



# Natura Impact Statement

Natura Impact Statement in relation to proposed Annual dredging and Beach Nourishment at Magheraroarty Beach by Donegal County Council over a Five-year Period within the zone of influence of the Ballyness Bay SAC site code 001090 and Falcarragh to Meenlaragh SPA site code 004149

Greentrack Environmental Consultants

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# 1 INTRODUCTION

Greentrack Consultants have been instructed by Donegal County Council to undertake this Natura Impact Statement under Article 6 of the EU Habitats Directive, examining their proposal for the annual dredging and beach nourishment at Magheraroarty Beach, Gortahork, Co. Donegal. The aim of this NIS is to assess any likely significant effects or impacts caused by the proposed development on the integrity of the Natura 2000 network caused by this proposal, both independently and in conjunction with other plans and projects.

## 1.1 Background and Requirement for NIS

### 1.1.1 Project Description

The proposal is for the annual dredging and beach nourishment of Magheraroarty Beach (Dooey Strand), Gortahork, Co. Donegal. Beach nourishment is the artificial placement of sand on an eroded shore to maintain the amount of sand present in the foundation of the coast which compensates for natural erosion. The process involves dredging material (sand, pebbles) from a source area (offshore or inland) to feed the beach where erosion is occurring.

The works comprise the relocation of material from a 0.62Ha area of accretion within Magheraroarty Harbour to a 12.7ha intertidal area on the Strand which suffers erosion from wave and wind action and longshore drift. The proposed area for beach nourishment is relatively small in scale with Dooey Strand over 3km long (approx. 80ha). C.5000- 20000 ton of recently deposited sand is envisaged to be the minimum amount to be removed from the harbour and returned to the marked location (map 1) on Dooey Strand through the process of beach nourishment. The amount of material to be removed will depend on accretion during winter storm events.

Annual maintenance dredging of Magheraroarty harbour is required to maintain navigable depths to -2.5m Chart Datum for the Tory Island ferry, commercial fishing boats and charter boats of the local area. The subject site is within the boundary of Ballyness Bay SAC and adjacent to Falcarragh to Meenlaragh SPA. The project directly affects 13.32ha of the c.1000ha Ballyness Bay SAC Coastal Cell comprising a relatively small proportion of the SAC at 1.33%.

Map 1 shows the location of the subject site. Photographs 1-3 give a visual assessment of the subject site.

**Map 1: Location of Subject site**



**Photograph 1: Overview of the subject site**



**Photograph 2:  
Magheraroarty Pier (site for dredging)**



**Photograph 3:  
Approximate location for beach nourishment**



### **1.1.2 EU Habitats Directive**

The Habitats Directive (Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna) formed a basis for the designation of Special Areas of Conservation (SAC's). Similarly, Special Protection Areas are legislated for under the Birds Directive (Council Directive 79/409/EEC on the Conservation of Wild Birds). Collectively, SACs and SPAs are referred to as Natura 2000 sites. In general terms, they are of exceptional importance in terms of rare, endangered or vulnerable habitats and species within the European Community. Under Article 6(3) of the Habitats Directive an Appropriate Assessment must be undertaken for any plan or project that is likely to have a significant effect on the conservation objectives of a Natura 2000 site. An Appropriate Assessment is an evaluation of the potential impacts of a plan or project on the conservation objectives of a Natura 2000 site, and the development, where necessary, of mitigation or avoidance measures to preclude negatives effects. The main aim of the EU Habitats Directive is to "contribute towards ensuring biodiversity through the

conservation of natural habitats of wild fauna and flora in the European territory of the Member States to which the treaty applies". The Directive was originally transposed into Irish law by the European Communities (Natural Habitat) Regulations, S1 94/1997. However, two judgments of the Court of Justice of the EU (CJEU) – notably cases C-418/04 and C-183/05 - found that Ireland had not adequately transposed the two Directives. Therefore, Part 6 of the European Communities (Birds and Natural Habitats) Regulations 2011-2015 is now the relevant part dealing with the protection of flora and fauna since the revoke of the European habitats Regulations of 1997. This consolidates the European Communities (Natural Habitats) Regulations 1997 to 2005 and the European Communities (Birds and Natural Habitats) (Control of Recreational Activities) Regulations 2010, as well as addressing transposition failures identified in CJEU judgments.

