kg^{-1}			<0.08	<0.08				<0.08		<0.08
PCB 153	µg kg^{-1}			<0.08	<0.08				<0.08		<0.08
PCB 180	µg kg^{-1}			<0.08	<0.08				<0.08		<0.08
PCB 118	µg kg^{-1}			<0.08	<0.08				<0.08		<0.08
PCB (Σ ICES 7) Note 6	µg kg^{-1}	7	1260	<0.56	<0.56				<0.56		<0.56
PAH (Σ 16) Note 7	µg kg^{-1}	4000		411.10	391.30				288.30		421.30
Total Extractable Hydrocarbons	g kg^{-1}	1.0		0.158	0.107				0.099		0.15

***Note: Sample station 1 is outside the proposed dredge area**

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Parameter	Units (dry wt) Note 2	Lower Action Limit	Upper Action Limit	Sampling points			
				S9	S10	S11	S12
Arsenic	mg kg^{-1}	9	70	7.9	9.8	13.9	7.9
Cadmium	mg kg^{-1}	0.7	4.2	0.4	0.4	0.5	0.3
Chromium	mg kg^{-1}	120	370	32.7	40.7	51.1	29.4
Copper	mg kg^{-1}	40	110	11.8	14.1	36.9	13
Lead	mg kg^{-1}	60	218	11.5	15.4	27	9
Mercury	mg kg^{-1}	0.2	0.7	0.02	0.03	0.05	0.02
Nickel	mg kg^{-1}	21	60	16.1	20.2	23.7	14.3
Zinc	mg kg^{-1}	160	410	52.5	61.6	149	47.5
Σ TBT & DBT Note 3	mg kg^{-1}	0.1	0.5	<0.002		<0.002	
γ-HCH (Lindane) Note 4	µg kg^{-1}	0.3	1	<0.1		<0.1	
HCB Note 5	µg kg^{-1}	0.3	1	<0.1		<0.1	
PCB (individual congeners of ICES 7) Note 6 PCB 028	µg kg^{-1}	1	180	<0.08		<0.08	
PCB 052	µg kg^{-1}			<0.08		<0.08	
PCB 101	µg kg^{-1}			<0.08		<0.08	
PCB 138	µg kg^{-1}			<0.08		<0.08	
PCB 153	µg kg^{-1}			<0.08		<0.08	
PCB 180	µg kg^{-1}			<0.08		<0.08	
PCB 118	µg kg^{-1}			<0.08		<0.08	
PCB (Σ ICES 7) Note 6	µg kg^{-1}	7	1260	<0.56		<0.56	
PAH (Σ 16) Note 7	µg kg^{-1}	4000		104.20		809.60	
Total Extractable Hydrocarbons	g kg^{-1}	1.0		0.061		0.11	

***Note: Sample station 1 is outside the proposed dredge area**

	Exceed Lower Irish Action Limit
	Exceed Upper Irish Action Limit

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Note 1: Applicants should highlight in Table B.1 any results which exceed either the upper or lower Irish action levels. Action levels are published in: *Cronin et al. 2006. Guidelines for the Assessment of Dredge Material for Disposal in Irish Waters. Marine Environment & Health Series, No. 24. Marine Institute.*
Note 2: Total sediment <2 mm
Note 3: Sum of tributyl tin and dibutyl tin
Note 4: 1α,2α,3β,4α,5α,6β-hexachlorocyclohexane
Note 5: Hexachlorobenzene
Note 6: ICES 7 polychlorinated biphenyls: PCB 28, 52, 101, 118, 138, 153, 180.
Note 7: Polyaromatic hydrocarbons (measured as individual compounds): Naphthalene, Acenaphthylene, Acenaphthene, Fluorene,Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(ah)anthracene, Benzo(ghi)perylene, Indeno(123-cd)pyrene.

Based on the results, all sediment samples, except at sampling station 1, can be placed into Class 2 (Aquafact, 2018). Class 2 sediments hold contaminant concentrations between Level 1 and Level 2 and are considered marginally contaminated (Cronin *et al*., 2006). Due to an elevated concentration of copper at sampling station 1 (263 mg kg^{-1}), which exceeds the upper Irish guidance level, this sediment can be categorized as Class 3. Class 3 sediments are those above Level 2 and are considered heavily contaminated and very likely to cause biological effects (Cronin *et al*., 2006). However, sampling station 1 is located outside the proposed dredge area, as shown in Figure 1, and so will not be subject to dredging activity carried out as part of the proposal.

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4.2.3.5 Benthic Ecology at Dredge Site

In 2009 Aqua-Fact undertook benthic survey work at 10 sampling stations in and around Fenit Harbour to inform the Fenit Harbour and Marina Expansion project. The western part of the inner harbour area (grab Stations S1 and S2) was dominated by fine muds (>98% silt-clay content). Only three species were recorded in any appreciable numbers in this area but numbers were still low when compared to the stations outside the harbour. *Nepthys hombergii* and nemerteans dominated here. The harbour entrance area (grab Stations S3) was dominated by silt-clay, with Stations S4 and S6 dominated by sandy mud. All stations had a poor species assemblage with *Nepthys hombergii* dominated each site.

The area east of the harbour was relatively homogenous consisting of sandy mud formed into small wavelets by the action of the tidal currents. Further east, areas of compact clay formed large shallow mounds on the bottom. Apart from drift algae, no flora or fauna was observed. Faunal grab station S4 revealed the dominance of the infaunal polychaete *Nephtys hombergii* in this location along with the bivalve molluscs *Abra nitida* and *Nucula nucleus*. The community here was consistent with the SS.SMU Sub-littoral cohesive mud and sandy mud community biotope.

4.2.4 Description of Dumpsite

4.2.4.1 Site Location and Land Use

The dumpsite is located approximately 3km west of the coast at Carrahane Lower townland and approximately 1.5km north-northwest of Fenit Island in the outer part of Tralee Bay. It lies between 1.5km to 2.5km south and southeast of Illaunnabarnagh and Mucklaghmore Islands, which are essentially small rocky outcrops. The seabed in the general surrounds is classified as sand and muddy sand with reefs located over 1km to the northwest.

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The boundary extents of the dumpsite are square in shape with each side measuring 1km giving a total area of 100ha (see Figure 6 below). Tidal currents are generally low at the dump site. The current largest velocities occur at mid ebb and mid flood with magnitudes ranging from 0.2 to 0.3 m/s. The proposed dump site was selected as a suitable location after consultation with a number of stakeholders in the area as well as conforming to navigational safety of the port authority.

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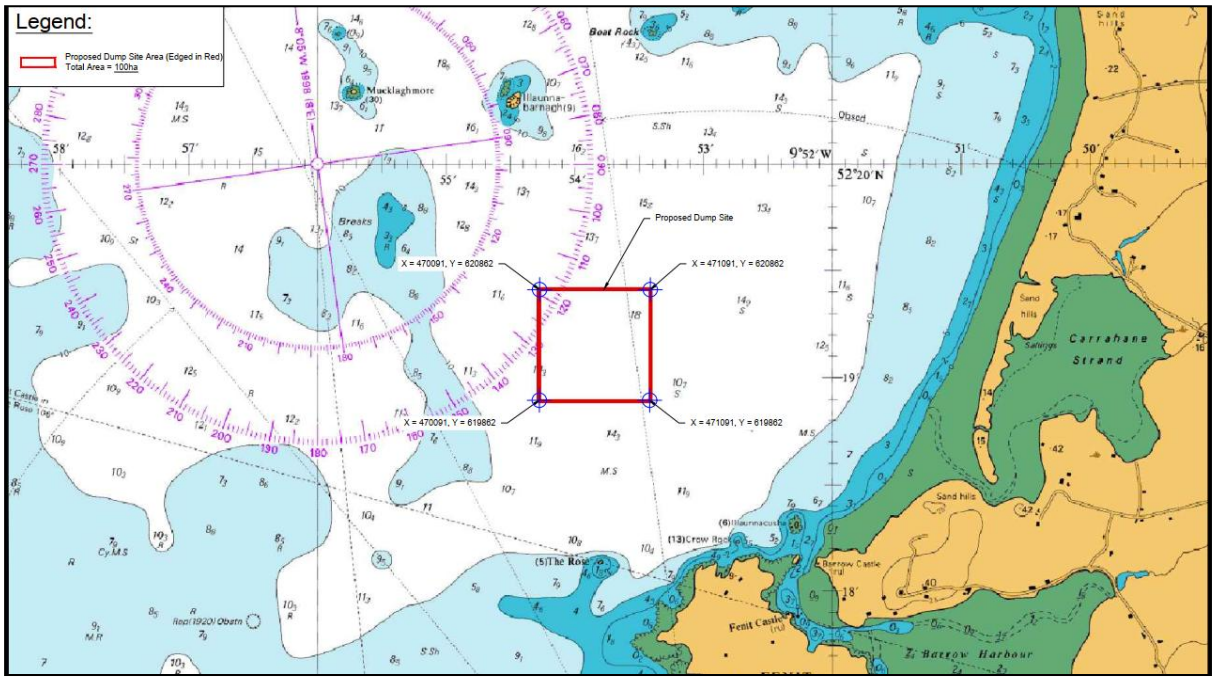


Figure 6. Dumpsite location in outer Tralee Bay

4.2.4.2 Bedrock geology at Dumpsite

The GSI map indicates that Tralee Bay is underlain with Carboniferous Limestone as is the Tralee area.

4.2.4.3 Bathymetry at Dumpsite

The bathymetry survey conducted by Hydrographic Services Ltd indicates that depths in the dumpsite range between 16.4m and 19.6m and outside the dumpsite range from 13.7m to 19.1m.

4.2.4.4 Marine Sediments at Dumpsite

The sediment type in the disposal site consists of fine/medium sand, coarse/medium sand, gravelly coarse sand and sandy gravel. Areas of hard ground occur in the western half. Very fine sands dominate just over 1km south of the dumpsite. Fine/very fine sand dominates to the east of the dumpsite and gravelly coarse/very coarse sand dominates to the north. All sediments were classified as sand, gravelly sand or sandy gravel by Folk (1954). Silt-clay fractions were low throughout (<10%).

4.2.4.5 Benthic Ecology at Dumpsite

The habitat in the area of the dumpsite can be described (according to Fossitt, 2000) as *SS1 Infralittoral gravels and sands*. Variation in community type and dominant species between the stations was evident. These local variations are common in the natural environment. All species observed are typically of the gravelly/sandy habitat in the area. The species present represent a balanced mix of longer lived deeper burrowing equilibrium species and smaller shorter lived opportunistic species. Some of the main dominants of the assemblage include the bivalve *Spisula subtruncata* and the polychaetes *Magelona johnstoni*, *Nephtys* sp. and *Syllis pontxioi* (Aquafact, 2018).

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4.2.5 Characteristics of the Project

4.2.5.1 Requirement for Maintenance Dredging

Fenit Harbour acts as a barrier within the bay, reducing and impeding flow, thus interrupting the natural hydrodynamics of the area. This contributes to an ongoing accumulation of material within the commercial berth and the inner harbour area and hence the requirement for routine maintenance dredging. Historically, this has been done in a 3 or 5 year cycle depending on whether dredging is required in the commercial shipping berth or inner marina harbour area. The first and only capital dredging operation was undertaken in 1995/6 to develop the new marina, spring pier and breakwater, and to provide sufficient navigation depth for fishing vessels, yachts and commercial shipping during all tides. The volume of capital dredging in 1996 amounted to 200,000m^3 of material. Following this dredging operation the optimum design depths were a minimum of -3.5mCD for the inner harbour and marina area, -7.5mCD for the commercial shipping berth and -5mCD for the shipping manoeuvre area. Since 1996 maintenance dredging of the commercial berth was undertaken in 2000, 2003, 2008 and 2016. Material from these dredging campaigns was disposed of in the licensed site to the north of Tralee Bay.

The previous DaS licence (EPA Dumping at Sea permit no. S0007-02 and Foreshore licence no. FS 6474 issued by the Foreshore unit of the Department of Environment) covered the period of 20th October 2015 to 20th October 2016. Within that period, over 130,000 tonnes of material were dredged from the harbour over the course of ten days in April 2016. Since the area was last dredged in 2016, the area has silted up and safe navigation and berthing of commercial ships is compromised based on recent bathymetry data. Recent assessments have highlighted the need for annual dredging to avoid having to deal with excessive accumulation.

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Currently, the commercial berth, which is actively used by Liebherr Crane shipping activities, is depositing sediment at a rate of approximately 2m over a 3 year period. This is considered to be a relatively rapid deposition rate. One of the reasons for such a relatively rapid accumulation rate with the commercial berth in recent years is believed to be related to the accumulation of sediment adjacent to the eastern breakwater leg. As a result it is believed that the accumulated sediment outside the breakwater at the harbour mouth is directing flow and material into the berth at a faster rate than in the past. Inadequate navigation depth leads to reduced control of ship movement and resulting safety and navigation issues. Admiralty chart shows the optimum design depths for navigation and berthing safely, however, the site as evident from the recent bathymetry data currently does not meet these.

The current application is for an eight year period for an ongoing maintenance dredging campaign requirement. The proposed works aim to remove approximately 1,000,000m^3 of sediment over the 8 year period. Within this period, dredging will take place on an annual basis. The volume of material to be removed will be approximately 250,000 tonnes in 2020, decreasing to between 75,000 and 150,000 tonnes per year thereafter (see Table 2 below). These figures are the maximum dredge volumes, where actual volumes will be determined at the time by funding availability. The increase in volume of material to be removed relative to the 2015/2016 dredge campaign can be attributed to the larger dredge area which is proposed, encompassing almost the entire harbour area, as well as turning area and part of the approach channel outside the harbour. It is proposed that works will take place between February and the end of May over a 4-6 week period in 2020 and annually thereafter over a 3-4 week period.

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Table 2. Approximate annual estimates of material to be removed on an annual basis (2020-2027)

Year	Area	(Tonnes)
1	B,C	250,000
2	A,B,C	100,000
3	A,B,C	150,000
4	A,B,C	75,000
5	A,B,C	150,000
6	A,B,C	75,000
7	A,B,C	100,000
8	A,B,C	100,000

As part of the proposal, material will be removed from three main areas; the inner harbour and marina area (Area A), the commercial shipping berth and navigational channel (Area B) and the outer shipping manoeuvre area (Area C) located just east of the harbour (see Figure 7 below). Area A, the inner harbour and marina, covers an area of 25,495m^2. Area B, the commercial shipping berth which encompasses the harbour mouth, covers an area of 44,875m^2. Area C which lies east of the harbour mouth comprises the shipping manoeuvre area. This area encompasses approximately 47,040m^2. The maintenance dredging footprint will take place within zones that have been subject to previous dredging and also in zones where dredging has not yet occurred.

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Figure 7. Proposed dredge areas within Fenit Harbour

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The maintenance dredging project will prioritise dredging adjacent to the commercial berth. The total maximum area or footprint to be dredged is 11.8ha and the total maximum volume is 1,000,000m^3. These figures are the maximum dredge areas and volumes because in reality it will be funding and financial constraints that will determine the actual area and volume of maintenance dredging. Deposition rates in the marina and fishing berth are relatively slower than the commercial berth and manoeuvring area.

Once the conditioned DaS licence is in place, KCC will have to notify EPA of the next planned campaign as well as documenting and notifying OSPAR of all dredged quantities. Furthermore, KCC will have to notify the EPA of the selected dredger that will be used for the each dredging event. The FL applies to singular dredging events; therefore, KCC will need to apply to the DHPLG for each proposed dredging event.

4.2.5.2 Dredging Operation

A suction hopper dredger is the proposed primary dredging method to be used. In conjunction with the suction dredger, a plough dredger or a mechanical dredger such as a grab or backhoe may also be used where limited access for large dredging plant occurs. The suction hopper dredge will be on site for a maximum of six weeks, subject to weather and tides. The suction hopper dredger enables removal of material from the bed in a controlled fashion. This type of dredger has greater controls in terms of the accuracy of dredging and minimisation of any plumes within the water column in comparison to a back-hoe dredger. The suction hopper dredger moves in a linear defined corridor and dredges in stages. In effect it does so by a series of passes over a defined footprint area until it reaches its design depth.

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One of two suction pipes descends to the bottom of the seabed with a trailing head at the end, which also serves to loosen material on the seabed. The trailing head moves across the dredge area sucking up the sediment, comparable to a large vacuum cleaner. Material is then discharged to the hopper and the material will sink while the seawater is discharged overboard.

Dredging pumps suck water through the pipes to prime them and once this is complete the pipe then begins to suck sediment. The dredging operation is fully automated and linked to satellite GPS. The area and volume of dredging is pre-programmed to an automated computerised system. Sensors estimate the area and volume of dredge material. Furthermore, cameras are placed on the boat and suction dredge. Depth is determined using sounders. The crew visually monitor during the dredging operation for any plumes or any rubbish that might damage the dredge equipment. The harbour also provides good shelter against poor weather conditions. In summary, much of the dredge operation is automated through a computer management system and thus the operation is well controlled within harbour. The use of the suction hopper dredger method and associated automation of the dredging operation is relatively clean, fast and efficient and is thus the most suitable method for sensitive sites and this is the method of maintenance dredging used in sensitive marine environments such as the Shannon Estuary, Port of Cork and Dublin Port, and has also been used in past dredging campaigns at Fenit.

As the dredger progresses it fills its on-board storage bay. When full the dredger then steams to the dumpsite location. Once there the location within the footprint of the dumpsite is recorded and the dredger opens it sea doors that close the hopper and deposit the excavated silt material onto the sea bed. The position over which the dredger deposits each load and the deposited volume is recorded.

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Once the dredger is finished the disposal process it then steams back to port and recommences the dredging operation. This process is repeated until such time as all material is removed and the design depths are achieved. A bathymetry survey is then undertaken to confirm dredge depths. Deposition is undertaken at optimum times of the tide, within good weather windows. Visual monitoring of the plume at the deposition site is undertaken as part of normal good practice.

	
Sample image of suction hopper dredger with single suction tube (source: IHC Holland, www.theartofdregding.com)	**Sample image of suction hopper dredger filling its storage area (source: www.mining-technology.com)**

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The dredging period is limited to February-May and will take place over a four to six week period in the initial year, reducing to a three to four week period in each subsequent year of the campaign. The inner Tralee Bay area due east of the harbour has an area designated for shellfish, which in this case is the native oyster. Accordingly, any potential impact on the shellfish areas has to be avoided or minimised. Therefore, the dredging must avoid the oyster spatting (settlement and recruitment of larvae) period between June and July and ideally the oyster harvesting period between November and end of January/early February due to relatively heavy use of the harbour during this time. The summer leisure period will also be avoided. Once dredging operations are completed a full report of the volumes removed and deposited at the dump site will be produced following a bathmetry survey. This will also include drawings and details presenting the dump footprint, its co-ordinates and the volumes deposited.

4.2.5.3 Dredge material

The characteristics of the dredge material have been described in Section 4.2.3.4 above.

4.2.5.4 Selection of Dumpsite

The dump site which is proposed to be used for the deposition of all material dredged under the current proposed eight year dredge campaign is the same dumpsite as previously used for the previous 2016 campaign (see Figure 6). The western half of the dumpsite overlaps with two dumpsites where dredged material was dumped between 1996 and 2003. A further historic dumpsite occurs approximately 0.5km west of Fenit Island where dredged material was dumped between 1985 and 1996.

A Dump Site Selection Report for the selected dumpsite was completed by Malachy Walsh and Partners in 2015, prior to the 2016 dredge campaign, where alternative sites were examined in a systematic manner. This report provides detail on the criteria for dumpsite selection, consultation

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and the staged and iterative process involved in the selection process. Some of the characteristics for selecting the dumpsite over other sites included:

- Avoidance of shipping lanes and main navigation routes
- Avoidance of known seabed archaeological features
- Avoidance of Natura 2000 sites
- Avoidance of fishing grounds and nursery areas for fish and aquaculture
- Avoid impacts on Blue Flag beaches
- Selection of area of sea bed with reasonable depths of water
- Selection of an area of sea bed that has a suitable profile or depression
- Location that has favourable current regime
- Location that has suitable bed characteristics for receipt of dredged material
- Minimisation of impacts on benthic communities within and surrounding the dump site
- Examination of previously used dump site locations and experience with these locations

A DaS permit is required for the deposition of dredge material. Over the years a number of DaS permits were issued by the Department of Marine and Department of Environment. The last DaS permit expired in October 2016 after the most recent dredging project was completed.

4.2.5.5 Sediment Transport Model (STM)

Based on past models simulated, during the dredging operations there will be a localised increase in turbidity as there will be disturbance of silt/sand on the bed as it is removed and there will also be spill over from the hopper as it is filled. This in effect will generate a localised dredge plume in the immediate vicinity of the dredge vessel. Increases in suspended sediment will be greatest as a result of plough dredging at the dredge site.

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Previous modelling shows that suspended sediment generated as a result of dredging activity moves east out of the harbour but at very low quantities with sediment suspensions rates ranging from 0.006kg/m^3 at high water (Figure 8) to 0.03kg/m^3 at mid flood (Figure 9).

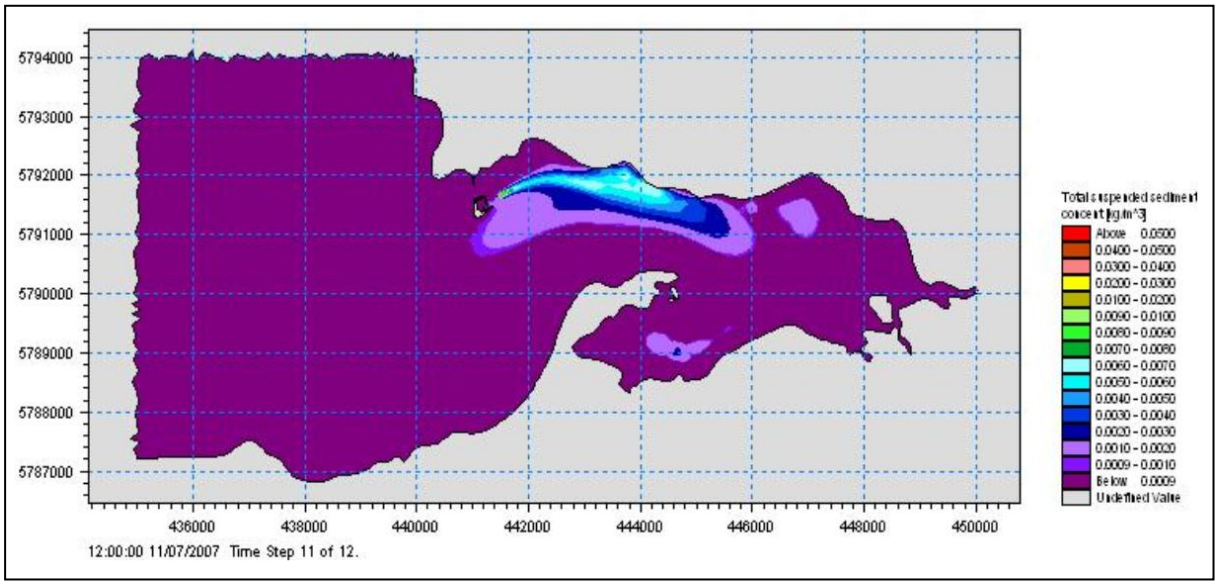


Figure 8. Suspended sediment concentration at high water after 12 days dredging

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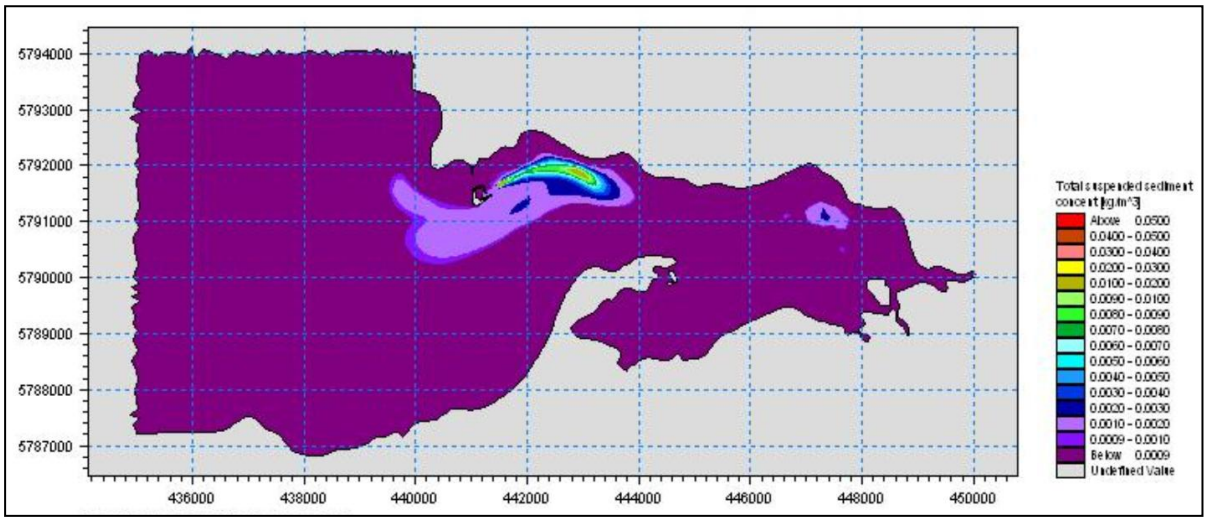
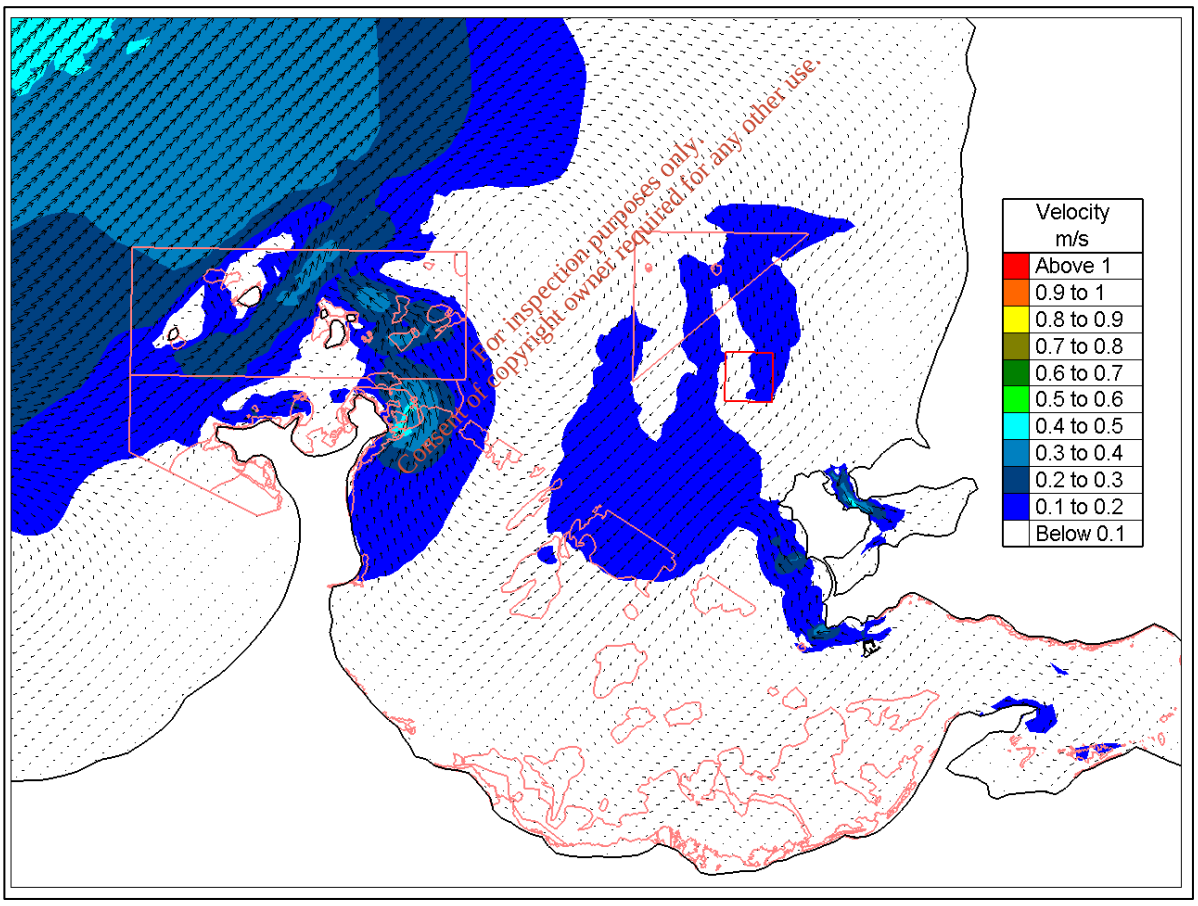


Figure 9. Suspended sediment concentration at mid flood tide after 13 days dredging

The dump site was also previously subject to extensive tidal and sediment transport modelling. Tidal currents are generally low at the dump site, which is shown as a red box in Figures 10 and 11.



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Figure 10. Computed depth averaged velocities at high water spring tide

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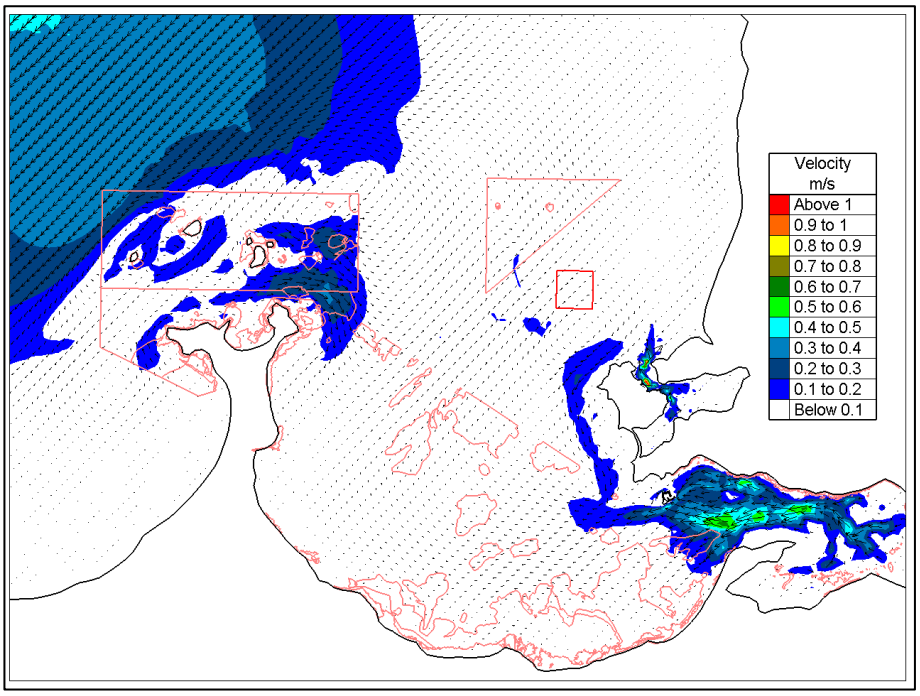


Figure 11.Computed depth averaged velocities at low water spring tide

At the dump site previous modelling was undertaken to simulate the effect of dumping with a dredge disposal rate of 5,500m^3 per day. The modelling output presented here looks at the two key indicators namely total deposition and suspended sediment resulting from the disposal (Figures 12 to 15).

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Over the course of these simulations it is shown that at the dumpsite the total deposition reduces from a maximum of 100kg/m^2 initially to a maximum of 30kg/m^2 in within the site. Generally the majority of the initial load is shown to remain at the site (see total deposition after 9 days of disposal (Figure 12) and after 49 days of disposal (Figure 13).

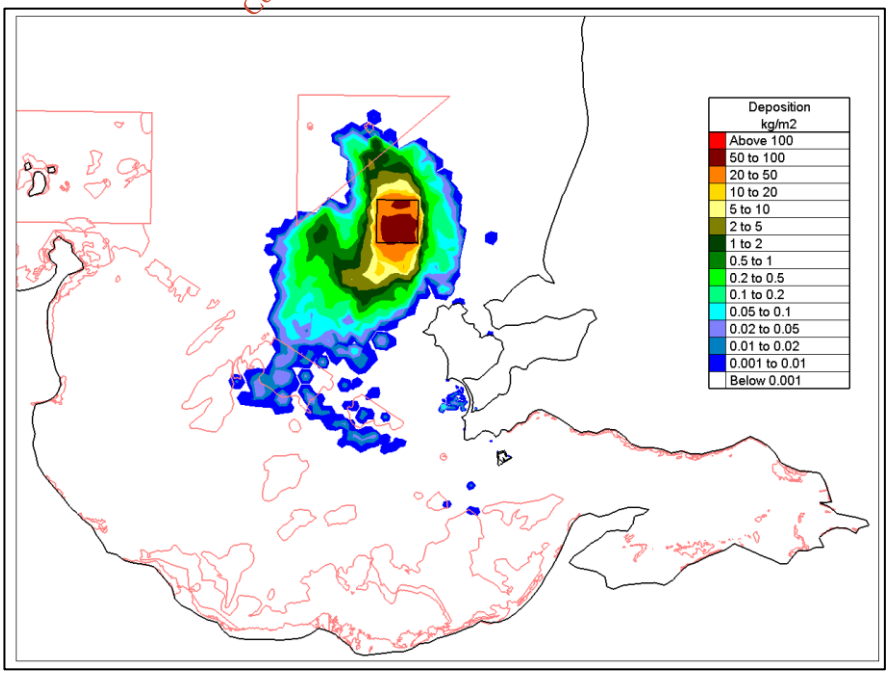


Figure 12. Total deposition of sand and silt after 9 days disposal

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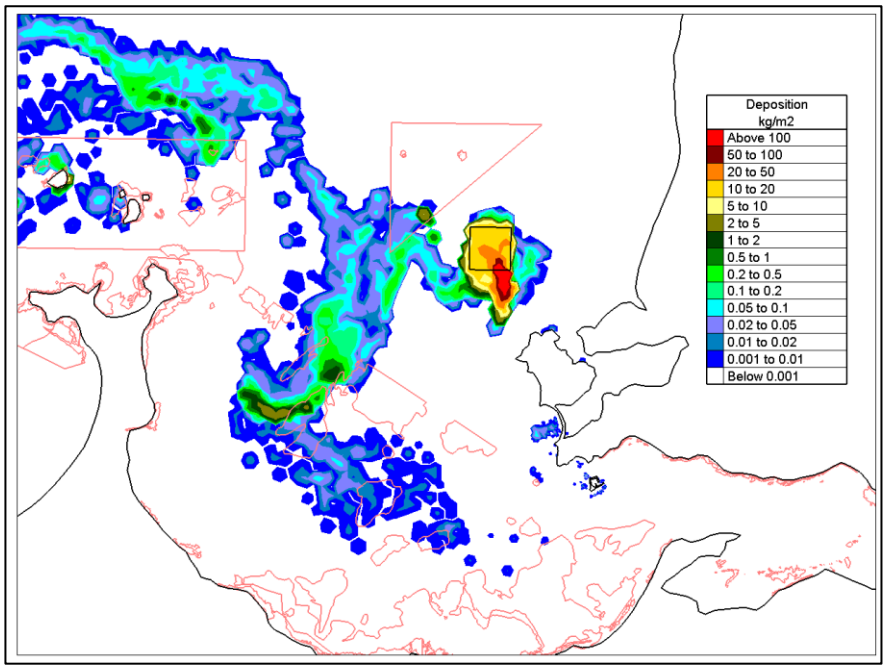


Figure 13. Total deposition of sand and silt after 49 days disposal

The suspended silt fractions released during the disposal show an interesting circulation pattern of material firstly moving south similar to the 50day trend of total load, but then migrating north-west and west (Figures 14 and 15). The maximum concentrations of suspended sediment are in the 50mg/l after 50 days. Deposition rate are less than 0.2kg/m^2 with highs of 3kg/m^2 around the max concentration locations.

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It should be noted that for the proposed dredging campaign the greatest amount of dredging will be a rate of 3,000m^3 per day albeit over a longer period than previously modelled. It is considered reasonable to assume that at the dumpsite approximately 2mm per m^2 of coarse sediments is likely to be deposited with the remaining finer silt fractions migrating offshore.

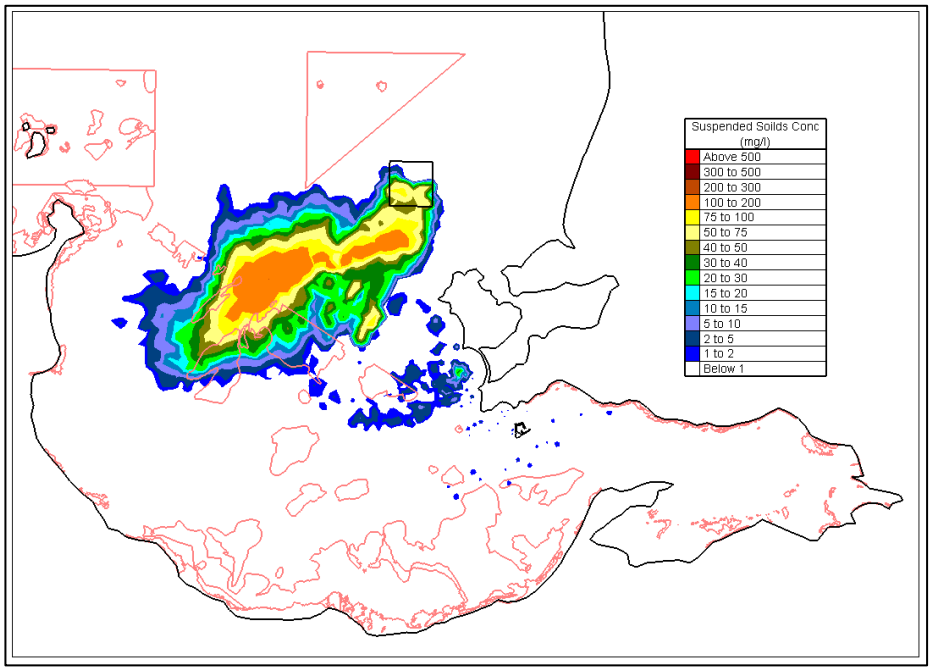


Figure 14. Silt fraction suspended solids concentration after 9 days disposal

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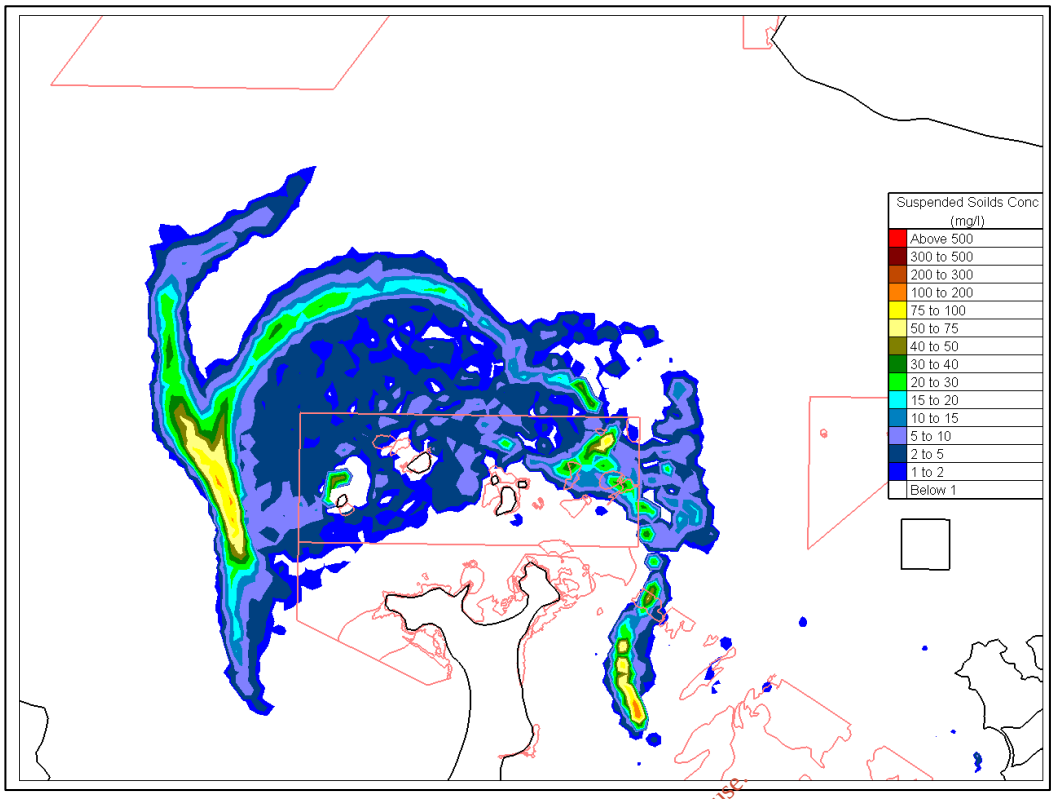


Figure 15. Silt fraction suspended solids concentration after 49 days disposal

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4.2.5.6 Project Characteristics Summary

The following table provides a summary of the characteristics of the project.