Article 6 (3) of the Habitats Directive states that:

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

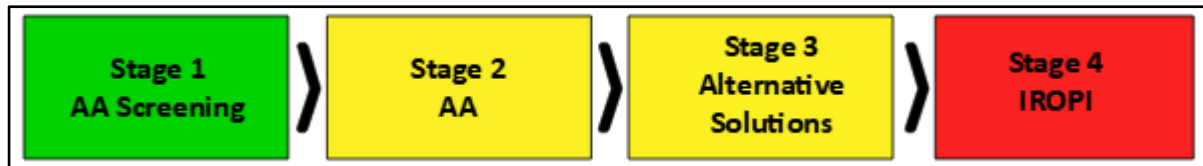
As such any project likely to have a significant effect, either individually or in combination with other plans or projects, upon the conservation objectives of a Natura 2000 site must undergo an assessment of its implications on relevant Natura 2000 sites. In order to establish whether a likely significant effect will arise as a result of the implementation of a project a Screening Assessment should be undertaken. It is therefore deemed necessary to screen the project for the potential to result in significant negative effects to the published conservation objectives of Natura 2000 sites. The applicant is therefore submitting this NIS to allow the consent authority, Donegal County Council, to carry out an Appropriate Assessment on the planning application as submitted.

### **1.1.3 Stages of the Habitat Directive Assessment**

Screening for Appropriate Assessment must be carried out to assess, in view of best scientific knowledge and in view of the conservation objectives of the relevant European site(s), if the proposed operation/activity on its own or in combination with other plans or projects is likely to have a significant effect on the European site(s) (Regulation 42(1) of the 2011 Regulations). The likely effects of all aspects of the operation must be considered and screened in combination with other operations and other management activities which are completed, commenced, permitted, or proposed and other developments that could act in combination. It must be determined that an Appropriate Assessment is required if it cannot be excluded on the basis of objective scientific information, following screening, that the project, alone or in combination with other plans or projects will have a significant effect on the European site(s) (Regulation 42(6)). The precautionary principle should be applied in reaching this determination, i.e. where there is uncertainty or a lack of data, it should not be assumed that significant effects will not result.

The Appropriate Assessment process consists of four stages as summarised below in sequential order. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required. Stages 1 and 2 deal with the main requirements for assessment under Article 6(3). Stage 3 may be part of Article 6(3) or may be a necessary precursor to Stage 4, which is the main derogation step to Article 6(4).





**Figure 1: Stages of Screening**

**Stage 1 - Screening for any likely significant impacts.** Screening involves an initial assessment of the project or plan's effect on a Natura 2000 site(s). If it cannot be concluded that there will be no significant effect upon a Natura 2000 site, an Appropriate Assessment is required. The process addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3):

- I. whether a plan or project is directly connected to or necessary for the management of the site, and
- II. whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on a Natura 2000 site in view of its conservation objectives.

**If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2 (AA).** Screening should be undertaken without the inclusion of mitigation, unless potential impacts clearly can be avoided through the modification or redesign of the plan or project, in which case the screening process is repeated on the altered plan. The greatest level of evidence and justification will be needed in circumstances when the process ends at screening stage on grounds of no impact. This report provides the information necessary to enable the appropriate authority to screen the proposed development for the requirement to prepare an Appropriate Assessment.

**Stage 2 - Appropriate Assessment (Natura Impact Statement or NIS):** The consideration of the impact on the integrity of the Natura 2000 site(s) from the project or plan, either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts.

**Stage 3 – Assessment of alternative solutions:** The process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site. The process must return to Stage 2, as alternatives will require appropriate assessment in order to proceed. Demonstrating that all reasonable alternatives have been considered and assessed, and that the least damaging option has been selected, is necessary to progress to Stage 4.

**Stage 4 – Assessment where no alternative solutions exist and where adverse impacts remain:** Stage 4 is the main derogation process of Article 6(4), which examines whether there are imperative reasons of overriding public interest (IROPI) for allowing a plan or project that will have adverse effects on the integrity of a Natura 2000 site to proceed in cases where it has been established that no less damaging alternative solution exists. Compensatory measures must be proposed and assessed. The Commission must be informed of the compensatory measures. Compensatory measures must be practical, implementable, likely to succeed, proportionate and enforceable, and they must be approved by the Minister.

Each listed stage determines whether a further stage in the process is necessary. If, for example, the conclusions at the end of Stage One are that there will be no significant impacts on the Natura 2000 site(s), there is no requirement to proceed further.

Following on from Article 6(3) of the Habitats Directive the objective of this Natura Impact Statement is to screen for “Likely Significant Effects” and to conclude whether or not the proposed activity is likely to result in significant adverse effects to the integrity of any Natura 2000 sites within the zone of influence. The appraisal of adverse effects to the integrity of these sites will be established by assessing the potential impacts the proposal will have on the conservation objectives of said Natura 2000 sites. This report will also detail measures that will avoid, reduce and mitigate any such adverse effects.