Size, scale, area, land-take	– The current FL is for a singular dredge event in 2020 for 250,000 tonnes of material which will be dredged from Fenit Harbour, the harbour manoeuvring area and harbour approach channel and deposited at the dumpsite. – The current DaS application is for an eight year period (2020 – 2027) for an ongoing maintenance dredging campaign requirement on an annual cycle (see table 2 above). – The dredge material currently covers an area of 11.8ha with dredge depths of up to 3m (~2m on average).
Details of physical changes that will take place during the various stages of implementing the proposal	Eight year DaS licence application: – The optimum design depths are a minimum of -3.5mCD for the inner harbour and marina area, -7.5mCD for the commercial shipping berth and -5mCD for the shipping manoeuvre area. An ongoing maintenance dredging campaign will be required on an annual cycle to maintain these depths. – This material will then be disposed of at a dumpsite approximately 3km off the coast in the outer bay in annual dredging events over the 8 year period. – The dumpsite is the same dumpsite used in the previous 2015 dredge campaign. FL application: – A FL will be required for each proposed dredging event within the eight year period. A FL will also be required for the dumpsite, which addresses a maximum volume to be deposited over an eight year period. The NIS is completed in support of the current FL application only. – The current sediment depths in Area A, the inner harbour and marina, are between –1.9mCD and -3mCD. This area will be dredged to design depth of -3.5mCD. – The current sediment depths in Area B, the commercial berth, are

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	approximately -5mCD and this will be dredged to -7.5mCD allowing ships and boats greater draught. – The current sediment depths in Area C, the outer manoeuvring area, are approximately -3mCD and this will be dredged to -5mCD allowing ships and boats greater draught. – This material will then be disposed of at a dumpsite approximately 3km off the coast in the outer bay.
Description of resource requirements for the construction/operation and decommissioning of the proposal (water resources, construction material, human presence etc)	– Suction hopper dredger equipped with one or two rearward extending suction pipes, dredging pumps, an overflow to discharge the water – Fuel and oils
Description of timescale for the various activities that will take place as a result of implementation (including likely start and finish date)	The dredging works will take place between February and the end of May annually to avoid adversely affecting oysters in the bay and summer leisure activities. The suction hopper dredger will be on site for a 4-6 week period in the initial year (250,000T) and annually thereafter over a 3-4 week period (between 75,000 and 150,000T p/a), subject to weather and tides.
Description of wastes arising and other residues (including quantities) and their disposal	The principal waste is the dredge material, which comprises of muddy sand dominated by silt-clay and very fine sand for the most part.
Identification of wastes arising and other residues (including quantities) that may be of particular concern in the context of the Natura 2000 network	Parameters that lie within Class 2 are considered marginally contaminated and include arsenic, nickel and zinc. With the exception of arsenic, nickel, and zinc all other parameters are below the lower Irish action limit within the proposed dredge area.
Description of any additional services required to implement the project or plan, their location and means of construction	N/A

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4.3 IDENTIFICATION OF OTHER PROJECTS OR PLANS OR ACTIVITIES

4.3.1 Harbour operations

Fenit harbour forms the main access point to the sea for various water based activities, including commercial shipping, fishing, sailing, casual boating and lifesaving. Land use within the existing harbour includes commercial shipping, fishing, leisure and amenity, lifesaving and maintenance dredging.

4.3.2 Fenit Harbour and Marina Expansion Project

Planning permission for Fenit Harbour and Marina Expansion project was granted by KCC in 2010. The total proposed development will result in a 7ha expansion of the existing harbour and includes the following key elements:

- Moving and extending the existing rubble-mound breakwater eastwards of its current location
- Expanding the existing Marina into the extended harbour space. Including the provision of 210 additional berths consisting of pontoons, fingers and an access bridge and bank seat
- Sheet piled wave wall
- Expansion of the landmass on the northern side of the harbour to create space for a new boatyard and boat lift, washdown area, refuse area, and oyster landing area
- Provision of additional parking to compliment the above
- Expansion of the existing commercial pier by widening it and lengthening the existing mooring length by 20m
- Upgrading of the existing site services to compliment the proposed development
- Capital Dredging Works to facilitate the above

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4.3.3 Other Current/Outstanding Grants of PLanning permission

The Fenit Development Association is currently seeking a grant of planning permission in relation to the re-instatement of diving boards at Fenit Bathing Slip. The development comprises construction and installation of new diving boards, modification of existing concrete structures, and construction of new access platforms, railings and associated services.

Conditional planning permission was granted by Kerry County Council to Liebherr Container Cranes Ltd. on 30/09/2014 in relation to a development in Fenit Harbour. The permitted development involved the demolition of all existing buildings located on the Cross Quay, the construction of a new building comprising single-storey industrial hall and three-storey ancillary building, alterations to existing services and site features including relocation and integration of existing electricity sub-station[1]. This project has been completed.

4.3.4 Oyster Fishing

Oysters are harvested in the months of November until the end of January/early February. Oyster fishermen harvest oysters using a dredge plough over a relatively large portion of the inner bay and within the Shellfish designated area, both of which occur approximately 0.5km east of the head of Fenit pier. The dredge is towed along the seabed by a boat and rakes up the oysters into a net causing sediment to become suspended in the water column resulting in sediment plumes. Fishermen must seek an oyster dredge licence from IFI.

[1] http://mapping.kerrycoco.ie/PlanningEnquiryV424/MainFrames.aspx Accessed 30/04/19

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4.3.5 Diffuse and Point Sources of Pollution

Polluting substances from point (industrial pollutants, wastewater effluents, stormwater sewers) and diffuse (urban and agricultural runoff) sources associated with ongoing activities in the Tralee Bay catchment area enter the lower catchment and estuary. The following is a list of known point sources:

- Tralee WWTP, status: pass *(source: EPA)*
- Ballyheigue WWTP, status: pass *(source: EPA)*
- Fenit Septic Tank, status: fail due to lack of secondary treatment *(source: EPA)*
- Ardfert WWTP, status: fail due to lack of secondary treatment *(source: EPA)*
- Castlegregory Septic Tank, status: fail due to lack of secondary treatment *(source: EPA)*
- Two WWDL (Waste Water Discharge Licences or Certificates) occur within the bay hinterland *(source: North Kerry – Tralee Bay WMU, 2009-2015)*

An application for consent for an urban WWTP at Fenit and Castlegregory has been lodged to the EPA and KCC, respectively. This has been approved for Castlegregory WWTP.

4.4 IDENTIFICATION OF NATURA 2000 SITES

4.4.1 Likely Zone of Impact Influence

As described above, the test for the screening for Appropriate Assessment is to assess, in view of best scientific knowledge, if the development, individually or in combination with other plans or projects is likely to have a significant effect on a Nature 2000 site. If there are any significant, potentially significant, or uncertain effects, it will be necessary to proceed to Appropriate Assessment and submit an NIS. National guidance recommends that a list is compiled of all Natura 2000 sites within what is described as a 'likely zone of impact of [a] plan or project' (DoEHLG , 2009, p.32) and which may, or ultimately may not, be impacted upon by the proposal. In the case of plans it is recommended that this zone extends out for a distance of 15km (Scott Wilson *et al*., 2006, cited in DoEHLG, 2009). With regard to projects such as the proposal considered in this report, the guidance goes on to state, as follows:

> *For projects, the distance could be much less than 15km, and in some cases less than 100m, but this must be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in combination effects.* (DoEHLG, 2009)

The Natura 2000 sites within this 'likely zone of impact' and their qualifying features of Special Conservation Interest are identified in section 4.4.2, below, and the conservation objectives of the sites are described in accordance with the guidance. Following this, the potential impacts associated with the proposal will be identified before an assessment is made of the likely significance of these impacts. If, at the end of the screening process, it cannot be objectively concluded that no significant impacts are likely or, if screening concludes that there is uncertainty about the significance of the impacts, it will be necessary to proceed to Stage 2, Appropriate Assessment.

4.4.2 Identification of Natura 2000 Sites

Adopting the precautionary principle in identifying potentially affected European sites, it has been decided to include all cSACs and SPAs within 15km of the proposal site.

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Table 3 below lists designated cSACs and SPAs within 15km or the zone of influence of the proposal site including their proximity. A map showing these designated sites in relation to the proposal is given in Appendix 3.

Table 3: Natura 2000 sites within 15km radius of proposal site

No.	Designated Site	Site Code	Proximity of dredge site to nearest point of designated site	Proximity of dumpsite to nearest point of designated site
1	Tralee Bay and Magharees Peninsula, West to Cloghane SAC	002070	Both the commercial berth and dredge areas lie within this site.	3.2km to the northeast
2	Akeragh, Banna and Barrow Harbour SAC	000332	0.8km to the southeast	1.4km to the northwest
3	Tralee Bay Complex SPA	004188	1.2km to the south, separated by Fenit neck of land, and 1.6km to the west	1.9km to the northwest
4	Slieve Mish Mountains SAC	002185	4km to the north	9.4km to the north
5	Magharee Islands SAC	002261	7.1km to the southeast	0.8km to the southeast
6	Magharee Islands SPA	004125	8km to the southeast	1.6km to the south
7	Dingle Peninsula SPA	004153	10.4km to the east-southeast	8km to the northeast
8	Mount Brandon SAC	000375	10.8km to the northeast	11.1km to the northeast
9	Castlemaine Harbour SAC	000343	12.1km to the north-northwest	17.4km to the north
10	Castlemaine Harbour SPA	004029	12.4km to the north	17.4km to the north
11	Ballyseedy Wood SAC	002112	12.9km to the west-northwest	16.4km to the northwest
12	Kerry Head SPA	004189	13. 4km to the south	7.6km to the south-southwest
13	Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA	004161	14.9km to the southwest	16.6km to the west
14	Lower River Shannon SAC	002165	15.9km to the southeast	9.3km to the south-southeast
15	Kerry Head Shoal SAC	002263	20.4km to the southeast	14.4km to the southeast

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4.4.3 Characteristics of Natura 2000 Sites

The following table lists the qualifying features of conservation interest for the cSACs and SPA sites that lie within 15km of the proposal site. Information pertaining to designated sites is from site synopses, conservation objectives and other information available on www.npws.ie[2].

Table 4: Natura 2000 sites with qualifying features of conservation interest

Designated Site	Qualifying features of conservation interest
Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Annual vegetation of drift lines [1210]

[2] As of 03/08/2017

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Designated Site	Qualifying features of conservation interest
	Perennial vegetation of stony banks [1220] *Salicornia* and other annuals colonizing mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Dunes with *Salix repens ssp.argentea* (Salix arenariae) [2170] Humid dune slacks [2190] *Molinia* meadows on calcareous, peaty or clavey-silt-laden soils (Molinion caeruleae) [6410] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] Otter (*Lutra lutra*) [1355] Petalwort (*Petalophyllum ralfsii*) [1395]
Akeragh, Banna and Barrow Harbour SAC (000332)	Annual vegetation of drift lines [1210] Salicornia and other annuals colonizing mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] European dry heaths [4030]
Tralee Bay Complex SPA (004188)	Whooper Swan (*Cygnus cygnus*) [A038] Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Wigeon (*Anas penelope*) [A050] Teal (*Anas crecca*) [A052] Mallard (Anas platyrhynchos) [A053] Pintail (*Anas acuta*) [A054] Scaup (*Aythya marila*) [A062] Oystercatcher (*Haematopus ostralegus*) [A130] Ringed Plover (*Charadrius hiaticula*) [A137] Golden Plover (*Pluvialis apricaria*) [A140] Grey Plover (*Pluvialis squatarola*) [A141] Lapwing (*Vanellus vanellus*) [A142] Sanderling (*Calidris alba*) [A144] Dunlin (*Calidris alpina*) [A149] Black-tailed Godwit (*Limosa limosa*) [A156] Bar-tailed Godwit (*Limosa lapponica*) [A157] Curlew (*Numenius arquata*) [A160] Redshank (*Tringa totanus*) [A162] Turnstone (*Arenaria interpres*) [A169] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Common Gull (*Larus canus*) [A182] Wetlands [A999]
Slieve Mish Mountains SAC (002185)	Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030]

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Designated Site	Qualifying features of conservation interest
	Alpine and Boreal heaths [4060] Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani) [8110] Calcareous rocky slopes with chasmophytic vegetation [8210] Siliceous rocky slopes with chasmophytic vegetation [8220] *Trichomanes speciosum* (Killarney Fern) [1421]
Magharee Islands SAC (002261)	Reefs [1170]
Magharee Islands SPA (004125)	Storm Petrel (*Hydrobates pelagicus*) [A014] Shag (*Phalacrocorax aristotelis*) [A018] Common Gull (*Larus canus*) [A 182] Common Tern (*Sterna hirundo*) [A193] Arctic Tern (*Sterna paradisaea*) [A194] Little Tern (*Sterna albifrons*) [A195] Barnacle Goose (*Branta leucopsis*) [A396]
Dingle Peninsula SPA (004153)	Fulmar (*Fulmarus glacialis*) [A009] Peregrine (*Falco peregrinus*) [A103] Chough (*Pyrrhocorax pyrrhocorax*) [A346]
Mount Brandon SAC (000375)	Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130] Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] Blanket bogs (* if active bog) [7130] Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani) [8110] Calcareous rocky slopes with chasmophytic vegetation [8210] Siliceous rocky slopes with chasmophytic vegetation [8220] *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Trichomanes speciosum* (Killarney Fern) [1421]
Castlemaine Harbour SAC (000343)	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Dunes with *Salix repens* ssp. *argentea* (Salicion arenariae) [2170] Humid dune slacks [2190] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion

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Designated Site	Qualifying features of conservation interest
	incanae, Salicion albae) [91E0] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Petalophyllum ralfsii* (Petalwort) [1395]
Castlemaine Harbour SPA (004029)	Red-throated Diver (*Gavia stellata*) [A001] Cormorant (*Phalacrocorax carbo*) [A017] Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Wigeon (*Anas penelope*) [A050] Mallard (*Anas platyrhynchos*) [A053] Pintail (*Anas acuta*) [A054] Scaup (*Aythya marila*) [A062] Common Scoter (*Melanitta nigra*) [A065] Oystercatcher (*Haematopus ostralegus*) [A130] Ringed Plover (*Charadrius hiaticula*) [A137] Sanderling (*Calidris alba*) [A144] Bar-tailed Godwit (*Limosa lapponica*) [A157] Redshank (*Tringa totanus*) [A162] Greenshank (*Tringa nebularia*) [A164] Turnstone (*Arenaria interpres*) [A169] Chough (*Pyrrhocorax pyrrhocorax*) [A346] Wetlands & Waterbirds [A999]
Ballyseedy Wood SAC (002112)	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0]
Kerry Head SPA (004189)	Fulmar (*Fulmarus glacialis*) [A009] Chough (*Pyrrhocorax pyrrhocorax*) [A346]
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161)	Hen Harrier (*Circus cyaneus*) [A082]
Lower River Shannon SAC (002165)	Sandbanks which are slightly covered by sea water all the time [1110] Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] *Salicornia* and other annuals colonizing mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] *Molinia* meadows on calcareous, peaty or clavey-silt-laden soils (Molinion caeruleae) [6410] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] Freshwater pearl mussel (*Margaritifera margaritifera*) [1029] Sea lamprey (*Petromyzon marinus*) [1095]

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Designated Site	Qualifying features of conservation interest
	Brook lamprey (*Lampetra planeri*) [1096] River lamprey (*Lampetra fluviatilis*) [1099] Salmon (*Salmo salar*) [1106] Bottle-nosed dolphin (*Tursiops truncatus*) [1349] Otter (*Lutra lutra*) [1355]
Kerry Head Shoal SAC (002263)	Reefs [1170]

4.4.4 Conservation Objectives

According to the Habitats Directive, the *conservation status of a natural habitat* will be taken as 'favourable' within its bio-geographic range when:

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

According to the Habitats Directive, the conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations. The conservation status will be taken as 'favourable' within its bio-geographic range when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

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The specific conservation objectives for each site are available on www.npws.ie. These have been accessed for the sites listed in the tables above on the 29/04/2019.

Site specific and detailed conservation objectives were available for the following sites:

- Tralee Bay and Magharees Peninsula West to Cloghane SAC (002070). Version 1. Produced February 2014
- Akeragh, Banna and Barrow Harbour SAC (000332). Version 1. Produced January 2017
- Tralee Bay Complex SPA (004188). Version 1. Produced April 2014
- Magharee Islands SAC (002261). Version 1. Produced December 2013
- Mount Brandon SAC (000375). Version 1. Produced July 2016
- Castlemaine Harbour SAC (000343), Castlemaine Harbour SPA (004029). Version 2.0. Produced July 2011
- Lower River Shannon SAC (002165). Version 1. Produced August 2012
- Kerry Head Shoal SAC (002263). Version 1. Produced October 2013

Generic conservation objectives were available for the following sites:

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- Slieve Mish Mountains SAC (002185). Generic version 6.0. Produced February 2018
- Magharee Islands SPA (004125). Generic version 6.0. Produced February 2018
- Dingle Peninsula SPA (004153). Generic version 6.0. Produced February 2018
- Ballyseedy Wood SAC (002112). Generic version 6.0. Produced February 2018
- Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161). Generic version 6.0. Produced February 2018
- Kerry Head SPA (004189). Generic version 6.0. Produced February 2018

Management plans are not available for any of the sites.

All conservation objectives together with other designated site information are available on http://www.npws.ie/protectedsites/.

4.5 IDENTIFICATION OF POTENTIAL IMPACTS

Potential likely ecological impacts arising from the project are identified in this section.

Description of elements of the project likely to give rise to potential ecological impacts.	- Maintenance dredging operations at Fenit Harbour to be conducted annually over an eight year dredge campaign - The dredge site is located within a Natura 2000 site - Disposal of dredge material at dumpsite following each dredge event - Yearly dredging and dumping activities will be subject to the granting of individual FL to be applied for on a yearly basis - Dumping activities at dumpsite will be subject to a DaS licence (this is being sought for the full eight year period).
Describe any likely direct, indirect or secondary ecological impacts of the project (either alone or in combination with other plans or projects) by virtue of: ○ *Size and scale;* ○ *Land-take;* ○ *Distance from Natura 2000 Site or key features of the Site;* ○ *Resource requirements;* ○ *Emissions;* ○ *Excavation requirements;* ○ *Transportation requirements;* ○ *Duration of construction, operation etc.; and* ○ *Other.*	- Loss and alteration of seabed habitat and associated species at the location of the dredge areas, which lie within an Natura 2000 site - Loss and alteration of seabed habitat and associated species (smothering effects) at the location of the dumpsite, which lies within 1km of the nearest Natura 2000 site - Potential water quality impacts from increased suspended sediment and turbidity levels in the water column and/or marine sediment contaminants at the dredge and dumpsite - Potential water quality impacts from accidental oil spill associated with fuelling activities of the suction hopper dredger - Potential low-level disturbance to marine mammals through underwater noise emissions.

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4.6 ASSESSMENT OF SIGNIFICANCE OF POTENTIAL IMPACTS

This section considers the list of sites identified in Section 4.4.2 above, together with the potential ecological impacts identified in the previous section and determines whether the project is likely to have significant effects on a Natura 2000 site.

When assessing impact, Natura 2000 sites are only considered relevant where a credible or tangible source-pathway-receptor link exists between the proposed development and a protected species or habitat type. In order for an impact to occur there must be a risk initiated by having a 'source' (e.g. marine dredging), a 'receptor' (e.g. a protected habitat/species and/or the habitats on which they depend), and an impact pathway between the source and the receptor (e.g. a waterbody which connects the proposal site to the protected species or habitats). An evaluation based on these factors to determine which Natura 2000 sites are the plausible ecological receptors for potential impacts of the proposed programme of dredging works will be conducted in Sections 4.6.1 and 4.6.2 below. The evaluation takes cognisance of the scope, scale, nature and size of the project, its location relative to the Natura 2000 sites listed in Table 3 above, and the degree of connectedness that exists between the project and each Natura 2000 site's potential ecological receptors.

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4.6.1 Natura 2000 sites outside the zone of potential impact influence

With regards to the proposal, it is considered that the project does not include any element that has the potential to significantly alter the conservation objectives for which certain Natura 2000 sites, listed in Table 3 above, are designated. It is considered that these Natura 2000 sites are outside the zone of potential impact influence of the proposal due to the absence of plausible impact pathways and/or the attenuating effect of the distance intervening. Therefore, it is objectively concluded that significant impacts on these sites are not reasonably foreseeable as a result of the programme of works described at Section 4.2.5. These sites, which are listed in Table 5 below, along with their distance and the rationale for exclusion, will not be considered further in this document.