## 1.2 Guidance Documents

This NIS was carried out in accordance with relevant guidance, in particular:

- Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities. Department of Environment, Heritage and Local Government, 2010.
- European Commission. Managing Natura 2000 Sites: The provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC. Office for Official Publications of the European Communities, Luxembourg, 2018.
- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological Guidance on the Provisions of Article 6 (3) and (4) of the Habitats Directive 92/43/EEC. European Commission, 2002.
- Guidance Document on Article 6 (4) of the ‘Habitats Directive’ 92/43/EEC. Clarification of the Concepts of Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence. Opinion of the European Commission. European Commission, 2007 / 2012.
- Habitats Directive and environmental assessment of plans and projects. García Ureta, A. Journal for European Environmental and Planning Law 2, 8496, 2007.
- Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Circular NPW 1/10 & PSSP 2/10.
- Compliance Conditions in respect of Developments requiring (1) Environmental Impact Assessment (EIA); or (2) having potential impacts on Natura 2000 sites. Circular letter PD 2/07, NPWS 1/07.
- Compliance of Existing Land Use Plans with the EU Habitats Directive. Department of Environment, Heritage and Local Government (2011) Circular Letter PSSP 5/2011.

## 1.3 Statement of Authority

This Natura Impact Statement has been compiled by Daniel Faulkner, Shannen McEwen and Donna Gavigan, Ecologists with Greentrack. Daniel holds a B.Sc (Hons) Environmental Science from NUI Galway and is an associate member of CIEEM. Shannen holds a BSc (Hons) Environmental Science with a Diploma in Professional Practice from the University of Ulster. Shannen is also an Associate Member of the Institution of Environmental Sciences. Donna holds a B.Agr.Sc (Hons) in Agricultural Science from UCD along with a MSc in Wildlife Conservation and Management from UCD. Donna is a member of Birdwatch Ireland, the Irish Wildlife Trust, Bumblebee Conservation Trust, Bat Conservation Ireland and the Irish Whale and Dolphin Group.

# 2 APPROACH AND METHODOLOGY

## 2.1 Approach

The function of this NIS is to identify whether the proposal will have a likely significant effect on the integrity of Natura 2000 sites detailed. The nature of the likely interactions between the proposal and the integrity of the site will depend upon

- a) sensitivity of the site’s qualifying interests to potential impacts arising from the proposal
- b) current conservation status of the sites and

- c) the likely changes that will result from activities associated with the proposal, in combination with other plans and projects.

## 2.2 Methodology

The methodology used for this NIS is undertaken in the following stages:

- Define the project and determine whether it is necessary for the conservation management of Natura 2000 sites
- Identify Natura 2000 sites likely to be influenced by this development
- Review the project to determine if it has the potential to affect the Natura 2000 sites and determine whether the Natura 2000 sites are vulnerable to the effect
- Identify other plans or project that, in combination with this project, have the potential to affect Natura 2000 sites.

## 3 THE PROJECT AND NATURA 2000 BASE LINE

In accordance with the requirements outlined in Articles 6(3) and (4) and the relevant national guidance, the following screening has been produced in a stage-by-stage approach, including:

- Establish whether the project is necessary for the management of a Natura 2000 site
- Identification of Natura 2000 sites potentially affected
- Characteristics of the Natura 2000 sites affected
- Conservation Status
- Conservation Objectives

### 3.1 Definition of the Project

The project has been defined in Section 1.1.1 and it is not necessary for the nature conservation of any Natura 2000 site.

### 3.2 Identification of Natura 2000 Sites

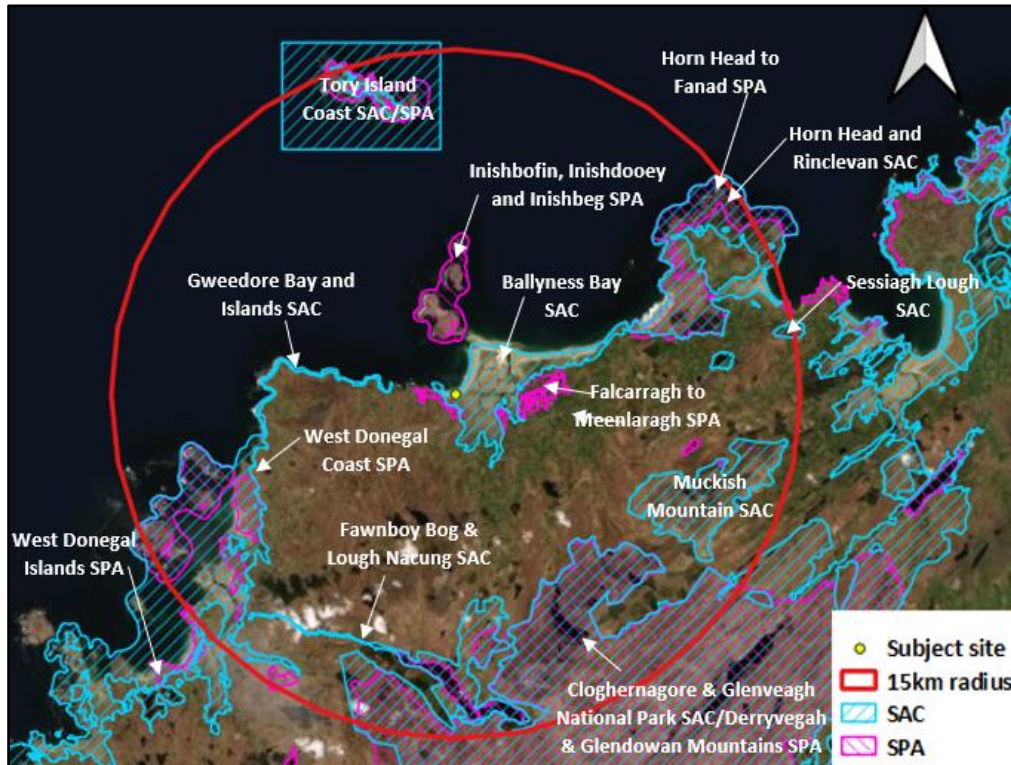
In terms of the identification of relevant Natura 2000 sites, the zone of impact (also known as the area of influence) is determined based on their potential connectivity (*source-pathway-receptor* model) to the proposed Project in terms of, for example:

- Nature, scale, timing, and duration of works and possible impacts
- Distance and nature of pathways (dilution and dispersion; intervening 'buffer' lands, roads *etc.*); and
- Sensitivity and location of ecological features.

The 'zone of influence' (ZoI) is essentially the effect area over which alterations may have potential ecological impact. The ZoI over which the proposed development may impact upon Natura 2000 Sites and their Qualifying Interests will vary for different ecological receptors, depending on the pathway for potential impacts, as well as the specific nature of the habitats/species (e.g. some species have ability to move/disperse and some habitats have better ability than others to absorb impacts). Having considered the potential ecological impacts through source-receptor-pathway connectivity (e.g. hydrological link) and given the nature of the proposed project, it was deemed that the zone of influence for such projects would be limited to a radius of 15 km as recommended by NPWS.

The Natura 2000 sites occurring within 15 Km of the subject site are listed in Table 3.1 and are screened for possible threats from the proposed development. Map 2 indicates the relative locations of all listed Natura 2000 sites in relation to the subject site.

**Map 2: Subject site relative to the named Natura 2000 sites within 15km**



**Table 3.2: Natura 2000 Sites within Zone of Influence**

Site Name	Site Code	Distance from Subject Site	Avenue of Connectivity to Subject Site	Significant Threat Possible (Y/N)
<b>Ballyness Bay SAC</b>	001090	Within	Direct avenue of connectivity	<b>Y</b>
<b>Falcarragh to Meenlaragh SPA</b>	004149	Adjacent	Direct avenue of connectivity	<b>Y</b>
<b>Inishbofin, Inishdooley and Inishbeg SPA</b>	004083	2.1km N	No significant avenue of connectivity.	N - Hydrologically connected through NW Atlantic seaboard. This represents a large buffer to any potential negative effects on integrity of this site.
<b>Gweedore Bay and Islands SAC</b>	001141	3.3km W	No significant avenue of connectivity.	N - Hydrologically connected through NW Atlantic seaboard. This represents a large buffer to any potential negative effects on integrity of this site.
<b>Horn Head and Rinclevan SAC</b>	000147	6.2km E	No significant avenue of connectivity.	N - Hydrologically connected through NW Atlantic seaboard. This represents a large buffer to any potential

Site Name	Site Code	Distance from Subject Site	Avenue of Connectivity to Subject Site	Significant Threat Possible (Y/N)
				negative effects on integrity of this site.
<b>Horn Head to Fanad Head SPA</b>	004194	7.1km E	No significant avenue of connectivity.	N - Hydrologically connected through NW Atlantic seaboard. This represents a large buffer to any potential negative effects on integrity of this site.
<b>Muckish Mountain SAC</b>	001179	9km SE	No significant avenue of connectivity.	N
<b>Cloghernagore Bog and Glenveagh National Park SAC</b>	002047	9.1km SE	No significant avenue of connectivity.	N
<b>Derryveagh and Glendowan Mountains SPA</b>	004039	9.1km SE	No significant avenue of connectivity.	N
<b>West Donegal Coast SPA</b>	004150	9.8km SW	No significant avenue of connectivity.	N - Hydrologically connected through NW Atlantic seaboard. This represents a large buffer to any potential negative effects on integrity of this site.
<b>West Donegal Islands SPA</b>	004230	10km SW	No significant avenue of connectivity.	N - Hydrologically connected through NW Atlantic seaboard. This represents a large buffer to any potential negative effects on integrity of this site.
<b>Tory Island Coast SAC</b>	002259	10.6km N	No significant avenue of connectivity.	N - Hydrologically connected through NW Atlantic seaboard. This represents a large buffer to any potential negative effects on integrity of this site.
<b>Fawnboy Bog and Lough Nacung SAC</b>	000140	11.8km SW	No significant avenue of connectivity.	N
<b>Tory Island SPA</b>	004073	12km N	No significant avenue of connectivity.	N - Hydrologically connected through NW Atlantic seaboard. This represents a large