Table 5. Natura 2000 sites outside the zone of potential impact influence

Natura 2000 site	Proximity of subject sites to nearest point of designated site	Rationale for exclusion from assessment
Slieve Mish Mountains SAC (002185)	Dredge site is 4km to the north, dumpsite is 9.4km to the north	• Designated for a variety of terrestrial habitats and one terrestrial plant species • No overlap - Intervening distance of in excess of 4km between site and SAC • Marine nature and location of the works • Marine habitats not suitable for Killarney fern • No plausible impact pathway for qualifying habitat or species effects
Dingle Peninsula SPA (004153)	Dredge site is 10.4km to the east, dumpsite is 8km to the northeast	• Designated for two coastal/upland species (chough, peregrine) and one species of seabird (fulmar) • Marine nature and location of the works • Intervening distance of in excess of 8km between site and SPA • Significant impacts not reasonably foreseeable
Mount Brandon SAC (000375)	Dredge site is 10.8km to the northeast, dumpsite is 11.1km to the northeast	• Designated for variety of terrestrial and freshwater habitats, one freshwater invertebrate and one terrestrial plant species • No overlap - Intervening distance of in excess of 10km between site and SAC • Marine nature and location of the works • Marine habitats not suitable for freshwater pearl mussel or Killarney fern • No plausible impact pathway for qualifying habitat or species effects

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Natura 2000 site	Proximity of subject sites to nearest point of designated site	Rationale for exclusion from assessment
Castlemaine Harbour SAC (000343)	Dredge site is 12.1km to the north-northwest, dumpsite is 17.4km to the north	• Designated for a variety of coastal and terrestrial habitats, marine and freshwater species and one liverwort species • Due to the separation buffer provided by the intervening Dingle Peninsula landmass between the SAC and the proposed dredge area and dumpsite the SAC is outside of the zone of influence of the project • Significant habitat or species impacts are not reasonably foreseeable
Castlemaine Harbour SPA (004029)	Dredge site is 12.4km to the north, dumpsite is 17.4km to the north	• Designated for variety of seabird, wader, wildfowl and coastal/upland species • Due to the separation buffer provided by the intervening Dingle Peninsula landmass between the SPA and the proposed dredge area and dumpsite the SPA is outside of the zone of influence of the project • Significant habitat or species impacts are not reasonably foreseeable
Ballyseedy Wood SAC (002112)	Dredge site is 12.9km to the west-northwest, dumpsite is 16.4km to the northwest	• Designated for one woodland habitat-type • No overlap - Intervening distance of in excess of 12km between site and SAC • Marine nature and location of the works • No plausible impact pathway for qualifying habitat or species effects
Kerry Head SPA (004189)	Dredge site is 13.4km to the south, dumpsite is 7.6km to the south-southwest	• Designated for one seabird (fulmar) and one coastal/upland (chough) species • Marine nature and location of the works • Intervening distance of in excess of 7km between site and SPA • Significant impacts not reasonably foreseeable
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161)	Dredge site is 14.9km to the southwest, dumpsite is 16.6km to the west	• Designated for one species, namely hen harrier • No overlap - Intervening distance of in excess of 14km between site and SPA • Marine nature and location of the works • Marine habitats not suitable for hen harrier • Significant impacts not reasonably foreseeable

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4.6.2 Natura 2000 sites within the zone of potential impact influence

Of the designated sites listed in Table 5 above, seven are considered to have the potential to be impacted as a result of the proposal. There is potential for habitat alteration, species disturbance/displacement and/or water quality impacts to occur within these remaining Natura 2000 sites as a result of the proposal. These Natura 2000 sites are intrinsically linked to the proposal site and to each other through the coastal water bodies of 'Inner Tralee Bay', 'Outer Tralee Bay', 'Brandon Bay', 'Southwestern Atlantic Seaboard' (HA 23), 'Mouth of the Shannon' (HAs 23;27), and 'Shannon Plume' (HA's 27;28)[3]. Therefore, the assessment of significance of potential impacts that follows focuses on the following designated sites:

- Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)
- Akeragh, Banna and Barrow Harbour SAC (000332)
- Tralee Bay Complex SPA (004188)
- Magharee Islands SAC (002261)
- Magharee Islands SPA (004125)
- Lower River Shannon SAC (002165)
- Kerry Head Shoal SAC (002263)

The likelihood of significant effects to a Natura 2000 site from the project was determined based on a number of indicators including:

- Habitat loss
- Habitat alteration
- Water quality and resource
- Habitat or species fragmentation
- Disturbance and/or displacement of species

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The likelihood of significant cumulative/in-combination effects is assessed in Section 4.6.7.

[3] Available at http://gis.epa.ie/Envision. Accessed 10/04/2018

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4.6.3 Habitat Loss and Alteration

There will be habitat loss as a result of dredging of the marina, commercial berth and manoeuvring area within Fenit Harbour. These areas were last dredged in 2016 and in the intervening period sediment has deposited and accumulated up to 3m in places; this level of sedimentation is considered to be relatively high. There will be habitat loss within:

- Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)

The proposed dumpsite is not located within a Natura 2000 site; therefore, disposal of dredge material at the dumpsite will not result in habitat loss within any Natura 2000 site.

With regards to the potential for habitat alteration there will be a temporary local increase in suspended solids in the vicinity of the dredging operation at Fenit Harbour. With regard to the dumpsite, according to the results of previous sediment transport modelling there is potential for increased suspended sediments and sediment deposition within and outside of the bay. Previous modelling indicated that suspended silt fractions released during the disposal show an interesting circulation pattern of material firstly moving south but then migrating north-west and west. This material becomes well-dispersed with the tide eventually flushed out to sea in a north-westerly direction away from the mouth of the Shannon estuary. Therefore, based on the results of sediment transport modelling simulations, it is anticipated that the project will not result in significant effects to marine/inter-tidal/coastal habitats within the Lower River Shannon SAC.

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Due to the intervening distance of over 14km between the dumpsite and the Kerry Head Shoal SAC, which lies to the northwest of the dumpsite, and the dilution factor available off the western Irish coast, it is anticipated that the proposal will not have a significant effect on the conservation objectives of 'Reefs' for which the site is designated.

It is considered that there is potential for habitat alteration as a result of increased suspended sediments and sediment deposition within the following Natura 2000 sites:

- Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)
- Tralee Bay Complex SPA (004188)
- Akeragh, Banna and Barrow Harbour SAC (000332)
- Magharee Islands SAC (002261)
- Magharee Islands SPA (004125)

4.6.4 Habitat or Species Fragmentation

Habitat fragmentation can be described as discontinuities in an organisms preferred habitat. This can result in species fragmentation through fragmentation of the population. Habitat loss or alteration can result in habitat fragmentation. There is potential for habitat/species fragmentation within the following Natura 2000 sites:

- Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)
- Tralee Bay Complex SPA
- Akeragh, Banna and Barrow Harbour SAC (000332)
- Magharee Islands SAC (002261)

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- Magharee Islands SPA (004125)

Due to the intervening distance and the results of sediment transport modelling simulations, as discussed in Section 4.6.3 above significant habitat or species fragmentation are not expected to occur within the following Natura 2000 sites:

- Lower River Shannon SAC (002165)
- Kerry Head Shoal SAC (002263)

4.6.5 Disturbance and/or Displacement of Species

Disturbance or displacement of species will result from habitat loss/alteration within Fenit Harbour as a result of the dredging operations and at the dumpsite through deposition of sediment on the seabed. Indirect species disturbance/displacement may also potentially result from underwater noise emissions associated with dredging/vessel activity or from water quality effects associated with dredging operations such as increased turbidity in the water column or the potential release of contaminants to the aquatic environment. It is considered that there is potential for disturbance/and or displacement of species within the following Natura 2000 sites:

- Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)
- Tralee Bay Complex SPA
- Akeragh, Banna and Barrow Harbour SAC (000332)
- Magharee Islands SAC (002261)
- Magharee Islands SPA (004125)
- Lower River Shannon SAC (002165)

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4.6.6 Water Quality

It is estimated that a relatively low percentage volume of sediment will be lost to the water column during dredging operations. Loss of this material will result in an increase in the volume of suspended sediments and an increase in turbidity levels in the water column. It is predicted that the greatest increase in suspended sediment concentration will occur in the vicinity of the proposed dredging areas. It is expected that concentrations will lower significantly with distance from the dredging operations. Disturbance of the seabed during dredging events also has the potential to result in the release of contaminants and polluting material to the aquatic environment where such substances are found to occur in marine sediments at higher levels. There is also potential for water quality impacts via accidental oil spill associated with fuelling activities of the suction hopper dredger.

It is considered that there is potential for water quality effects within the following Natura 2000 sites:

- Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)
- Tralee Bay Complex SPA
- Akeragh, Banna and Barrow Harbour SAC (000332)
- Magharee Islands SAC (002261)
- Magharee Islands SPA (004125)

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Due to the intervening distance, the results of sediment transport modelling simulations, as discussed in Section 4.6.3 above, and the available dilution factor off the west Irish coast, significant water quality impacts are not expected to occur within the following Natura 2000 sites:

- Lower River Shannon SAC (002165)
- Kerry Head Shoal SAC (002263)

4.6.7 Cumulative/In-combination Impacts

Other projects/activities that could potentially interact with the proposed dredging and dumping operations to result in cumulative or in-combination impacts to the environment include regular harbour activities such as commercial shipping, fishing, and casual boating. It is considered that there is potential for cumulative water quality or species disturbance/displacement impacts as a result of interaction between the proposal and other projects/activities to the following Natura 2000 sites:

- Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)
- Tralee Bay Complex SPA
- Akeragh, Banna and Barrow Harbour SAC (000332)
- Magharee Islands SAC (002261)
- Magharee Islands SPA (004125)
- Lower River Shannon SAC (002165)

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4.7 CONCLUSION OF SCREENING STAGE

In conclusion, to determine the potential impacts, if any, of the proposal to carry out maintenance dredging at Fenit Harbour and disposal of the dredge material to a dumpsite in Tralee Bay on nearby Natura 2000 sites, a screening for Appropriate Assessment was undertaken. The proposed development is within 15km of fifteen Natura 2000 sites.

It has been objectively concluded during the screening process that eight sites within 15km of the project are likely not to be significantly affected by the proposal to dredge Fenit harbour and dispose of the dredge material at a dumpsite in Tralee Bay, and these include:

- Slieve Mish Mountains (002185)
- Mount Brandon SAC (000375)
- Ballyseedy Wood SAC (002112)
- Castlemaine Harbour SAC (000343)
- Castlemaine Harbour SPA (004029)
- Dingle Peninsula SPA (004153)
- Kerry Head SPA (004189)
- Kerry Head Shoal SAC (002263)

It has been concluded that the proposal to dredge Fenit harbour and dispose of the dredge materials at a dumpsite in Tralee Bay is likely to have a significant effect, or significant effects cannot be ruled out at this stage, on the following Natura 2000 sites:

- Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)
- Tralee Bay Complex SPA (004188)
- Akeragh, Banna and Barrow Harbour SAC (000332)
- Magharee Islands SAC (002261)
- Magharee Islands SPA (004125)
- Lower River Shannon SAC (002165)

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Further assessment is required to determine whether the project is likely to adversely affect the integrity of these Natura 2000 sites.

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Appendix 1

Stages of Appropriate Assessment

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Stage 1 - Screening

This is the first stage of the Appropriate Assessment process and that undertaken to determine the likelihood of significant impacts as a result of a proposed project or plan. It determines need for a full Appropriate Assessment.

If it can be concluded that no significant impacts to Natura 2000 sites are likely then the assessment can stop here. If not, it must proceed to Stage 2 for further more detailed assessment.

Stage 2 - Natura Impact Statement (NIS)

The second stage of the Appropriate Assessment process assesses the impact of the proposal (either alone or in combination with other projects or plans) on the integrity of the Natura 2000 site with respect to the conservation objectives of the site and its ecological structure and function. This is a much more detailed assessment that Stage 1. A Natura Impact Statement containing a professional scientific examination of the proposal is required and includes any mitigation measure to avoid, reduce or offset negative impacts.

If the outcome of Stage 2 is negative i.e. adverse impacts to the sites cannot be scientifically ruled out, despite mitigation, the plan or project should proceed to Stage 3 or be abandoned.

Stage 3 - Assessment of alternative solutions

A detailed assessment must be undertaken to determine whether alternative ways of achieving the objective of the project/plan exists.

Where no alternatives exist the project/plan must proceed to Stage 4.

Stage 4 - Assessment where no alternative solutions exist and where adverse impacts remain

The final stage is the main derogation process examining whether there are imperative reasons of overriding public interest (IROPI) for allowing a plan or project to adversely affect a Natura 2000 site where no less damaging solution exists.

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Appendix 2

Site Synopses

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SITE SYNOPSIS

Site Name: Tralee Bay and Magharees Peninsula, West to Cloghane SAC

Site Code: 002070

This large site in Co. Kerry stretches from Tralee town westwards to Fenit Harbour and Cloghane, encompassing Tralee Bay, Brandon Bay and the Magharees Peninsula. It includes extensive mudflats at the eastern end, the beaches of Derrymore Island, the sand dunes and lagoons of the Magharees Peninsula, as well as the rocky headlands at its end. The site includes two Statutory Nature Reserves, Tralee Bay and Derrymore Island, and much of the estuarine part of the site has been designated a Special Protection Area (SPA) for birds and their habitats.

The site is mostly underlain by limestone, but significant parts of this are covered with glacial drift or windblown sand. The main exposures occur at Fenit port, Oyster Hall, Blennerville and at Rough Point and Fahamore, but there are some other low outcrops on the beaches west to Castlegregory. Elsewhere the sandstones and slates of the Dingle Beds appear.

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The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

- [1130] Estuaries
- [1140] Tidal Mudflats and Sandflats
- [1150] Coastal Lagoons*
- [1160] Large Shallow Inlets and Bays
- [1170] Reefs
- [1210] Annual Vegetation of Drift Lines
- [1220] Perennial Vegetation of Stony Banks
- [1310] *Salicornia* Mud
- [1330] Atlantic Salt Meadows
- [1410] Mediterranean Salt Meadows
- [2120] Marram Dunes (White Dunes)
- [2130] Fixed Dunes (Grey Dunes)*
- [2170] Dunes with Creeping Willow
- [2190] Humid Dune Slacks
- [6410] *Molinia* Meadows
- [91E0] Alluvial Forests*
- [1355] Otter (*Lutra lutra*)
- [1395] Petalwort (*Petalophyllum ralfsii*)

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Both the Tralee and Brandon (Owenmore) estuaries feature wide expanses of sheltered intertidal flats, often fringed with saltmarsh vegetation. Plant species are typically scarce on the flats, although there are some eelgrass (*Zostera* spp.) beds and patches of green algae (e.g. *Ulva* spp. and *Enteromorpha* spp.). The eelgrass beds at Derrymore Island include *Zostera noltii*, a species which has a limited distribution in Ireland. A variety of polychaetes (worms) and bivalve molluscs are also present in the intertidal sections.

The majority of Tralee Bay is shallow and composed of sublittoral sediments. In the more sheltered areas of the bay, there is a variety of important sublittoral sediment communities in which a number of rare species occur. Seagrass beds in sandy substrates are characterized by oysters and the rare anemone *Calliactis parasitica* which lives on shells inhabited by the hermit crab *Pagurus bernhardus*. The little known hydroid, *Laomedia angulata*, is also found on the fronds of the seagrass. The native oyster, *Ostrea edulis,* occurs in sediment communities throughout the bay. Maerl beds, composed of the free-living coralline algae *Lithothamnion corallioides* and *Phymatolithon calcareum*, and characterized by anemones (*Anthopleura balli*) and oysters, occur in the middle of the bay. The rare anemone *Halcampa chrysanthellum* has been recorded here.

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The intertidal reefs of Tralee Bay and the Magharees peninsula range from being exposed to sheltered from wave action, and the communities present are good examples of the communities typically found on these types of shores. The barnacle/limpet community with the lichen *Lichina pygmaea* is an uncommon community and is found in the upper-mid shore at Rough Point. The low shore at Rough Point, which is moderately exposed to wave action, and the shore at Coosanea, which is sheltered from wave action, are both very species-rich. Rocky outcrops on the shore half way round the bay near Camp are known to support a community of the uncommon honeycomb worm *Sabellaria alveolata*. The sublittoral reefs support communities characterised by a variety of red foliose algae, as well as the brown algae *Dictyota dichotoma,* and are typical of communities that are subjected to sand scour as indicated by the presence of the red algae *Furcellaria lumbricalis* and *Polyides rotundus*.

In the transition zone between the intertidal flats and saltmarsh, specialised colonisers of mud predominate - swards of Common Cord-grass (*Spartina anglica*) are extensive on the leeward side of Derrymore Island, while swards of Glasswort (*Salicornia europaea* agg.) also occur in parts of the site.

Saltmarsh vegetation frequently fringes the mudflats, with the most extensive areas being found at Blennerville, Derrymore Island and Formoyle in Brandon Bay. The dominant type of saltmarsh present is Atlantic salt meadow. Characteristic species occurring include Common Saltmarsh-grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea-milkwort (*Glaux maritima*), Sea Plantain (*Plantago maritima*), Red Fescue (*Festuca rubra*), Creeping Bent (*Agrostis stolonifera*), Saltmarsh Rush (*Juncus gerardi*), Long-bracted Sedge (*Carex extensa*), Lesser Sea-spurrey (*Spergularia marina*) and Sea Arrowgrass (*Triglochin maritima*). Areas of

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Mediterranean salt meadows, characterised by clumps of Sea Rush (*Juncus maritimus*), occur occasionally.

Sandy beaches backed by strips of 'white' dunes are common along the southern shore of the site. The vegetation of these 'white' dunes is dominated by Marram (*Ammophila arenaria*). However, the main dune area on this southern shore occurs on the Magherees Peninsula - a tombolo which joins a number of the Magharees Islands with the mainland. Here there are extensive areas of fixed 'grey' dunes, which feature a number of damp hollows or dune slacks. The fixed dunes are species-rich, with characteristic species such as White Clover (*Trifolium repens*), Lesser Hawkbit (*Leontodon taraxacoides*), Common Centaury (*Centaurium erythraea*), Lady's Bedstraw (*Galium verum*) and grasses (e.g. *Festuca rubra, Poa trivialis* and *Avenula pubescens*).

Relatively scarce plants found on the dunes include the following: Fringed Rock-cress (*Arabis brownii*), Fragrant Orchid (*Gymnadenia conopsea*), Squinancywort (*Asperula cynanchica*), Autumn Lady's-tresses (*Spiranthes spiralis*) and Dodder (*Cuscuta epithymum*). Dune slack species include Strawberry Clover (*Trifolium fragiferum*), Chaffweed (*Anagallis minima*) and the fungus *Inocybe halophila*.

Lough Gill, a natural sedimentary lagoon, is located at the base of the Magherees Peninsula. The lagoon is only slightly brackish and therefore contains freshwater species along with lagoon specialists. Submerged flora present includes Beaked Tasselweed (*Ruppia maritima*) and Horned Pondweed (*Zannichellia palustris*), while species fringing the lagoon include Common Reed (*Phragmites australis*), Sea Club-rush (*Scirpus maritimus*) and Grey Club-rush (*S. lacustris* subsp. *tabernaemontani*).

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Other coastal habitats that occur within the site include shingle beaches, rocky shores and vegetated sea-cliffs. The site also contains fragments of terrestrial habitats such as deciduous woodland, scrub, heath, dry limestone grassland, wet grassland and freshwater marshes.

There is some good limestone flora on the hill at Oyster Hall, with Burnet Rose (*Rosa pimpinellifolia*), Southern Polypody (*Polypodium australe*) and Hairy Rock-cress (*Arabis hirsuta*) occurring. There is an old record for the Red Data Book species, Sea-kale (*Crambe maritima*). At Fahamore and Rough Point it is the intertidal communities that are particularly rich, benefiting from a multitude of microhabitats in the eroded limestone. Red algae are frequent, including the agar seaweeds *Gelidium* and *Pterocladia*.

A small area of *Molinia* meadow is found in the site, with species such as Purple Moor-grass (*Molinia caerulea*), Devil's-bit Scabious (*Succisa pratensis*), Sharp-flowered Rush (*Juncus acutiflorus*) being common, and species such as Greater Tussock-sedge (*Carex paniculata*), Tormentil (*Potentilla erecta*), Marsh Cinquefoil (*Potentilla palustris*), Wild Angelica (*Angelica sylvestris*) and Common Valerian (*Valeriana officinalis*) also frequent.

Beach features dominate the northern coast of the Dingle Peninsula with an excellent series of shingle ridges forming Derrymore Island and the tombolo which links

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former Magheree Islands (Rough Point, etc.) to the mainland. Here there is a large area of well developed sand dunes with an exceptionally rich flora and great topographic variation. The flora includes Fringed Rock-cress, Squinancywort, Dodder, Autumn Lady's-tresses and Chaffweed - all plants with a restricted distribution in the west of Ireland. These occur in a vegetation with abundant Red Fescue, scattered Marram, and herbs such as Lady's Bedstraw, Wild Thyme (*Thymus praecox*), Common Bird's-foot-trefoil (*Lotus corniculatus*) and Kidney Vetch (*Anthyllis vulneraria*). Yellow-rattle (*Rhinanthus minor*), eyebrights (*Euphrasia* spp.), Pyramidal Orchid (*Anacamptis pyramidalis*) and Heath Spotted-orchid (*Dactylorhiza maculata*) are four sensitive species which also occur here.

At the seaward edge drift line vegetation is often present. The more stable areas of shingle support Sea Beet (*Beta vulgaris* subsp. *maritima*), Sea Mayweed (*Matricaria maritima*), Sea Campion (*Silene vulgaris* subsp. *maritima*), Curled Dock (*Rumex crispus*), oraches (*Atriplex* spp.), Sea Sandwort (*Honkenya peploides*) and Silverweed (*Potentilla anserina*).

Between the dunes where erosion has removed the sand down to the water table there are temporary ponds or dune slacks with many additional species. Marsh Pennywort (*Hydrocotyle vulgaris*), Silverweed, various sedges (*Carex panicea* and *C. nigra*) and, in places, Strawberry Clover, Adder's-tongue (*Ophioglossum vulgatum*), Knotted Pearlwort (*Sagina nodosa*) and the orchids *Dactylorhiza majalis* and *D. incarnata* all occur. Some parts of the dune slacks feature a vegetation community characterised by the presence of Creeping Willow (*Salix repens*).

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Woodland is rare on the Dingle Peninsula so the three stands included in this site are locally important. A deserted river valley at Killelton, the steep valley of the Finglas River at Camp and the west-facing slopes of Drom Hill opposite Cloghane all have features of significant interest. The last site has many species of lower plant (liverworts and lichens) that form distinctive elements of the westernmost natural woods in Ireland. At Garrahies Wood, adjacent to the Finglas River, there is an example of wet woodland on base-rich soils subject to flooding. The woodland type falls into the ash-alder alluvial forest category. The most common tree species are Alder (*Alnus glutinosa*), Downy Birch (*Betula pubescens*) and willows (*Salix* spp.). Bluebell (*Hyacinthoides non-scripta*), grasses and Bramble (*Rubus fruticosus* agg.) are the most common species in the ground layer.

The dune complex on the Magharees Peninsula supports the largest Irish breeding population of Natterjack Toads. Indeed, the population may be the largest breeding population in Britain and Ireland. The Natterjack Toad is listed as vulnerable in the Red Data Book and is protected under both European and national legislation. The toads require shallow warm water to spawn in and sandy habitats for over-wintering. Their tadpoles are vulnerable to predation in permanent lakes but despite this they have some success in Lough Gill which is a shallow lake with flat shores of sand, wet grassland or marsh. Natterjack Toads also breed within the site at Fermoyle, to the west. Also recorded from Fermoyle is the rare whorl snail *Vertigo angustior*, a species listed on Annex II of the E.U. Habitats Directive. Two species of

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hover fly - *Platycheris perpilladus* and *Sphaerophoria loewi* - have their only Irish records from the Magharees Peninsula dune system and a water beetle, *Cercyon sternalis,* was first recorded in Ireland in 1997 in Lough Gill.

The site supports populations of several rare plant species which have not been mentioned already. The bryophyte Petalwort (*Petalophyllum ralfsii*), which is listed on Annex II of the E.U. Habitats Directive, is known from the dune slacks on the Magharees Peninsula and Smooth Brome (*Bromus racemosus*), a Red Data Book grass, has been recorded from two wet meadows within the site. Several aquatic plants of interest grow in Lough Gill, the rarest being the Red Data Book stonewort *Chara canescens*. The Slender-leaved Pondweed (*Potamogeton filiformis*) occurs far to the south of its distribution elsewhere in Ireland and Britain, while there are also old records for Spiral Tasselweed (*Ruppia spiralis*). The marshes along the southern shore in the past support a rich variety of vegetation including several species rare in Kerry such as Water Dock (*Rumex hydrolapathum*) and Greater Spearwort (*Ranunculus lingua*), as well as sedges (*Carex dioica, C. limosa* and *C. diandra*) on patches of peat. Despite local reclamation it is likely that most of these still survive.

Otters regularly feed within this extensive site though it is not known if they breed. Otter is listed on Annex II of the E.U. Habitats Directive.

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Tralee Bay, including Lough Gill, is an internationally important wetland for wintering waders and wildfowl. Species present which are listed on Annex I of the E.U. Birds Directive include Whooper Swans (24, mid-1980s), Golden Plover (3,053, 1994-95) and Bar-tailed Godwit (903, 1995-96). The dunes also provide an important feeding ground for Chough, a resident Annex I species.

Other wintering waders and wildfowl present include: Pale-bellied Brent Goose (944, mid-1980s), Shelduck (218, 1995-96), Gadwall (14, 1994-95), Teal (860, 1994-95), Pintail (56, 1995-96), Shoveler (144, mid-1980s), Scaup (1560, 1994-95), Scoter (620, 1994-95), Red-breasted Merganser (46, 1994-95), Ringed Plover (332, 1994-95), Grey Plover (674, 1995-96), Lapwing (5700, 1994-95), Knot (320, 1994-95), Sanderling (270, 1994-95), Purple Sandpiper (103, mid-1980s), Dunlin (4122, 1995-96), Black-tailed Godwit (508, 1994-95), Curlew (826, 1994-95), Redshank (352, 1995-96), Greenshank (21, 1994-95) and Turnstone (477, mid-1980s). Most of these species are present in nationally important numbers.

The dunes at this site face pressures from intensive farming practises and recreational use by visitors. The most threatening activities include fertilisation of the species-rich dune grasslands, over-grazing, and trampling of areas of dunes adjacent to tourist facilities (e.g. caravan parks). These activities may lead to severe erosion and eutrophication of the dune grasslands and dune slacks. Parts of the dune system are also vulnerable to invasion by Sea Buckthorn (*Hippophae rhamnoides*).

Agricultural run-off from areas of fertilised dune grasslands in the vicinity of Lough Gill pose a continued threat to the nutrient status of the lagoon; algal blooms and fish

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kills have occurred in the past. Removal of sand has also occurred and poses a threat to the integrity of the system.

Generally, the intertidal areas are relatively robust, although certain communities are vulnerable. For example, *Spartina* has spread widely, and may oust less vigorous colonisers of mud and may also reduce the area of mudflat available to feeding birds. Other activities, such as land reclamation and aquaculture, pose potential threats in terms of damage to habitats and potential disturbance to wintering birds.

Domestic and industrial wastes are discharged into inner Tralee Bay, but water quality is generally satisfactory - except in the inner bay, reflecting the sewage load from Tralee Town. Further industrial development along the bay in the vicinity of Tralee Town and Fenit and water polluting operations are potential threats.

This site is of considerable ecological and conservation significance for the excellent diversity of habitats it contains, many of which are listed on Annex I of the E.U. Habitats Directive. The occurrence of a species listed on Annex II of the E.U. Habitats Directive adds further importance to the site. The presence of a number of Red Data Book species, including the largest population of Natterjack Toads in Ireland, is also notable, as is the occurrence of several species listed on Annex I of the E.U. Birds Directive.

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SITE SYNOPSIS

Site Name: Akeragh, Banna and Barrow Harbour SAC

Site Code: 000332

Akeragh, Banna and Barrow Harbour SAC is a large coastal site covering a 10 km section of coastline in Co. Kerry, and including a wide diversity of habitats. The underlying rock is limestone, which outcrops only in the southern part of the site, in the impressive columns and hillsides north of Fenit. Elsewhere shell sand is predominant with occasional development of peat.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[1210] Annual Vegetation of Drift Lines
[1310] Salicornia Mud
[1330] Atlantic Salt Meadows
[1410] Mediterranean Salt Meadows
[2110] Embryonic Shifting Dunes
[2120] Marram Dunes (White Dunes)
[2130] Fixed Dunes (Grey Dunes)*
[2190] Humid Dune Slacks
[4030] Dry Heath

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Sand dunes run southwards from Ballyheigue and they become especially interesting south of the Akeragh outflow where they show great variety in both physiography and vegetation. The largest proportion of the sand dune system is fixed dune grassland. The vegetation is made up of a mosaic of Marram (*Ammophila arenaria*) tussocks interspersed with low-lying patches of a Red Fescue-Lady's Bedstraw (*Festuca rubra-Galium verum*) community. Other species occurring include Smooth Meadow-grass (*Poa pratensis*), Daisy (*Bellis perennis*), Ribwort Plantain (*Plantago lanceolata*) and Bulbous Buttercup (*Ranunculus bulbosus*). There is a sparse occurrence of moss species, including *Brachythecium rutabulum, Tortula ruralis* ssp. *ruraliformis* and *Homalothecium lutescens*. These tend to be restricted to areas close to rabbit burrows, where they are associated with species such as Germander Speedwell (*Veronica chamaedrys*), Squinancywort (*Asperula cynanchica*) and Dog Lichen (*Peltigera* spp.). A number of other species typical of Mesobromion grasslands are found in this habitat type, reflecting the calcareous nature of the site. These include Pyramidal Orchid (*Anacamptis pyramidalis*), Thyme-leaved Sandwort (*Arenaria serpyllifolia*) and Hairy Rock-cress (*Arabis hirsuta*). Dodder (*Cuscuta epithymum*), a parasitic plant, grows in abundance on the fixed dune slopes at Carrahane.

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Mobile Marram dunes occur as a narrow band running along the seaward side of the entire coastal strip. There is a slight increase in dune mobility towards the growing tip at Carrahane. The main ridges are dominated by Marram and reach heights in excess of 20 m in places. Companion species include Sea Spurge (*Euphorbia paralias*), Colt's-foot (*Tussilago farfara*), Sea-holly (*Eryngium maritimum*) and Sand Sedge (*Carex arenaria*). Also occurring are embryonic dunes, with such species as Sand Couch (*Elymus farctus*) and Sea Rocket (*Cakile maritima*). The latter species, along with Spear-leaved Orache (*Atriplex prostrata*), has also been recorded from the 'annual vegetation of drift lines' habitat at this site.

The site contains a number of dune slack areas, these being best developed on the landward side of Carrahane dunes. Species present in these dune slacks include Common Bent (*Agrostis stolonifera*), Red Clover (*Trifolium pratense*), Glaucous Sedge (*Carex flacca*), Water Mint (*Mentha aquatica*), Creeping Willow (*Salix repens*) and the scarce Marsh Helleborine (*Epipactis palustris*).

Of particular ecological interest is the gradation from fixed dune and dune slack to saltmarsh at Carrahane. Saltmarsh here is particularly well-developed but also occurs at Barrow Harbour. Common saltmarsh species include Thrift (*Armeria maritima*), Red Fescue, Sea Plantain (*Plantago maritima*), Saltmarsh Rush (*Juncus gerardi*) and Sea Rush (*Juncus maritima*). A number of scarce species are associated with the saltmarsh, notably Hard-grass (*Parapholis strigosa*), Saltmarsh Flat-sedge (*Blysmus rufus*), Strawberry Clover (*Trifolium fragiferum*) and a species of sea-lavender (*Limonium recurvum*). Glassworts (*Salicornia* spp.) occur on the edges of the saltmarsh and in sheltered areas extends onto the intertidal muds.

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The harbour is surrounded by low hills of limestone which support an interesting grassland community where they remain unfertilised. This is best seen at the entrance to Carrahane Bay but recurs sporadically elsewhere. Coastal heath occurs scattered on limestone rocky areas in the southern part of the site. It generally occurs in association with dry grassland. Species which occur include Gorse (*Ulex europaeus*), Western Gorse (*U. gallii*), Burnet Rose (*Rosa pimpinellifolia*), Blackthorn (*Prunus spinosa*), Biting Stonecrop (*Sedum acre*), Black Medick (*Medicago lupulina*), Common Whitlowgrass (*Erophila verna*), Kidney Vetch (*Anthyllis vulneraria*) and Wild Madder (*Rubia peregrina*), among others.

Akeragh Lough now supports extensive areas of brackish vegetation. It was formerly richer in birdlife, but the lake level has been controlled by a sluice on the outflow, the total water area has declined. Also, the peaty land to the east has been afforested. The site supports important wintering waterfowl populations. Brent Goose occur in internationally important numbers (360 in winter 1996/97), while in winter 1996/97 nationally important populations of Ringed Plover (130), Grey Plover (62), Lapwing (approx. 2000), Sanderling (280) and Bar-tailed Godwit (345) occurred. Notable populations of Golden Plover, Oystercatcher, Dunlin, Curlew and Redshank also occur. The regular occurrence of Golden Plover and Bar-tailed Godwit is of note as these species are listed on Annex I of the E.U. Birds Directive.

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This large site is of major ecological interest due both to its range of floristically-rich coastal habitats, nine of which are listed on Annex I of the E.U. Habitats Directive, including one priority habitat, and as a wintering site for significant numbers of waterfowl (including two Annex I species).

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SITE SYNOPSIS

SITE NAME: TRALEE BAY COMPLEX SPA

SITE CODE: 004188

The Tralee Bay Complex SPA is located along the coast of north Co. Kerry between Ballyheige in the north, Tralee in the east and Stradbally in the west. The site includes the inner part of Tralee Bay, including Derrymore Island, the inlets of Barrow Harbour and Carrahane Strand, Akeragh Lough, Lough Gill, and much of the intertidal habitat from Scraggane Point at the northern end of the Magharees Peninsula around the coast to *c*. 2 km south of Ballyheige. Inner Tralee Bay is well sheltered by the Derrymore Island peninsula. The intertidal sediments vary from muddy sands on the upper shore to firm rippled sands on the lower, more exposed shore. The sediments have a diverse macro-invertebrate fauna, with such species as Cockle (*Cerastoderma edule*), Lugworm (*Arenicola marina*), Ragworm (*Hediste diversicolor*), Baltic Tellin (*Macorna balthica*) and Shrimp (*Crangon crangon*) occurring. The intertidal flats have extensive beds of Eelgrass (*Zostera* spp.).

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Whooper Swan, Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Mallard, Pintail, Scaup, Oystercatcher, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Turnstone, Black-headed Gull and Common Gull. It is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

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Tralee Bay Complex SPA is an internationally important wetland for wintering waders and wildfowl. It supports an internationally important population of Light-bellied Brent Goose (1,412) and nationally important populations of a further 21 species, i.e. Whooper Swan (101), Shelduck (220), Wigeon (1,634), Teal (623), Mallard (571), Pintail (54), Scaup (892), Oystercatcher (1,011), Ringed Plover (344), Golden Plover (6,393), Grey Plover (195), Lapwing (6,106), Sanderling (228), Dunlin (2,444), Black-tailed Godwit (139), Bar-tailed Godwit (608), Curlew (1,170), Redshank (635), Turnstone (229), Black-headed Gull (1,320) and Common Gull (599) – all figures are five year mean peak counts for the period 1995/96 to 1999/2000, except the gulls which are four year mean peak counts for the period 1996/97 to 1999/2000.

Tralee Bay Complex SPA is of high ornithological importance as it annually supports over 20,000 wintering waterbirds, including an international important population of Light-bellied Brent Goose and nationally important populations of 21 other species. It is of note that three of the species that regularly occur, Whooper Swan, Golden Plover and Bar-tailed Godwit, are listed on Annex I of the E.U. Birds Directive. Tralee Bay is a Ramsar Convention site and parts of the Tralee Bay Complex SPA are designated as Nature Reserves. Lough Gill is a Wildfowl Sanctuary.

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SITE SYNOPSIS

Site Name: Slieve Mish Mountains SAC

Site Code: 002185

The Slieve Mish Mountains form the backbone of the eastern half of the Dingle Peninsula in Co. Kerry. The highest peak is Baurtregaum (851 m). The range is composed predominantly of Old Red Sandstone.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[4010] Wet Heath
[4030] Dry Heath
[4060] Alpine and Subalpine Heaths
[8110] Siliceous Scree
[8210] Calcareous Rocky Slopes
[8220] Siliceous Rocky Slopes
[1421] Killarney Fern (*Trichomanes speciosum*)

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The dominant habitat within Slieve Mish Mountains SAC is heath. Wet heath, dry heath and acid grassland occur in mosaics on the lower slopes of the mountains, while dry heath tends to dominate the upper, steeper slopes. Typical species of the wet heath include Purple Moor-grass (*Molinia caerulea*), Cross-leaved Heath (*Erica tetralix*), Common Cottongrass (*Eriophorum angustifolium*) and Deergrass (*Scirpus cespitosus*). The dry heath is dominated by Heather (*Calluna vulgaris*), with grasses (e.g. *Agrostis capillaris, A. canina* and *Festuca ovina*) and mosses. Some alpine heath occurs on the highest ridges; this supports a number of locally scarce species, including Dwarf Willow (*Salix herbacea*), Stiff Sedge (*Carex bigelowii*), Thrift (*Armeria maritima*) and Crowberry (*Empetrum nigrum*).

The site is intersected, particularly on its northern flank, by several steep-sided glaciated river valleys or glens. The head of Derrymore Glen features a classic oligotrophic corrie lake which is surrounded by steep cliffs. Steep cliffs, scree and rocky ridges are features of the site above 650 m. Cliffs within the site support a number of rare bryophytes, i.e. *Bazzania pearsonii, Daltonia splachnoides, Dumortiera hirsute, Mastigophora woodsii, Moerckia hibernica, Paraleptodontium recurvifolium, Radula carringtonii* and *Scapania ornithopodioides*, along with several relatively scarce vascular plant taxa typical of high-altitude inland cliffs, i.e. Starry Saxifrage (*Saxifraga stellaris*), Roseroot (*Rhodiola rosea*), Alpine Scurvygrass (*Cochlearia officinalis* subsp. *alpina*), Alpine Hair-grass (*Deschampsia cespitosa* subsp. *alpina*), Mountain Everlasting (*Antennaria dioica*), Mountain Sorrel (*Oxyria digyna*), Brittle Bladder-fern (*Cystopteris*

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fragilis) and Irish Saxifrage (*Saxifraga rosacea*). The cliffs also support Kidney Saxifrage (*Saxifraga hirsuta*), St Patrick's-cabbage (*Saxifraga spathularis*) and the hybrid between these two species.

The site includes a small area of dry deciduous woodland, supporting species such as Sessile Oak (*Quercus petraea*), Ash (*Fraxinus excelsior*) and Holly (*Ilex aquifolium*).

The site contains a good population of Killaney Fern (*Trichomanes speciosum*), a species that is listed on Annex II of the E.U. Habitats Directive. Two other plants that are also listed in the Irish Red Data Book occur, namely Betony (*Stachys officinalis*) and Cornish Moneywort (*Sibthorpia europaea*). In Ireland, the latter species is confined to the Dingle Peninsula - its most easterly known station lies within the site. Other notable plant species recorded from the site include Whorled Caraway (*Carum verticillatum*), Lemon-scented Fern (*Oreopteris limbosperma*) and Ivy-leaved Bellflower (*Wahlenbergia hederacea*). Killarney Fern (*Trichomanes speciosum*) and Betony are protected under the Flora (Protection) Order, 2015.

Peregrine Falcons breed on cliffs within the site, and Chough are known to feed in the area. Both of these species are listed on Annex I of the E.U. Birds Directive.

Most of the site is grazed by sheep, with a smaller area being grazed by cattle. Over-grazing on parts of the site has led to some habitat degradation, particularly of the wet heath covering the lower slopes. Most of the blanket bog within the site has been extensively cut for turf and some of the turbary is still active. The lack of forestry within the Slieve Mish range is notable.

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Overall, the site is of considerable conservation significance, particularly for the presence of several habitats and species that are listed on Annexes I and II of the E.U. Habitats Directive. The presence of two bird species that are listed on Annex I of the E.U. Birds Directive and the populations of several rare or scarce plant species adds to the importance of the site.

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SITE SYNOPSIS

Site Name: Magharee Islands SAC

Site Code: 002261

This marine site is centred around the Magharee Islands, which lie about 2 km north of the Magharee Peninsula in Co. Kerry. The site includes two of the smaller islands, Illaunnabarnagh and Mucklaghmore, which lie about 5 km to the north-east of the main group. The islands are exposed on their west coasts and more sheltered on their east coasts with moderately strong currents between them. The islands are composed of Carboniferous limestone.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[1170] Reefs

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The shallow water reefs around and between the Magharee Islands consist of areas that are exposed to wave action on the west coasts of the islands, more sheltered on the east coasts and subject to weak or moderate tidal streams. For the most part, the reefs are a mixture of boulders, cobbles, pebbles and sand, but in some areas are solid bedrock. In shallow water areas that are sheltered from wave action, mixed kelp forests of *Laminaria hyperborea*, *Saccorhiza polyschides* and *L. saccharina* colonize larger boulders and bedrock. On some reefs only *L. hyperborea* and *L. saccharina* are present with a sparse understorey of red algae - this is an uncommon community. The sea squirts *Polycarpa scuba* and *Distomus variolosus* occur in the kelp communities and both of these species have a limited distribution in Ireland and Britain. *P. scuba* (=*rustica*) has only previously been recorded from the Irish Sea, English Channel and Brittany, but was common on the south-east coast. *D. variolosus* in Ireland is only known from between Galway and Tralee Bay on the west coast, and the east and south-east coasts.

In areas exposed to wave action the reefs at depths of 19-28 m are generally characterised by a community of foliose red algae, in particular *Callophyllis laciniata*, *Schottera nicaeensis*, *Plocamium cartilagineum* and *Delesseria sanguinea* and the hydroid *Sertularia argentia,* indicating the tide-swept nature of the habitats. Branching and cushion sponge may also be common in this community. The sea squirt *Diazona violacea* and the sponge *Thymosia guernei* were recorded twice and both occur at the reef north-west of Gurrig Island. *D. violacea* is more characteristic of the deeper water Axinellid sponge community. The small crevice dwelling brittlestar *Ophiothrix balli* is frequent at several sites. Red algal species such as *Plocamium cartilagineum* and *Acrosorium venulosum* colonise small boulders and cobbles, and the red alga *Radicilingua thysanorhizans* is also present at the Mucklaghmore reefs.