Site Name	Site Code	Distance from Subject Site	Avenue of Connectivity to Subject Site	Significant Threat Possible (Y/N)
				buffer to any potential negative effects on integrity of this site.
<b>Sessiagh Lough SAC</b>	000185	13.7km E	No significant avenue of connectivity.	N

Ballyness Bay SAC and Falcarragh to Meenlaragh SPA are screened in for further studies due to potential significant threats to the integrity of both Natura 2000 sites as a result of the proposed development. Map 3 shows the location of these natura 2000 sites relative to the proposed development.

**Map 3: Proximal Natura 2000 sites**



Taking into consideration the ecological characteristics of the Natura 2000 sites together with the proposed development and associated activities (location and extent), direct and indirect potential impacts have been identified as part of this NIS. Ecological receptors that are sensitive to potential impacts from the existing development include the species and habitats listed in Section 3.5.

**3.3 Characteristics of the Natura 2000 Sites**

**Ballyness Bay SAC site code 001090:**

Ballyness Bay is situated in north-west Donegal adjacent to the towns of Gortahork and Falcarragh. The underlying geology is mostly pelites, with some smaller areas of limestone and quartzite. This is mostly covered by windblown sand and peat. Ballyness Bay is a large and very shallow estuarine complex, with extensive areas of sandflats which are exposed at low tide. Land use within the bay comprises fishing and sailing on a small scale; the surrounding dunes and grassland are grazed by sheep and cattle. Ballyness Bay contains several important coastal habitats listed on Annex I of the

E.U. Habitats Directive, including the priority habitat fixed dunes. The site is also an important wildfowl site. A full site synopsis can be found in Appendix I.

#### **Falcarragh to Meenlaragh SPA site 004149**

Falcarragh to Meenlaragh SPA is located on the eastern and western sides of Ballyness Bay on the north-west coast of Co. Donegal. This large site follows the coastline from Falcarragh to Meenlaragh and encompasses three areas of mixed agricultural grassland. The site is of special conservation importance for the Corncrake. A full site synopsis can be found in Appendix II.

### **3.4 Conservation status**

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives. Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites. The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, is stable or increasing, and
- the ecological factors that 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.

The favourable conservation status of a species is achieved when:

- population data on the species concerned indicate that it is maintaining itself, and
- the natural range of the species is neither being reduced or 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 (Habitats Directive, 1992).

### **3.5 Conservation Objectives**

#### **Ballyness Bay SAC**

The overarching Conservation Objective for the Ballyness Bay SAC is to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

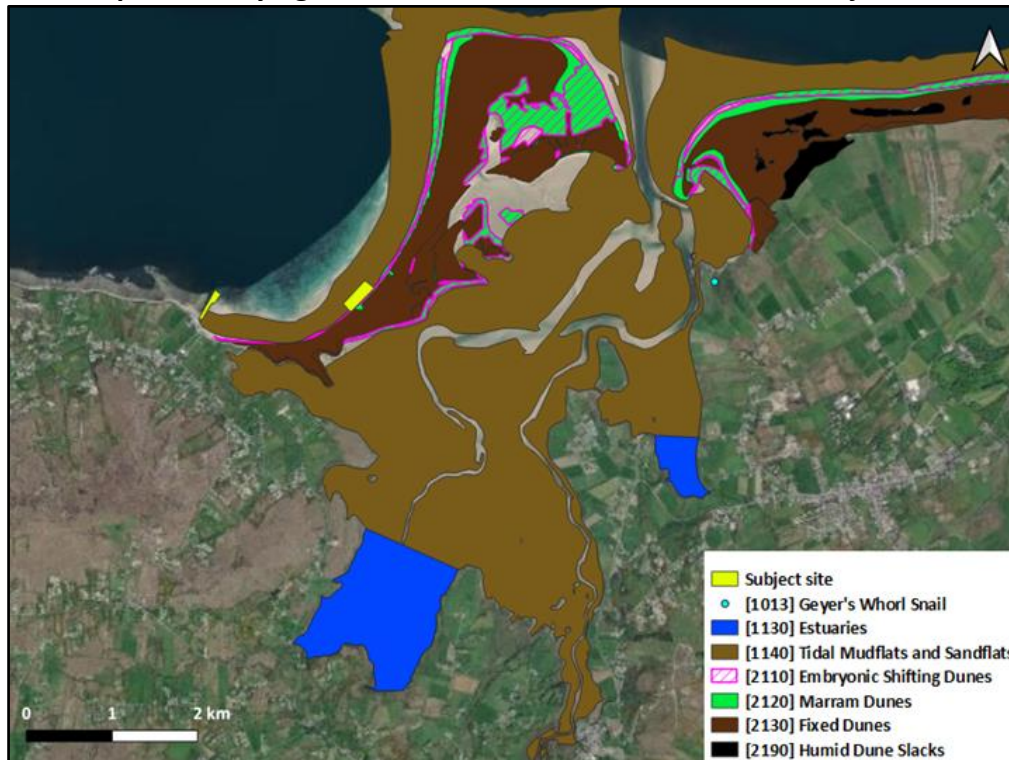
- [1130] Estuaries
- [1140] Mudflats and sandflats not covered by seawater at low tide
- [2110] Embryonic shifting dunes
- [2120] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)
- [2130] Fixed coastal dunes with herbaceous vegetation (grey dunes)
- [2190] Humid dune slacks
- [1013] *Vertigo geyeri* (Geyer's Whorl Snail)