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Illaunbarnagh is of national importance for breeding terns. In 1995 there were 46 pairs of Common Tern and 68 pairs of Arctic Tern. All tern species are listed on Annex I of the E.U. Birds Directive. Illaunabarnagh and Mucklaghbeg also have a nationally important population of Black Guillemots (113+ individuals in 1999).

This site is of conservation significance in particular for the reefs and associated communities which it hosts. The fact that the site supports important bird colonies adds further to its value.

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SITE SYNOPSIS

SITE NAME: MAGHAREE ISLANDS SPA

SITE CODE: 004125

The Magharee Islands lie about 2 km north of the Magharees Peninsula on the north side of the Dingle Peninsula, Co. Kerry. The site includes the main Magharee Islands ("Seven Hogs"), the islands of Mucklaghmore and Illaunnabarnagh to the east, Illaunnanoon and Doonagaun Island to the south and several smaller rocky islets. Illaunimmill and Illauntannig are the largest of the islands included in the site. The islands are most exposed on their west coasts, and there are moderately strong sea currents between them. The bedrock of the islands is Carboniferous limestone; the larger ones have a covering of glacial boulder clay. The islands are low-lying, being mostly less than 15 m above sea level. Illaunimmill and Illauntannig were at one time inhabited and both are still grazed by cattle and sheep. The remains of an early Christian church can be seen on Illauntannig. Areas of the surrounding seas are included around all of the islands.

This site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Barnacle Goose, Storm Petrel, Shag, Common Gull, Common Tern, Arctic Tern and Little Tern.

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The Magheree Islands are of national importance for breeding seabirds and also for wintering geese. In winter, the islands are utilised by a Barnacle Goose flock of national importance (85 – four survey mean between 1993 and 2003). The Magheree Islands are also an important site for breeding terns, which have been known from here since the 1850s. In 1995 the following were recorded: Common Tern (58 pairs), Arctic Tern (232 pairs) and Little Tern (36 pairs). The Little Tern population comprised over 20% of the national total. Sandwich Tern has bred in the past, for example in 1978, and a pair of Roseate Tern was also recorded breeding on Illaunnabarnagh in 2006. The site also supports nationally important populations of Storm Petrel (1,272 in 2007), Shag (61 pairs in 2001) and Common Gull (43 pairs in 2001). Other breeding seabirds recorded during a survey in 2001 were as follows: Fulmar (85 pairs), Cormorant (20 pairs), Lesser Black-backed Gull (20 pairs), Herring Gull (7 pairs) and Great Black-backed Gull (21 pairs). A recent survey in 2007 recorded the following breeding seabirds: Fulmar (137 pairs), Cormorant (91 pairs), Shag (223 pairs), Common Gull (178 pairs), Lesser Black-backed Gull (146 pairs), Herring Gull (82 pairs), Great Black-backed Gull (74 pairs), Common Tern (128 pairs), Arctic Tern (163) and Little Tern (18 pairs).

A possible breeding pair of Chough was recorded on the islands in 1992 and birds breeding on the mainland are known to forage on some of the islands.

Magharee Islands SPA is of high ornithological importance for breeding seabirds, especially terns, as well as for wintering Barnacle Geese, which are at the most southerly point of their range in Europe. It is of note that six of the species that occur,

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i.e. Storm Petrel, Barnacle Goose, Chough, Common Tern, Arctic Tern and Little Tern are listed on Annex I of the E.U. Birds Directive.

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SITE SYNOPSIS

SITE NAME: DINGLE PENINSULA SPA

SITE CODE: 004153

The Dingle Peninsula SPA is a large site situated on the west coast of Co. Kerry. It encompasses the high coast and sea cliff sections of the peninsula from just south of Brandon Point in the north, around to the end of the peninsula at Slea Head, and as far east as Inch in the south. The site includes the sea cliffs, the land adjacent to the cliff edge, areas of sand dune on the Magharees Peninsula and near Murreagh, and also several upland areas further inland of the coast about Ballybrack, Lough Doon, Anscaul Lough, Arraglen and Ballynane. The high water mark forms the seaward boundary. The site is underlain by a variety of sedimentary rock types of various ages, predominantly Devonian and Devonian/Silurian sandstones, conglomerates and siltstones, but also Ordovician mudstones, siltstones and breccias, and Silurian siltstones. An area of volcanic rocks of Silurian age is found about Clogher Head/Dunquin.

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The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Chough, Peregrine and Fulmar.

The site supports some of the highest densities in Ireland of breeding Chough, a Red Data Book species that is listed on Annex I of the E.U. Birds Directive. The abundance of Chough on the Dingle Peninsula was first noted in the 1800s. When the first modern survey of Chough was undertaken in 1982 the species was seen to be still abundant there. Since then the high importance of the site for Chough has been demonstrated by surveys in 1992 and 2002/03 when 107 and 105 breeding pairs respectively were recorded within the SPA.

The topography of the Dingle Peninsula, with its mosaic of grazed semi-improved and improved pastures, extensive well-drained uplands, and sand dune systems in close proximity to breeding cliffs, favours Chough. Particularly high densities of Chough occur at Reenbeg in the south of the site, The Three Sisters in the north-west and Ballydavid Head in the north. Large post-breeding flocks gather, particularly in the autumn, at the dune systems at Castlegregory and Inch (which is included in an adjacent SPA). Marked individuals have provided evidence that young birds converge in these flocks from throughout the peninsula and it is possible that Chough gather in the dunes here from even further afield. Known roost sites within the SPA include a site on the Magharees Peninsula and a number of inland locations such as the cliffs at Anscaul Lough, Arraglen and Lough Doon. Flocks of up to 80 birds form in the mountains during the summer months. Studies have shown that Chough forage mainly within 300 m inland of the cliff tops used for breeding and these areas have been included in the site.

The site also supports nationally important populations of Peregrine (5 pairs in 2002) and Fulmar (1,016 pairs), as well as smaller populations of other breeding seabirds: Razorbill (3 pairs), Herring Gull (33 pairs), Lesser Black-backed Gull (2 pairs), Shag

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(23 pairs) and Great Black-backed Gull (1 pair) – all seabird data from 1999-2000. The site also holds a population of Black Guillemot.

The Dingle Peninsula SPA is of ornithological importance as it supports an internationally important population of Chough. It also supports nationally important populations of Fulmar and Peregrine. The presence of Chough and Peregrine, both species that are listed on Annex I of the E.U. Birds Directive, is of particular significance. Part of the Dingle Peninsula SPA is a Statutory Nature Reserve.

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5.11.2014

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SITE SYNOPSIS

Site Name: Mount Brandon SAC

Site Code: 000375

This site comprises the central and north-western parts of the Dingle Peninsula. It is a mountainous area that encompasses several peaks including Mount Brandon (952 m), which is the highest peak outside of the Macgillycuddy's Reeks, Brandon Peak (840 m), and the Stradbally range which includes Beenoskee (826 m). The site includes the high sea cliffs of Brandon Head, as well as low-lying areas such as the Owenmore River/Cloghane River valley. Glaciation has played a large part in shaping the landscape into a series of ridges and valleys, with corrie lakes and steep cliffs. The underlying geology features Old Red Sandstone and Dingle Beds (the oldest Devonian rocks in Ireland). Conglomerates are also present.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

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[1230] Vegetated Sea Cliffs
[3110] Oligotrophic Waters containing very few minerals
[3130] Oligotrophic to Mesotrophic Standing Waters
[4010] Wet Heath
[4030] Dry Heath
[4060] Alpine and Subalpine Heaths
[6230] Species-rich *Nardus* Grassland*
[7130] Blanket Bogs (Active)*
[8110] Siliceous Scree
[8210] Calcareous Rocky Slopes
[8220] Siliceous Rocky Slopes
[1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)
[1421] Killarney Fern (*Trichomanes speciosum*)

Arctic and arctic-alpine species, including important bryophyte and lichen assemblages, are found on the dramatic north- to east-facing inland cliffs and on the alpine heath of the highest ridges (above 750 m). Species present include Dwarf Willow (*Salix herbacea*), Alpine Bistort (*Polygonum viviparum*), Alpine Saw-wort (*Saussurea alpina*), Mountain Sorrel (*Oxyria digyna*), Alpine Lady's-mantle (*Alchemilla alpina*), Alpine Hair-grass (*Deschampsia alpina*), Alpine Meadow-grass (*Poa alpina*), Roseroot (*Rhodiola rosea*), saxifrages (*Saxifraga stellaris* and *S. rosacea*), and ferns such as Holly Fern (*Polystichum lonchitis*), Green Spleenwort (*Asplenium viride*), Wilson's Filmy-fern (*Hymenophyllum wilsonii*) and Brittle Bladder-fern (*Cystopteris fragilis*).

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These inland cliffs correspond to the habitats Calcareous Rocky Slopes, Siliceous Rocky Slopes and Siliceous Scree, and are particularly important for their range of rare oceanic bryophyte species, including *Adelanthus lindenbergianus*, *Scapania nimbosa*, *S. ornithopodioides*, *Lejeunea* spp. and many more.

The most common habitats within the site are heath, upland grassland and blanket bog. The heath occurs in areas of shallow peat and on the mineral soils of the mountain sides. It varies in nature from dry to wet. The dry heath is dominated by Heather (*Calluna vulgaris*) and Western Gorse (*Ulex gallii*), while the wet contains Cross-leaved Heath (*Erica tetralix*), Purple Moor-grass (*Molinia caerulea*), Carnation Sedge (*Carex panicea*) and bog mosses (*Sphagnum* spp.). The dry heath often grades into upland grassland which supports a range of characteristic grasses: Mat-grass (*Nardus stricta*), Common Bent (*Agrostis capillaris*) and Viviparous Fescue (*Festuca vivipara*).

Areas of blanket bog occur on level or gently sloping ground. There are three main areas of particular interest: two upland bogs and a lowland, valley bog. Coumanare Bog is an impressive tract of mountain bog dominated by Purple Moor-grass and Deergrass (*Scirpus cespitosus*). It features a large and particularly well-developed scraw (i.e. area of floating vegetation), associated with a series of springs along the Scorid River, where bog mosses dominate (e.g. *Sphagnum cuspidatum, S. auriculatum* var. *auriculatum, S. papillosum* and *S. subnitens*). Another upland blanket bog, located on the south-facing slopes of Beenator and Coumbaun Mountains, is heavily grazed and dominated by Deergrass, Heather and Common Cottongrass (*Eriophorum angustifolium*). Some of the lowland bog in the Owenmore River/Cloghane River valley is intact and is dominated by Deergrass, with Black Bog-rush (*Schoenus nigricans*), Purple Moor-grass, Great Sundew (*Drosera anglica*) and bog mosses also occurring.

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Oligotrophic corrie lakes are a feature of the site, including a string of Paternoster lakes below the Brandon range. Characteristic plant species found include Shoreweed (*Littorella uniflora*), Quillwort (*Isoetes lacustris*) and Six-stamened Waterwort (*Elatine hexandra*).

Vegetated sea cliffs, which stretch for some 12 km along the north-western edge of the site, are amongst the highest in Ireland (over 400 m above sea level). The cliffs support a good variety of plant species typical of the habitat, including Thrift (*Armeria maritima*), Sea Campion (*Silene vulgaris* subsp. *maritima*), Sea Spleenwort (*Asplenium marinum*) and Rock Sea-spurrey (*Spergularia rupicola*). Populations of a number of relatively scarce plants, including Roseroot, Irish Saxifrage (*Saxifraga rosacea*) and Mountain Sorrel also occur. The cliff tops support heath or coastal grassland, and here such species as Creeping Willow (*Salix repens*), Crowberry (*Empetrum nigrum*) and Allseed (*Radiola linoides*) are found. The scare Small Adder's-tongue (*Ophioglossum azoricum*) has been recorded from cliff tops in the site.

A suite of rare Red Data Book plant species have been recorded, associated with the inland cliffs and alpine heath: Alpine Bistort, Alpine Meadow-grass, Alpine Saw-

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wort, Alpine Lady's-mantle and Holly Fern. Mount Brandon is one of the most southern locations in Britain and Ireland for Alpine Bistort, a species which is protected under the Flora (Protection) Order, 2015. Cornish Moneywort (*Sibthorpia europaea*), also a Red Data Book species, occurs at several locations within the site. In Ireland this species is found only on the Dingle Peninsula. Killarney Fern (*Trichomanes speciosum*), protected under the E.U. Habitats Directive and the Flora (Protection) Order, 2015, occurs within the site.

A population of Freshwater Pearl Mussel (*Margaritifera margaritifera*) occurs within the site. This is an endangered species that is listed on Annex II of the E.U. Habitats Directive. Other fauna of interest recorded from the site includes Large Heath (*Coenonympha tullia*), a vulnerable butterfly, and Arctic Char (*Salvelinus alpinus*), a Red Data Book fish species found recently in Anascaul Lough.

The Dingle Peninsula supports some of the highest densities in Ireland of breeding Chough, a Red Data Book species that is listed on Annex I of the E.U. Birds Directive. The abundance of Chough on the peninsula was first noted in the 1800s and has been demonstrated in recent surveys. In the site the birds are particularly to be found close to the Brandon Head sea cliffs, but also as large roosting flocks in several inland upland areas, as at Ballybrack, Lough Doon, Anscaul Lough and Arraglen. Peregrine, also an E.U. Birds Directive Annex I species, uses the site, as well as a variety of seabird species that breed on the sea cliffs.

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The main land use within the site is sheep grazing. The serious effects of over-grazing are widespread and are exacerbated by the upland, exposed nature of the site. Other threats come from turbary and afforestation. Part of the site is state-owned, the Mount Brandon Nature Reserve.

The site is of high conservation value due to the presence of good quality examples of 11 habitats that are listed on Annex I of the E.U. Habitats Directive, as well as populations of two species that are listed on Annex II of this Directive. The presence of the E.U. Birds Directive Annex I species, Chough and Peregrine, as well as of populations of a suite of rare Red Data Book plant species, adds considerably to the significance of the site.

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SITE SYNOPSIS

Site Name: Castlemaine Harbour SAC

Site Code: 000343

This is a large site located on the south-east corner of the Dingle Peninsula, Co. Kerry. It consists of the whole inner section of Dingle Bay, i.e. Castlemaine Harbour, the spits of Inch and White Strand/Rosbehy and a little of the coastline to the west. The River Maine, almost to Castlemaine, and much of the River Laune catchment, including the Gaddagh, Gweestion, Glanooragh, Cottoner's River and the River Loe, are also included within the site.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[1130] Estuaries
[1140] Tidal Mudflats and Sandflats
[1210] Annual Vegetation of Drift Lines
[1220] Perennial Vegetation of Stony Banks
[1230] Vegetated sea cliffs of the Atlantic and Baltic coasts
[1310] *Salicornia* Mud
[1330] Atlantic Salt Meadows
[1410] Mediterranean Salt Meadows
[2110] Embryonic Shifting Dunes
[2120] Marram Dunes (White Dunes)
[2130] Fixed Dunes (Grey Dunes)*
[2170] Dunes with Creeping Willow
[2190] Humid Dune Slacks
[91E0] Alluvial Forests*

[1095] Sea Lamprey (*Petromyzon marinus*)
[1099] River Lamprey (*Lampetra fluviatilis*)
[1106] Atlantic Salmon (*Salmo salar*)
[1355] Otter (*Lutra lutra*)
[1395] Petalwort (*Petalophyllum ralfsii*)

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Inch Spit holds a fine sand dune system. It is one of the largest and best remaining dune systems in the country. Fore dunes are found on the western side of Rosbehy and Inch. In these younger, mobile dunes, Marram (*Ammophila arenaria*) is common, with Groundsel (*Senecio vulgaris*), Sea Rocket (*Cakile maritima*) and Dandelion

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(*Taraxacum* agg.) also present. Other characteristic species include Sand Couch (*Elymus farctus*), Lyme-grass (*Leymus arenarius*) and Sea Spurge (*Euphorbia paralias*). Fixed dune, a priority habitat under the E.U. Habitats Directive, is well-represented at the site, and in particular towards the tip of Inch Spit. Such areas support species such as Lady's Bedstraw (*Galium verum*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Wild Thyme (*Thymus praecox*), Kidney Vetch (*Anthyllis vulneraria*), Wild Pansy (*Viola tricolor*), Biting Stonecrop (*Sedum acre*), Common Centuary (*Centaurium erythraea*), Thyme-leaved Sandwort (*Arenaria serpyllifolia*) and Common Whitlowgrass (*Erophila verna*), among others. There is also a rich lichen and bryophyte flora. The slightly damper conditions which prevail in dune slacks support Creeping Bent (*Agrostis stolonifera*), Crested Dog's-tail (*Cynosurus cristatus*), Glaucous Sedge (*Carex flacca*), Creeping Willow (*Salix repens*) and Jointed Rush (*Juncus articulatus*). The rare bryophyte Petalwort (*Petalophyllum ralfsii*), which is listed on Annex II of the E.U. Habitats Directive, has been recorded in this system. A smaller spit, with a similar diversity of dune types, occurs at Rosbehy on the southern shore, from where Yellow Centaury (*Cicendia filiformis*) and Knotted Pearlwort (*Sagina nodosa*) have been recorded from a dune slack along with other, more common, species.

The sand spits, and also the Coomore peninsula, are underlain by shingle and in places the shingle is exposed and supports a characteristic flora. Species present include Lyme-grass and Sea Sandwort (*Honkenya peploides*). Strandline communities are well-developed along Inch spit, with the exception of the north-western end where recreational pressure is high. Typical species of the strandline include Prickly Saltwort (*Salsola kali*), Sea Rocket, oraches (*Atriplex* spp.) and Sea Sandwort. Two Red Data Book plants, Sea Pea (*Lathyrus japonicus* subsp. *maritimus*) and Sea-kale (*Crambe maritima*), are found associated with the shingle and strandline communities.

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The coastline is fringed in many places by saltmarsh. The vegetation here includes Thrift (*Armeria maritima*), Common Saltmarsh-grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Sea Rush (*Juncus maritimus*) and Sea Plantain (*Plantago maritima*). Upper saltmarsh communities extend inland, along estuarine channels, where they are mixed with freshwater communities. Sea Club-rush (*Scirpus maritimus*) and Common Reed (*Phragmites australis*) occur at these locations. Common Cord-grass (*Spartina anglica*) has colonised the lower part of the saltmarsh at Inch and extends out onto the open mudflat. Glassworts (*Salicornia* spp.) occur in association with saltmarsh.

West of Inch, cliffs of glacial drift occur, which support such plants as Ivy (*Hedera helix*), Red Fescue (*Festuca rubra*), Heather (*Calluna vulgaris*), Thrift, Sea Plantain, Sea Mayweed (*Matricaria maritima*), Kidney Vetch and Honeysuckle (*Lonicera periclymenum*). Along the cliff-tops there is coastal grassland with species such as Sweet Vernal-grass (*Anthoxanthum odoratum*), Cock's-foot (*Dactylis glomerata*) and Wood Sage (*Teucrium scorodonia*).

Much of the site consists of intertidal sand and mudflats, supporting a number of soft sediment communities, including beds of eelgrass (mostly *Zostera noltii*) in some

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places. A subtidal mixed sediment community complex is also present in the channel between Rossbehy Point and Inch Point.

The rivers and their associated habitats also make up a considerable portion of the site. These associated habitats include wet grassland, woodland, scrub and bog/heath. In the valley up-river of Killorglin, is an interesting area of alluvial wet woodland, dominated by Alder (*Alnus glutinosa*) and willows (*Salix* spp.). The vegetation is quite diverse, and there are spectacular tussocks of Greater Tussock-sedge (*Carex paniculata*). Other species which occur include Ash (*Fraxinus excelsior*), Wild Angelica (*Angelica sylvestris*), Cuckooflower (*Cardamine pratensis*), Meadowsweet (*Filipendula ulmaria*), Common Nettle (*Urtica dioica*), Remote Sedge (*Carex remota*) and a range of bryophytes. While small in area, this is one of the few examples in Ireland of woodland on riverine alluvium dominated by native tree species.

Five plants listed in the Irish Red Data Book have been recorded at this site: Sea-kale, Corn Cockle (*Agrostemma githago*), Sea Pea, Pennyroyal (*Mentha pulegium*) and Irish Lady's-tresses (*Spiranthes romanzoffiana*). The three last-named are legally protected under the Flora (Protection) Order, 1999, as is the rare bryophyte, Petalwort. Other scarce species which occur here are Yellow Bartsia (*Parentucellia viscosa*), Lax-flowered Sea-lavender (*Limonium humile*) and Blue-eyed-grass (*Sisyrinchium bermudiana*).

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The vicinity of Castlemaine Harbour is also important as one of few areas in Ireland (all of which are in Co. Kerry) where the Natterjack Toad naturally occurs. This amphibian is listed in the Irish Red Data Book and on Annex IV of the E.U. Habitats Directive.

The site also supports a small colony of Common Seal, while two Lamprey species have been recorded in the Laune river catchment. The Laune catchment is used by Otter and is also an important Salmon system with nurseries, riffles pools and glides.

Castlemaine Harbour is a very important site for passage and wintering waterfowl. The following figures are derived from counts between 1994/5 and 1996/7. One species occurs here in internationally important numbers - Brent Goose (734) - with 16 species having populations of national importance: Cormorant (215), Shelduck (129), Pintail (167), Scaup (138), Wigeon (3,513), Red-breasted Merganser (51), Oystercatcher (1,539), Ringed Plover (330), Golden Plover (1,940), Grey Plover (122), Knot (347), Sanderling (207), Dunlin (1,360), Redshank (299), Greenshank (26) and Turnstone (296).

Castlemaine Harbour is of major ecological importance. It contains a range of coastal habitats of excellent quality, including many that are listed on Annex I of the E.U. Habitats Directive, and two which are listed with priority status (fixed dunes and alluvial forests). It also includes long stretches of river and stream which are excellent habitats for Salmon, Lamprey and Otter. Inch dunes are recognised as among the finest in the country, with particularly well-developed dune slacks. The

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site supports internationally important waterfowl populations, rare plant species, the rare Natterjack Toad, as well as populations of several animal species that are listed on Annex II of the E.U. Habitats Directive. Part of the site is designated a Special Protection Area (SPA) and is listed as a site under the Ramsar Convention. Part of Castlemaine Harbour is a Statutory Nature Reserve, while Inch and Rosbehy are Wildfowl Sanctuaries.

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SITE SYNOPSIS

SITE NAME: CASTLEMAINE HARBOUR SPA

SITE CODE: 004029

Castlemaine Harbour SPA is a large coastal site occupying the innermost part of Dingle Bay. It extends from the lower tidal reaches of the River Maine and River Laune to west of the Inch and Rosbehy peninsulas (*c*. 16 km from east to west). The average width of the estuary is 4-5 km though it is *c*. 11 km wide at the outer limit. The site comprises the estuaries of the River Maine and the River Laune, both substantial rivers, and has extensive areas of intertidal sand and mud flats. A number of other rivers, e.g. the Caragh and the Emlagh, flow into the site, as well as numerous small streams. Conditions in the bay are very sheltered due to the presence of three protruding sand spits on its seaward side. These spits overly gravel bars. Two of the spits, Rosbehy and Inch, are included within the site. Salt marshes fringe much of the shoreline. A very large dune system occurs on the Inch peninsula. A substantial area of shallow marine water is included in the site.

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The intertidal flats are mostly muds or muddy sands and have high densities of polychaete worms such as Ragworm (*Hediste diversicolor*) and Lugworm (*Arenicola marina*), along with a good variety of bivalves and molluscs. Eelgrass (*Zostera* spp.) is common in places. The introduced Common Cord-grass (*Spartina anglica*) is found in sheltered areas of the intertidal flats and has colonised the lower part of the saltmarsh at Inch. Salt marsh vegetation includes Thrift (*Armeria maritima*), Common Saltmarsh-grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Sea Rush (*Juncus maritimus*) and Sea Plantain (*Plantago maritima*). The sand dune system at Inch is the largest and arguably the best remaining intact dune system in the country and includes large areas of embryo dunes, Marram (*Ammophila arenaria*) dunes and fixed dunes, as well as dune slacks.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Red-throated Diver, Cormorant, Light-bellied Brent Goose, Wigeon, Mallard, Pintail, Scaup, Common Scoter, Oystercatcher, Ringed Plover, Sanderling, Bar-tailed Godwit, Redshank, Greenshank, Turnstone and Chough. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Castlemaine Harbour SPA is one of the most important sites for wintering waterfowl in the south-west. It provides habitats for an excellent diversity of waterbirds, including divers and seaduck. It is of international importance for its Light-bellied Brent Goose population (694) - figures given are mean peaks for the five winters 1995/96-1999/2000, as well as nationally important populations of a further fourteen waterbird species, i.e. Red-throated Diver (56), Cormorant (136), Wigeon (6,819), Mallard (487), Pintail (145), Scaup (74), Common Scoter (3,637), Oystercatcher (1,035), Ringed Plover (206), Sanderling (335), Bar-tailed Godwit (397), Redshank

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(341), Greenshank (46) and Turnstone (144). The population of Wigeon is of note, being 7.6% of the all-Ireland total, while that of Sanderling is over 5%. Other species which occur include Great Northern Diver (22), Shelduck (90), Teal (287), Red-breasted Merganser (29), Golden Plover (972), Grey Plover (46), Knot (199), Dunlin (933), Curlew (474) and Black-headed Gull (538). The site provides good quality habitat for the feeding and roosting requirements of the various bird species which winter here. Whilst not breeding within the site, Chough occur in nationally important numbers and are regularly found on the sand dunes at Inch where they feed and socialise; during the autumn in 2002/03 and 2003/04 the dunes at Inch held flocks of up to 40 and 64 birds respectively.

Castlemaine Harbour SPA is a very important ornithological site, with one species, Light-bellied Brent Goose, occurring in numbers of international importance. In addition, it supports nationally important populations of a further fifteen species. Of particular note is that five species that occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Red-throated Diver, Great Northern Diver, Golden Plover, Bar-tailed Godwit and Chough. Castlemaine Harbour is a Ramsar Convention site and parts of Castlemaine Harbour SPA are designated as a Statutory Nature Reserve and as Wildfowl Sanctuaries.

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SITE SYNOPSIS

Site Name: Ballyseedy Wood SAC

Site Code: 002112

Ballyseedy Wood lies south of the River Lee, some 2 km south-east of Tralee, Co. Kerry. Most of the wood is situated in the floodplain of the River Lee on sticky, gleyed clay.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[91E0] Alluvial Forests*

The woodland at the site is dominated by native tree species: Ash (*Fraxinus excelsior*), Alder (*Alnus glutinosa*), Rusty Willow (*Salix cinerea* subsp. *oleifolia*) and Hazel (*Corylus avellana*), with oak (*Quercus* spp.), Yew (*Taxus baccata*), elm (*Ulmus* sp.) and Spindle (*Euonymus europaeus*) also occurring. Non-native tree species found include Sycamore (*Acer pseudoplatanus*), Horse-chestnut (*Aesculus hippocastanum*), poplar (*Populus* sp.), Beech (*Fagus sylvatica*) and Hornbeam (*Carpinus betulus*). Three semi-natural woodland types are represented - areas dominated by Alder and Ash (following and adjacent to the River Lee); areas dominated by Ash and Hazel (on sloping, better-drained soil, mostly in the western half of the site); and areas dominated by Alder and Rusty Willow (on level sections further removed from the river).

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The Alder/Ash-dominated woodland is a high canopy wood. The very large Alder trees present were probably planted, but much of the secondary regeneration is also very mature, being up to 100 years old. Sycamore, Horse-chestnut, poplar and Beech can also be found here. In the understorey species such as Hawthorn (*Crataegus monogyna*), Holly (*Ilex aquifolium*), elm, Spindle and Guelder-rose (*Viburnum opulus*) are found. The Alder/Ash-dominated woodland conforms well with the woodland type 'Alluvial Forest', listed with priority status on Annex I of the E.U. Habitats Directive.

The Ash/Hazel-dominated woodland is also mature, with Sycamore, Hornbeam and Beech also present. Hazel is frequent in the sub-canopy, with Hawthorn and the occasional elm also occurring.

The Alder/willow woodland stands are, for the most part, dominated by Alder, with Rusty Willow occurring as scattered trees.

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The ground flora is represented by Wild Angelica (*Angelica sylvestris*), Meadowsweet (*Filipendula ulmaria*), Golden-saxifrage (*Chrysosplenium oppositifolium*), Enchanter's-nightshade (*Circaea lutetiana*), Soft Shield-fern (*Polystichum setiferum*), Broad Buckler-fern (*Dryopteris dilatata*), Scaly Male-fern (*Dryopteris affinis*), Thin-spiked Wood-sedge (*Carex strigosa*), Remote Sedge (*C. remota*) and Pendulous Sedge (*C. pendula*).

Several plant species which are nationally or locally scarce are found on the site, including Rough Horsetail (*Equisetum hyemale*), Thin-spiked Wood-sedge, Dark-leaved Willow (*S. myrsinifolia*) and Wood Horsetail (*E. sylvaticum*). The rare moss *Pylaisia polyantha*, a species known in Ireland only from Counties Donegal, Kerry and Mayo, has also been recorded from the site.

Ballyseedy Wood is a nesting site for Long-eared Owl, and the river is frequented by Otters, a species listed on Annex II of the E.U. Habitats Directive.

The site is undisturbed and apparently infrequently visited by man. Non-native tree species are present within the site but account for less than 30% of the woodland. Exotic and potentially invasive species present include Rhododendron (*Rhododendron ponticum*), Snowberry (*Symphoricarpos albus*), Cherry Laurel (*Prunus laurocerasus*), Japanese Knotweed (*Reynovtria japonica*) and Bamboo. These are, however, localised within the site and are not found throughout the woodland. In fact, some stands of woodland are remarkable for the complete absence of exotic species.

Ballyseedy Wood is of prime importance for its Alder/Ash-dominated woodland stands, a habitat type that is rare and threatened in Europe. The site is also of significance for several rare or scarce plant species that occur there. The scarcity of woodlands in north Kerry adds to the importance of the site.

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SITE SYNOPSIS

SITE NAME: KERRY HEAD SPA

SITE CODE: 004189

Kerry Head SPA is situated on the south side of the mouth of the River Shannon in north Co. Kerry. It encompasses the sea cliffs from just west of Ballyheigue, around the end of Kerry Head to the west and north-eastwards as far as Kilmore. The site includes the sea cliffs and land adjacent to the cliff edge. The high water mark forms the seaward boundary. Most of the site is underlain by Devonian siltstones, sandstones and mudstones; a small section of the site has rocks of Carboniferous age.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Chough and Fulmar.

The site supports an internationally important population of breeding Chough, a Red Data Book species that is listed on Annex I of the E.U. Birds Directive; 32 breeding pairs were recorded from the site in the 1992 survey and 30 in the 2002/03 survey. In addition, a flock of 20 birds was noted on the northern coast of the site during the latter survey. The site is of particular note for the density of breeding pairs found.

The site also supports a nationally important population of Fulmar (421 pairs), as well as a small population of Shag (8 pairs) – all seabird data from 2000. The site is also used by Peregrine (2 pairs in 2002).

Kerry Head SPA is one of the most important sites in the country for Chough. It also supports a population of Fulmar of national importance. The presence of Chough and Peregrine, both species that are listed on Annex I of the E.U. Birds Directive, is of particular significance

20.1.2015

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SITE SYNOPSIS

SITE NAME: STACK'S TO MULLAGHAREIRK MOUNTAINS, WEST LIMERICK HILLS AND MOUNT EAGLE SPA

SITE CODE: 004161

The Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA is a very large site centred on the borders between the counties of Cork, Kerry and Limerick. The site is skirted by the towns of Newcastle West, Ballydesmond, Castleisland, Tralee and Abbeyfeale. The mountain peaks included in the site are not notably high or indeed pronounced, the highest being at Knockfeha (451 m). Other mountains included are Mount Eagle, Knockanefune, Garraunbaun, Taur, Rock Hill, Knockacummer, Mullaghamuish, Knight's Mt, Ballincollig Hill, Beennageeha Mt, Sugar Hill, Knockanimpuba and Knockathea, amongst others. Many rivers rise within the site, notably the Blackwater, Owentaraglin, Owenkeal, Glenlara, Feale, Clydagh, Allaghaun, Allow, Oolagh, Galey and Smerlagh.

The site consists of a variety of upland habitats, though almost half is afforested. The coniferous forests include first and second rotation plantations, with both pre-thicket and post-thicket stands present. Substantial areas of clear-fell are also present at any one time. The principal tree species present are Sitka Spruce (*Picea sitchensis*) and Lodgepole Pine (*Pinus contorta*). A substantial part (28%) of the site is unplanted blanket bog and heath, with both wet and dry heath present. The vegetation of these habitats is characterised by such species as Ling Heather (*Calluna vulgaris*), Bilberry (*Vaccinium myrtillus*), Common Cottongrass (*Eriophorum angustifolium*), Hare's-tail Cottongrass (*Eriophorum vaginatum*), Deergrass (*Scirpus cespitosus*) and Purple Moor-grass (*Molinia caerulea*). The remainder of the site is mostly rough grassland that is used for hill farming. This varies in composition and includes some wet areas with rushes (*Juncus* spp.) and some areas subject to scrub encroachment.

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The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for Hen Harrier.

This SPA is a stronghold for Hen Harrier and supports the largest concentration of the species in the country. A survey in 2005 resulted in 40 confirmed and 5 possible breeding pairs, which represents over 29% of the national total. A similar number of pairs had been recorded in the 1998-2000 period. The mix of forestry and open areas provides optimum habitat conditions for this rare bird, which is listed on Annex I of the E.U. Birds Directive. The early stages of new and second-rotation conifer plantations are the most frequently used nesting sites, though some pairs may still nest in tall heather of unplanted bogs and heath. Hen Harriers will forage up to *c.* 5 km from the nest site, utilising open bog and moorland, young conifer plantations and hill farmland that is not too rank. Birds will often forage in openings and gaps within forests. In Ireland, small birds and small mammals appear to be the most frequently taken prey.

Short-eared Owl, also listed on Annex I of the E.U. Birds Directive and very rare in Ireland, has been known to breed within the site. Nesting certainly occurred in the late 1970s and birds have been recorded intermittently since. The owls are considered to favour this site due to the presence of Bank Voles, a favoured prey item. Merlin, a further E.U. Birds Directive Annex I species, also breeds but the size of the population is not known. Red Grouse is found on some of the unplanted areas of bog and heath – this is a species that has declined in Ireland and is now Red-listed.

The main threat to the long-term survival of Hen Harriers within the site is further afforestation, which would reduce and fragment the area of foraging habitat, resulting in possible reductions in breeding density and productivity. The site has a number of wind farm developments but it is not yet known if these have any adverse impacts on the Hen Harriers.

Overall, the site provides excellent nesting and foraging habitat for breeding Hen Harrier, and is considered to be among the top two sites in the country for the species.

21.5.2007

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SITE SYNOPSIS

Site Name: Lower River Shannon SAC

Site Code: 002165

This very large site stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head/ Kerry Head, a distance of some 120 km. The site thus encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. Rivers within the sub-catchment of the Feale include the Galey, Smearlagh, Oolagh, Allaughaun, Owveg, Clydagh, Caher, Breanagh and Glenacarney. Rivers within the sub-catchment of the Mulkear include the Killeenagarriff, Annagh, Newport, the Dead River, the Bilboa, Glashacloonaraveela, Gortnageragh and Cahernahallia.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

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[1110] Sandbanks
[1130] Estuaries
[1140] Tidal Mudflats and Sandflats
[1150] Coastal Lagoons*
[1160] Large Shallow Inlets and Bays
[1170] Reefs
[1220] Perennial Vegetation of Stony Banks
[1230] Vegetated Sea Cliffs
[1310] *Salicornia* Mud
[1330] Atlantic Salt Meadows
[1410] Mediterranean Salt Meadows
[3260] Floating River Vegetation
[6410] *Molinia* Meadows
[91E0] Alluvial Forests*
[1029] Freshwater Pearl Mussel (*Margaritifera margaritifera*)
[1095] Sea Lamprey (*Petromyzon marinus*)
[1096] Brook Lamprey (*Lampetra planeri*)
[1099] River Lamprey (*Lampetra fluviatilis*)
[1106] Atlantic Salmon (*Salmo salar*)
[1349] Bottle-nosed Dolphin (*Tursiops truncatus*)
[1355] Otter (*Lutra lutra*)

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The Shannon and Fergus Rivers flow through Carboniferous limestone as far as Foynes, but west of Foynes Namurian shales and flagstones predominate (except at Kerry Head, which is formed from Old Red Sandstone). The eastern sections of the Feale catchment flow through Namurian rocks and the western stretches through Carboniferous limestone. The Mulkear flows through Lower Palaeozoic rocks in the upper reaches before passing through Namurian rocks, followed by Lower Carboniferous shales and Carboniferous limestone. The Mulkear River itself, immediately north of Pallas Green, passes through an area of Rhyolites, Tuffs and Agglomerates.

The Shannon and Fergus Estuaries form the largest estuarine complex in Ireland. They form a unit stretching from the upper tidal limits of the Shannon and Fergus Rivers to the mouth of the Shannon Estuary (considered to be a line across the narrow strait between Kilcredaun Point and Kilconly Point). Within this main unit there are several tributaries with their own 'sub-estuaries' e.g. the Deel River, Mulkear River, and Maigue River. To the west of Foynes, a number of small estuaries form indentations in the predominantly hard coastline, namely Poulnasherry Bay, Ballylongford Bay, Clonderalaw Bay and the Feale or Cashen River estuary.

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Both the Fergus and inner Shannon Estuaries feature vast expanses of intertidal mudflats, often fringed with saltmarsh vegetation. The smaller estuaries also feature mudflats, but have their own unique characteristics, e.g. Poulnasherry Bay is stony and unusually rich in species and biotopes. Plant species are typically scarce on the mudflats, although there are some eelgrass (*Zostera* spp.) beds and patches of green algae (e.g. *Ulva* sp. and *Enteromorpha* sp.). The main macro-invertebrate community which has been noted from the inner Shannon and Fergus estuaries is a *Macoma-Scrobicularia-Nereis* community.

In the transition zone between mudflats and saltmarsh, specialised colonisers of mud predominate. For example, swards of Common Cord-grass (*Spartina anglica*) frequently occur in the upper parts of the estuaries. Less common are swards of Glasswort (*Salicornia europaea* agg.). In the innermost parts of the estuaries, the tidal channels or creeks are fringed with species such as Common Reed (*Phragmites australis*) and club-rushes (*Scirpus maritimus, S. tabernaemontani* and *S. triquetrus*). In addition to the nationally rare Triangular Club-rush (*Scirpus triqueter*), two scarce species are found in some of these creeks (e.g. Ballinacurra Creek): Lesser Bulrush (*Typha angustifolia*) and Summer Snowflake (*Leucojum aestivum*).

Saltmarsh vegetation frequently fringes the mudflats. Over twenty areas of estuarine saltmarsh have been identified within the site, the most important of which are around the Fergus estuary and at Ringmoylan Quay. The dominant type of saltmarsh present is Atlantic salt meadow occurring over mud. Characteristic species occurring include Common Saltmarsh-grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea-milkwort (*Glaux maritima*), Sea Plantain (*Plantago maritima*), Red Fescue (*Festuca rubra*), Creeping Bent (*Agrostis stolonifera*), Saltmarsh Rush (*Juncus gerardi*), Long-bracted Sedge (*Carex extensa*), Lesser Sea-spurrey

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(*Spergularia marina*) and Sea Arrowgrass (*Triglochin maritima*). Areas of Mediterranean salt meadows, characterised by clumps of Sea Rush (*Juncus maritimus*) occur occasionally. Two scarce species are found on saltmarshes in the vicinity of the Fergus estuary: a type of robust saltmarsh-grass (*Puccinellia foucaudii*), sometimes placed within the species Common Saltmarsh-grass (*P. maritima*) and Hard-grass (*Parapholis strigosa*).

Saltmarsh vegetation also occurs around a number of lagoons within the site, two of which have been surveyed as part of a National Inventory of Lagoons. Cloonconeen Pool (4-5 ha) is a natural sedimentary lagoon impounded by a low cobble barrier. Seawater enters by percolation through the barrier and by overwash. This lagoon represents a type which may be unique to Ireland since the substrate is composed almost entirely of peat. The adjacent shore features one of the best examples of a drowned forest in Ireland. Aquatic vegetation in the lagoon includes typical species such as Beaked Tasselweed (*Ruppia maritima*) and green algae (*Cladophora* sp.). The fauna is not diverse, but is typical of a high salinity lagoon and includes six lagoon specialists (*Hydrobia ventrosa, Cerastoderma glaucum, Lekanesphaera hookeri, Palaemonetes varians, Sigara stagnalis* and *Enochrus bicolor*). In contrast, Shannon Airport Lagoon (2 ha) is an artificial saline lake with an artificial barrier and sluiced outlet. However, it supports two Red Data Book species of stonewort (*Chara canescens* and *Chara cf. connivens*).