### **Falcarragh to Meenlaragh SPA**

The conservation objective of Falcarragh to Meenlaragh SPA is to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

- [A122] Corncrake (*Crex Crex*)

**Map 4: Qualifying interest of the SAC in relation to the subject site**



Map 4 was created using QGIS software with Article 17 spatial data (updated in 2019) available from the NPWS website. Map 4 shows that the qualifying interests occurring within the vicinity of the site are [1140] Mudflats and sandflats not covered by seawater at low tide (the subject site is a designated mudflat and sandflat) with [2110] Embryonic shifting dunes, [2120] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) and [2130] Fixed coastal dunes with herbaceous vegetation (grey dunes) all within close proximity.

## **4 PROJECT DESCRIPTION**

The proposal is for the annual dredging and beach nourishment of Magheraroarty Beach (Dooey Strand), Gortahork, Co. Donegal over a 5-year period. Such annual maintenance dredging has taken place since 2002 to maintain a navigable depth of -2.5m for a variety of commercial boats on the eastern side of the harbour. Each campaign of annual dredging will be carried out over 4 days. The amount of material to be removed from the harbour will vary year to year depending on the severity of winter storm events. The estimated minimum amount required to be removed to ensure safe navigable depth for commercial boating activity will range from c.5000 to c.20000 ton depending on winter storm severity.

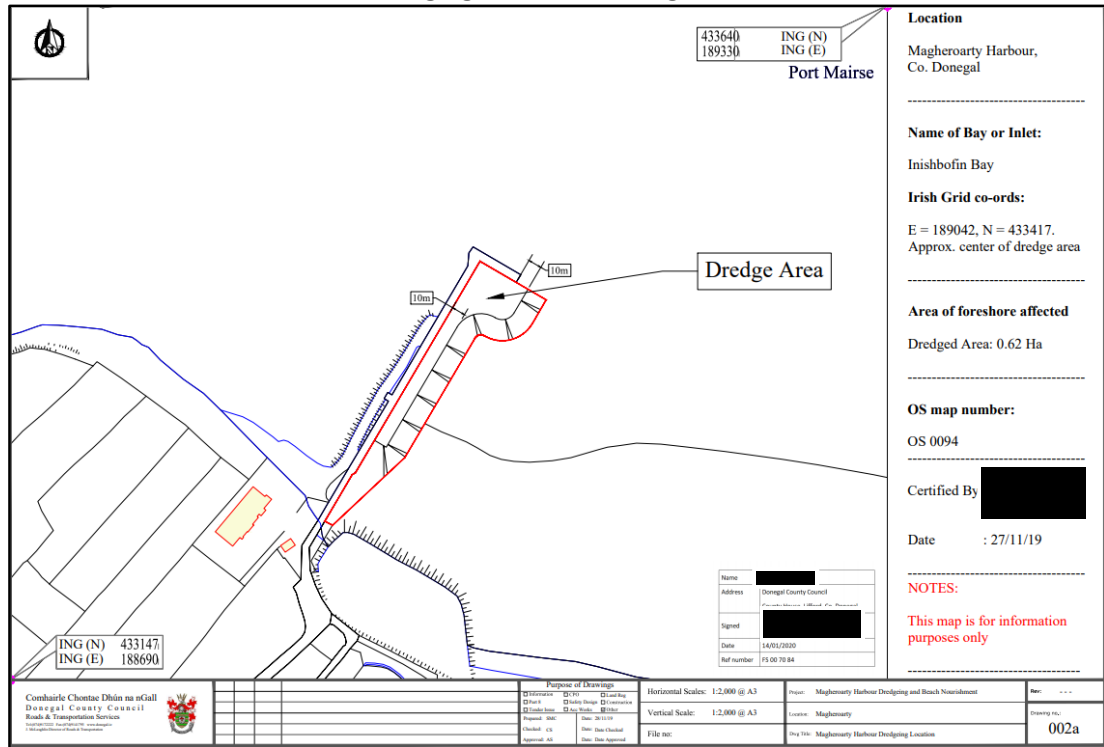
Prior to the commencement of works annually, an Ecological Clerk of Works is to be consulted. This person is to liaise with personnel working on site to ensure that environmental protection measures are adhered to, that conditions are suitable for works to take place and that all haul routes for material and the area for nourishment are clearly delineated as per Figures 2 and 3.



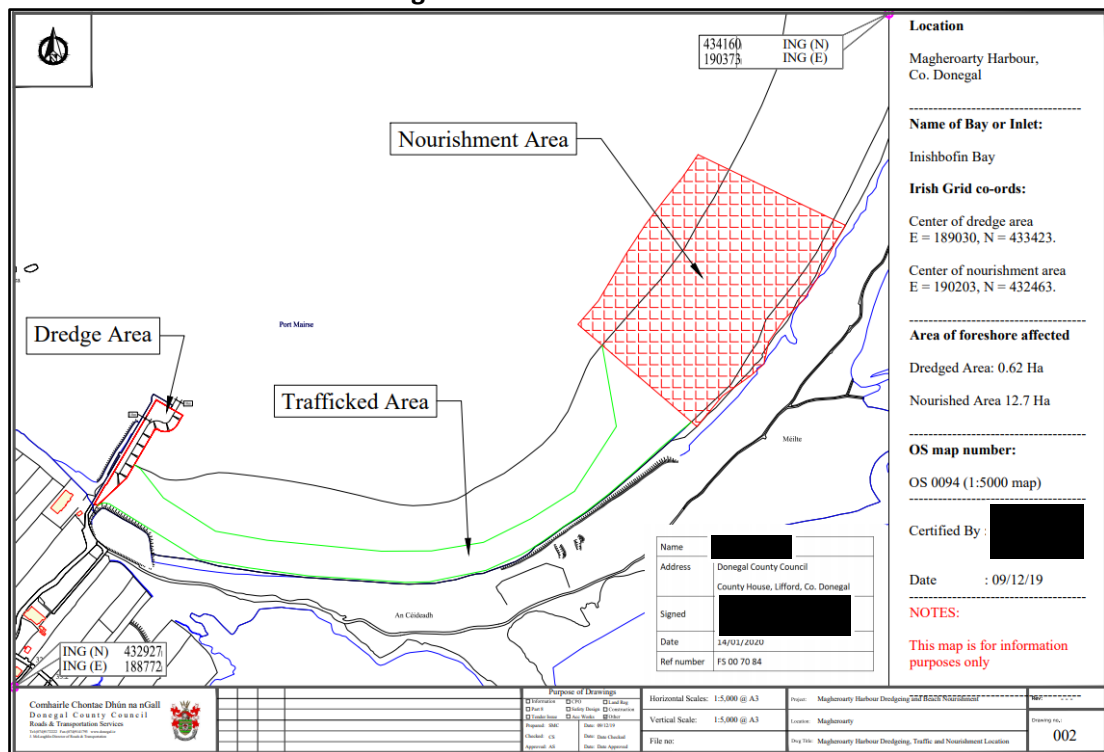
### 4.1 Proposed Dredging

Dredging is proposed to take place annually during the equinoctial-spring tides in an area c.0.62 ha. This will provide the maximum time at low tide-mid tide allowing for efficient removal of material from the harbour. Proposed dredging will be carried out at low to mid tide, from the beach, using 2 No. 360° excavators. The area for dredging and turning basin for excavators is illustrated in Figure 2.

**Figure 2:  
Dredging Site and Turning Basin**



**Figure 3: Nourishment Area**



Removal of material is to be carried out by experienced personnel to minimise excess sediment mobilisation. Removed material will then be loaded on to 2.no dump trucks and transported along a marked route along the foreshore, during low tide – mid tide to the agreed disposal site on Dooley Strand for the purposes of beach nourishment (Figure 2). Both the haul route and the area for disposal are to be clearly marked prior to any dredging. C.5000 - 20000 tons of material will be removed from the harbour depending on winter accretion. The minimum amount required to allow for safe navigable depth at the harbour will be removed. Dredging will take place in shifts during daylight hours. The works will take place over a 4-day period. The material to be removed from within Magheraroarty harbour is that of recently deposited sand which has been transported along Dooley Strand and deposited by natural processes. The nature of the deposit was analysed by Aquafact<sup>1</sup>. A brief outline of the deposit analysis is presented in Table 4.1. Three sediment stations were sampled within the proposed dredging area in January 2020 and analysed by Aquafact, the locations of the dredge site sampling points are shown in Figure 4.