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Most of the site west of Kilcredaun Point/Kilconly Point is bounded by high rocky sea cliffs. The cliffs in the outer part of the site are sparsely vegetated with lichens, Red Fescue, Sea Beet (*Beta vulgaris* subsp. *maritima*), Sea Campion (*Silene vulgaris* subsp. *maritima*), Thrift and plantains (*Plantago* spp.). A rare endemic type of sea-lavender, *Limonium recurvum* subsp. *pseudotranswallianum,* occurs on cliffs near Loop Head. Cliff-top vegetation usually consists of either grassland or maritime heath. The boulder clay cliffs further up the estuary tend to be more densely vegetated, with swards of Red Fescue and species such as Kidney Vetch (*Anthyllis vulneraria*) and Common Bird's-foot-trefoil (*Lotus corniculatus*).

The site supports an excellent example of a large shallow inlet and bay. Littoral sediment communities in the mouth of the Shannon Estuary occur in areas that are exposed to wave action and also in areas extremely sheltered from wave action. Characteristically, exposed sediment communities are composed of coarse sand and have a sparse fauna. Species richness increases as conditions become more sheltered. All shores in the site have a zone of sand hoppers at the top, and below this each of the shores has different characteristic species giving a range of different shore types.

The intertidal reefs in the Shannon Estuary are exposed or moderately exposed to wave action and subject to moderate tidal streams. Known sites are steeply sloping and show a good zonation down the shore. Well developed lichen zones and littoral reef communities offering a high species richness in the sublittoral fringe and strong populations of the Purple Sea Urchin *Paracentrotus lividus* are found. The communities found are tolerant to sand scour and tidal streams. The infralittoral reefs range from sloping platforms with some vertical steps, to ridged bedrock with

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gullies of sand between the ridges, to ridged bedrock with boulders or a mixture of cobbles, gravel and sand. Kelp is very common to about 18 m. Below this it becomes rare and the community is characterised by coralline crusts and red foliose algae.

Other coastal habitats that occur within the site include stony beaches and bedrock shores (these support a typical zonation of seaweeds such as *Fucus* spp., *Ascophyllum nodosum* and kelps), shingle beaches (with species such as Sea Beet, Sea Mayweed - *Matricaria maritima*, Sea Campion and Curled Dock - *Rumex crispus*), sandbanks which are slightly covered by sea water at all times (e.g. in the area from Kerry Head to Beal Head) and sand dunes (a small area occurs at Beal Point, where Marram – *Ammophila arenaria* is the dominant species).

Freshwater rivers have been included in the site, most notably the Feale and Mulkear catchments, the Shannon from Killaloe to Limerick (along with some of its tributaries, including a short stretch of the Kilmastulla River), the Fergus up as far as Ennis, and the Cloon River. These systems are very different in character: the Shannon is broad, generally slow flowing and naturally eutrophic; the Fergus is smaller and alkaline; while the narrow, fast flowing Cloon is acid in nature. The Feale and Mulkear catchments exhibit all the aspects of a river from source to mouth. Semi-natural habitats, such as wet grassland, wet woodland and marsh occur by the rivers, but improved grassland is the most common habitat type. One grassland type of particular conservation significance, *Molinia* meadows, occurs in several parts of the site and the examples at Worldsend on the River Shannon are especially noteworthy. Here are found areas of wet meadow dominated by rushes (*Juncus* spp.) and sedges (*Carex* spp.), and supporting a diverse and species-rich vegetation, including such uncommon species as Blue-eyed Grass (*Sisyrinchium bermudiana*) and Pale Sedge (*C. pallescens*).

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Floating river vegetation characterised by species of water-crowfoot (*Ranunculus* spp.), pondweeds (*Potamogeton* spp.) and the moss *Fontinalius antipyretica* are present throughout the major river systems within the site. The rivers contain an interesting bryoflora with *Schistidium alpicola* var. *alpicola* recorded from in-stream boulders on the Bilboa, new to Co. Limerick.

Alluvial woodland occurs on the banks of the Shannon and on islands in the vicinity of the University of Limerick. The woodland is up to 50 m wide on the banks and somewhat wider on the largest island. The most prominent woodland type is gallery woodland where White Willow (*Salix alba*) dominates the tree layer with occasional Alder (*Alnus glutinosa*). The shrub layer consists of various willow species with Rusty Willow (*Salix cinerea* ssp. *oleifolia*) and what appear to be hybrids of *S. alba* x *S. viminalis.* The herbaceous layer consists of tall perennial herbs. A fringe of bulrush (*Typha* sp.) occurs on the river side of the woodland. On slightly higher ground above the wet woodland and on the raised embankment remnants of mixed oak-ash-alder woodland occur. These are poorly developed and contain numerous exotic species but locally there are signs that it is invading open grassland. Alder is the principal tree species, with occasional Pedunculate Oak (*Quercus robur*), elm (*Ulmus glabra* and *U. procera*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and

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the shrubs Guelder-rose (*Viburnum opulus*) and willows. The ground flora is species-rich.

While woodland is infrequent within the site, however Cahiracon Wood contains a strip of old oak woodland. Sessile Oak (*Q. petraea*) forms the canopy, with an understorey of Hazel and Holly (*Ilex aquifolium*). Great Wood-rush (*Luzula sylvatica*) dominates the ground flora. Less common species present include Great Horsetail (*Equisetum telmeteia*) and Pendulous Sedge (*Carex pendula*).

In the low hills to the south of the Slievefelim Mountains, the Cahernahallia River cuts a valley through the Upper Silurian rocks. For approximately 2 km south of Cappagh Bridge at Knockanavar, the valley sides are wooded. The woodland consists of birch (*Betula* spp.), Hazel, oak, Rowan (*Sorbus aucuparia*), some Ash (*Fraxinus excelsior*) and willow (*Salix* spp.). Most of the valley is not grazed by stock, and as a result the trees are regenerating well. The ground flora features prominent Great wood-rush and Bilberry (*Vaccinium myrtillus*), along with a typical range of woodland herbs. Bracken (*Pteridium aquilinum*) is a feature in areas where there is more light available.

The valley sides of the Bilboa and Gortnageragh Rivers, on higher ground north-east of Cappamore, support patches of semi-natural broadleaf woodland dominated by Ash, Hazel, oak and birch. There is a good scrub layer with Hawthorn, willow, Holly and Blackthorn (*Prunus spinosa*) common. The herb layer in these woodlands is often open, with a typically rich mixture of woodland herbs and ferns. Moss species diversity is high. The woodlands are ungrazed. The Hazel is actively coppiced in places.

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There is a small area of actively regenerating cut-away raised bog at Ballyrorheen. It is situated approximately 5 km north-west of Cappamore in Co. Limerick. The bog contains some wet areas with good cover of bog mosses (*Sphagnum* spp.). Species of particular interest include Cranberry (*Vaccinium oxycoccos*) and White Sedge (*Carex curta*), along with two regionally rare mosses, including the bog moss *S. fimbriatum*. The site is being invaded by Downy Birch (*Betula pubescens*) scrub woodland. Both commercial forestry and the spread of Rhododendron (*Rhododendron ponticum*) has greatly reduced the overall value of the site.

A number of plant species that are listed in the Irish Red Data Book occur within the site, and several of these are protected under the Flora (Protection) Order, 1999. These include Triangular Club-rush (*Scirpus triquetrus*), a species which is only found in Ireland only in the Shannon Estuary, where it borders creeks in the inner estuary. Opposite-leaved Pondweed (*Groenlandia densa*) is found in the Shannon where it passes through Limerick City, while Meadow Barley (*Hordeum secalinum*) is abundant in saltmarshes at Ringmoylan and Mantlehill. Hairy Violet (*Viola hirta*) occurs in the Askeaton/Foynes area. Golden Dock (*Rumex maritimus*) is noted as occurring in the River Fergus estuary. Finally, Bearded Stonewort (*Chara canescens*), a brackish water specialist, and Convergent Stonewort (*Chara connivens*) are both found in Shannon Airport Lagoon.

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Overall, the Shannon and Fergus Estuaries support the largest numbers of wintering waterfowl in Ireland. The highest count in 1995-96 was 51,423 while in 1994-95 it was 62,701. Species listed on Annex I of the E.U. Birds Directive which contributed to these totals include: Great Northern Diver (3; 1994/95), Whooper Swan (201; 1995/96), Pale-bellied Brent Goose (246; 1995/96), Golden Plover (11,067; 1994/95) and Bar-tailed Godwit (476; 1995/96). In the past, three separate flocks of Greenland White-fronted Goose were regularly found, but none were seen in 1993/94.

Other wintering waders and wildfowl present include Greylag Goose (216; 1995/96), Shelduck (1,060; 1995/96), Wigeon (5,976; 1995/96), Teal (2,319; 1995-96), Mallard (528; 1995/96), Pintail (45; 1995/96), Shoveler (84; 1995/96), Tufted Duck (272; 1995/96), Scaup (121; 1995/96), Ringed Plover (240; 1995/96), Grey Plover (750; 1995/96), Lapwing (24,581; 1995/96), Knot (800; 1995/96), Dunlin (20,100; 1995/96), Snipe (719, 1995/96), Black-tailed Godwit (1,062; 1995/96), Curlew (1,504; 1995/96), Redshank (3,228; 1995/96), Greenshank (36; 1995/96) and Turnstone (107; 1995/96). A number of wintering gulls are also present, including Black-headed Gull (2,216; 1995/96), Common Gull (366; 1995/96) and Lesser Black-backed Gull (100; 1994/95). This is the most important coastal site in Ireland for a number of the waders including Lapwing, Dunlin, Snipe and Redshank. It also provides an important staging ground for species such as Black-tailed Godwit and Greenshank.

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A number of species listed on Annex I of the E.U. Birds Directive breed within the site. These include Peregine Falcon (2-3 pairs), Sandwich Tern (34 pairs on Rat Island, 1995), Common Tern (15 pairs: 2 on Sturamus Island and 13 on Rat Island, 1995), Chough (14-41 pairs, 1992) and Kingfisher. Other breeding birds of note include Kittiwake (690 pairs at Loop Head, 1987) and Guillemot (4,010 individuals at Loop Head, 1987).

There is a resident population of Bottle-nosed Dolphin in the Shannon Estuary. This is the only known resident population of this E.U. Habitats Directive Annex II species in Ireland. The population is estimated (in 2006) to be 140 ± 12 individuals. Otter, a species also listed on Annex II of this Directive, is commonly found on the site.

Five species of fish listed on Annex II of the E.U. Habitats Directive are found within the site. These are Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey (*Lampetra fluviatilis*), Twaite Shad (*Allosa fallax fallax*) and Salmon (*Salmo salar*). The three lampreys and Salmon have all been observed spawning in the lower Shannon or its tributaries. The Fergus is important in its lower reaches for spring salmon, while the Mulkear catchment excels as a grilse fishery, though spring fish are caught on the actual Mulkear River. The Feale is important for both types. Twaite Shad is not thought to spawn within the site. There are few other river systems in Ireland which contain all three species of lamprey.

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Two additional fish species of note, listed in the Irish Red Data Book, also occur, namely Smelt (*Osmerus eperlanus*) and Pollan (*Coregonus autumnalis pollan*). Only the former has been observed spawning in the Shannon.

Freshwater Pearl Mussel (*Margaritifera margaritifera*), a species listed on Annex II of the E.U. Habitats Directive, occurs abundantly in parts of the Cloon River.

There is a wide range of land uses within the site. The most common use of the terrestrial parts is grazing by cattle, and some areas have been damaged through over-grazing and poaching. Much of the land adjacent to the rivers and estuaries has been improved or reclaimed and is protected by embankments (especially along the Fergus estuary). Further, reclamation continues to pose a threat, as do flood relief works (e.g. dredging of rivers). Gravel extraction poses a major threat on the Feale.

In the past, cord-grass (*Spartina* sp.) was planted to assist in land reclamation. This has spread widely, and may oust less vigorous colonisers of mud and may also reduce the area of mudflat available to feeding birds.

Domestic and industrial wastes are discharged into the Shannon, but water quality is generally satisfactory, except in the upper estuary where it reflects the sewage load from Limerick City. Analyses for trace metals suggest a relatively clean estuary with no influences of industrial discharges apparent. Further industrial development along the Shannon and water polluting operations are potential threats.

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Fishing is a main tourist attraction on the Shannon and there are a large number of angler associations, some with a number of beats. Fishing stands and styles have been erected in places. The River Feale is a designated Salmonid Water under the E.U. Freshwater Fish Directive. Other uses of the site include commercial angling, oyster farming, boating (including dolphin-watching trips) and shooting. Some of these may pose threats to the birds and dolphins through disturbance. Specific threats to the dolphins include underwater acoustic disturbance, entanglement in fishing gear and collisions with fast moving craft.

This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitats lagoon and alluvial woodland, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. A good number of Red Data Book species are also present, perhaps most notably the thriving populations of Triangular Club-rush. A number of species listed on Annex I of the E.U. Birds Directive are also present, either wintering or breeding. Indeed, the Shannon and Fergus Estuaries form the largest estuarine complex in Ireland and support more wintering wildfowl and waders than any other site in the country. Most of the estuarine part of the site has been designated a Special Protection Area (SPA), under the E.U. Birds Directive, primarily to protect the large numbers of migratory birds present in winter.

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SITE SYNOPSIS

Site Name: Kerry Head Shoal SAC

Site Code: 002263

Kerry Head Shoal, Co. Kerry is situated on the west coast of Ireland, to the north of Tralee Bay and to the west of Kerry Head. It is a deep (20-46 m) limestone reef running in a north-east to south-west direction. The reef is exposed to the full force of swells from the Atlantic.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[1170] Reefs

The Kerry Head Shoal is of high importance as it is the best known example of the Axinellid sponge community in Ireland. Several species occur in associations that are unique in Ireland. The site contains a rich and diverse flora and fauna that is characterized by rare erect and encrusting sponges *Tetilla cranium, Quasillina brevis, Axinella flustra* and *Hexadella racovitzae*. These species are only known from one other locality in Ireland, while *T. zetlandica* has only been found in two other localities on the west coast.

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The shallow water reef communities of Kerry Head Shoal are extremely exposed to wave action and subject to weak tidal streams. Sparse kelp (*Laminaria hyperborea*) on bedrock with occasional ridges and overhangs at 21-26 m overlies an understorey of foliose red algae (*Callophyllis laciniata, Kallymenia reniformis, Acrosorium venulosum, Cryptopleura ramosa* and *Delesseria sanguinea*). The red alga *Drachiella spectabilis* is abundant and the brown alga *Carpomitra costata* is common. Both of these species are characteristic of clear Atlantic water. The fauna is characterised by a diverse assemblage of sponges including *Pachymatisma johnstonia, Cliona celata* and *Polymastia boletiformis*. Other species that are present include hydroids (*Aglaophenia pluma* and *Nemertesia antennina*), sea-fans (*Eunicella verrucosa*), sea-slugs (*Aplysia punctata*), bryozoa (*Membranipora membranacea* and *Electra pilosa*), and echinoderms (*Holothuria forskali*). Four species that generally occur in deeper water - the hydroid *Gymnangium montagui*, the sea-fan *Eunicella verrucosa*, the sea-squirt *Diazona violacea* and the sponge *Axinella dissimilis* - are present in the kelp community

In deeper water, at 33-46 m, the bedrock ranges from large and relatively flat terraces cut by gullies, to ridged bedrock and angular boulders. Here the reefs are colonised by excellent examples of the Axinellid cup sponge community with an extremely high number of sponge species (44 species) and few algal species. The sponges *Axinella infundibuliformis, Phakellia ventilabrum* and *P. vermiculata* are frequent in this

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community, as are a number of rare species including two sponges *Hexadella recovitzai* and *Axinella flustra*, the bryozoan rose 'coral' *Pentapora foliacea*, the sea-squirt *Diazona violacea* and the red soft coral *Alcyonium glomeratum*. In the deepest examples of this community the rare sponges *Tetilla zetlandica*, *T. cranium*, and *Quasillina brevis* are also present. The rare species of sea-slug *Aldisa zetlandica* has also been recorded from the deep reefs.

The reefs of the Kerry Head Shoal support a remarkable diversity of fauna and flora, including the best known example of the Axinellid sponge community in Ireland. The presence of a number of very rare sponge species (*Tetilla cranium*, *Axinella flustra*, *Hexadella racovitzai, T. zetlandica* and *Quasillina brevis*), known from only one or two other locations in Ireland, is of particular note.

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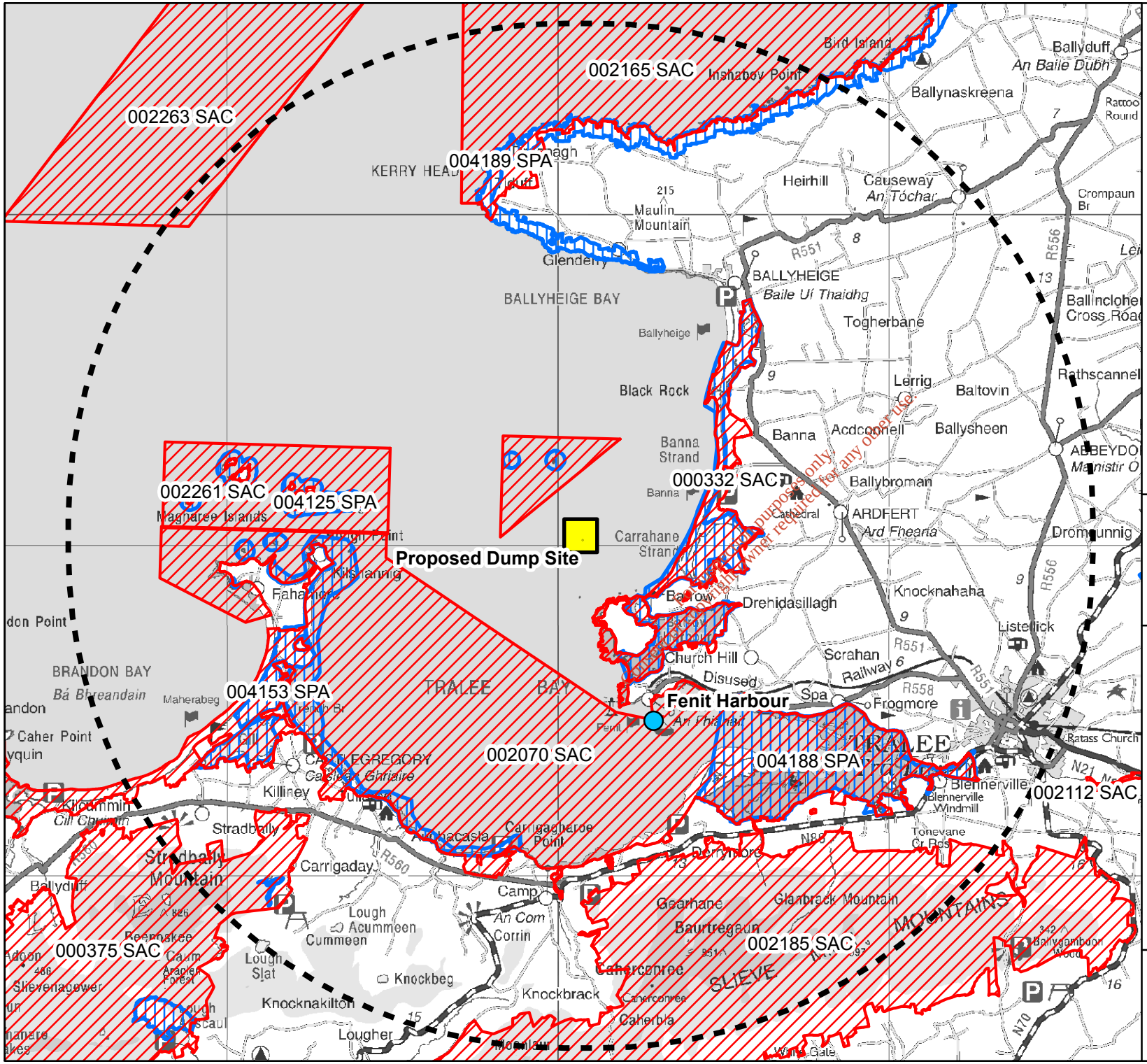
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Appendix 3

Figures

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Legend

- Proposed Dump Site
- Fenit Harbour
- Proposed Dump Site 15km Buffer
- Special Areas of Conservation (SAC)
- Special Protection Areas (SPA)

SPA Codes:
004125 Magharee Islands
004153 Dingle Peninsula
004188 Tralee Bay Complex
004189 Kerry Head

SAC Codes:
000332 Akeragh, Banna and Barrow Harbour
000375 Mount Brandon SAC
002070 Tralee Bay And Magharees Peninsula, West To Cloghane
002165 Lower River Shannon
002185 Slieve Mish Mountains
002263 Kerry Head Shoal SAC
002112 Ballyseedy Wood
002261 Magharee Islands

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Project Title:
Fenit Harbour Maintenance Dredging and Dumpsite 2019

Drawing Title:
Natura 2000 Sites

Client: Kerry County Council

Drawn By: JK
Checked By: HD
Drawing Date: 29/04/2019

Scale (A3): 1:160,000

Malachy Walsh and Partners
Engineering and Environmental Consultants

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