**Table 4.1 Sediment Characterisation Results (Aquafact 2020)**

Parameter	S1	S2	S3
<b>Visual Inspection</b>	Brown clean sand	Brown clean sand	Brown clean sand
<b>Density g/ml</b>	1.55	1.53	1.55
<b>Moisture content %</b>	33.79	37.68	35.23
<b>Gravel %</b>	3.7	0.2	0.4
<b>Silt-clay %</b>	3.3	3.6	1.1
<b>Sand %</b>	93.1	96.2	98.6
<b>TOC %</b>	0.66	0.27	0.20



**Figure 4: Location of Sampling Points**

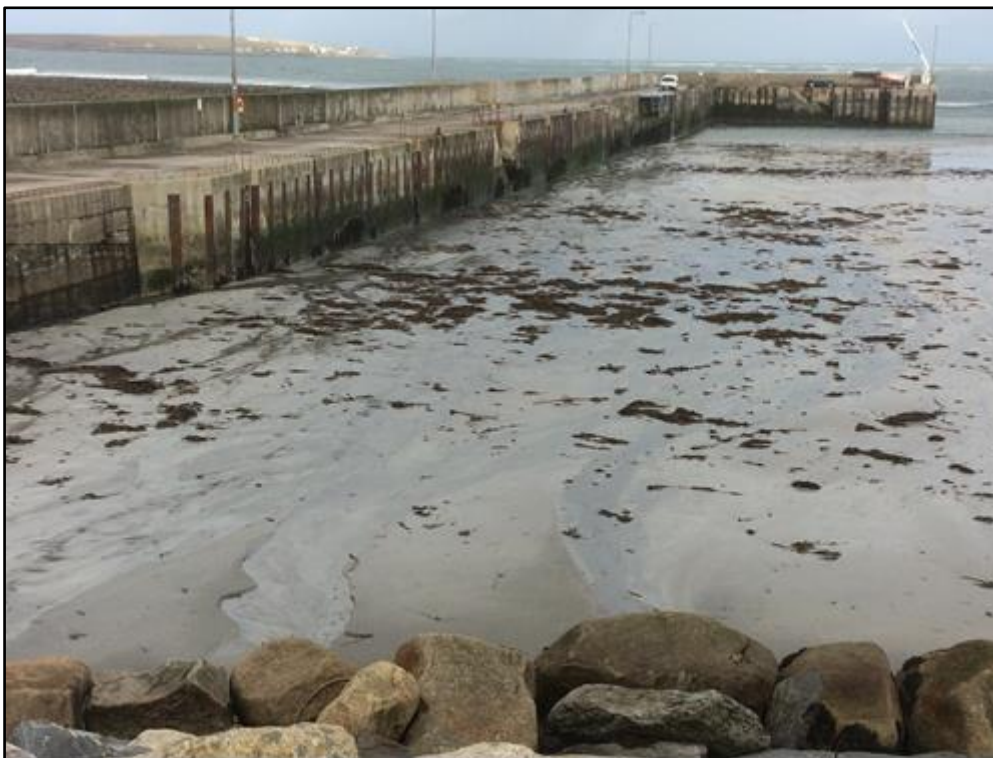
<sup>1</sup> Marine Sediment Characterisation Magheraroarty Pier, Aquafact, 2020

Additionally, sediment characterisation indicated that sediment was below the lower action limits<sup>2</sup> for metals, organochlorines, total extractable hydrocarbons, organotin and Sigma 16 Polycyclic Aromatic Hydrocarbons (PAHs).

Dredging will give rise to temporary increases sediment mobilisation in the surrounding water column due to physical disturbance and removal of sediment during each dredge event. This localised increase in sediment will comprise sediment of similar nature to that described in Table 4.1 The proposal comprises annual dredge events which will take place within the confines of the harbour and which will comprise relatively small volumes of material (c.5000-20000 tons). 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 dredge site, these impacts will be localised to the area in question and temporary in nature.

Photographs 4 to 5 illustrate the process of dredging carried out in previous campaigns.

**Photograph 4:**  
**Site for dredging at Magheraroarty harbour (Pre-dredging) at low tide**



<sup>2</sup> Cronin, M., McGovern, E., McMahon, T. & Boelens, R., "Guidelines for the Assessment of Dredge Material for Disposal in Irish Waters", Marine Environment and Health Series No. 24, Marine Institute 2006

**Photograph 5:  
Site for dredging at Magheraroarty Harbour (during dredging)**



#### **4.2 Proposed Beach Nourishment**

The agreed location for beach nourishment on Dooley Strand covers an area of the intertidal foreshore of approximately 12.7ha approx. midway along the beach (Figure 2). The area for nourishment is to be delineated prior to dredging. The area is defined by the centre point E 190203, N 432463 (ING). The proposed area for beach nourishment represents a small portion of the 3km long Dooley Strand. The deposited material will be spread to a height not exceeding 20mm above the existing ground level in the area for nourishment.

Previous campaigns have demonstrated that the deposited sand is naturally levelled by tidal action, with material dispersing on the incoming and outgoing tides. A limited quantity of material will be deposited during each dredging shift due to the timing of the tide. This will help ensure no visible sediment plumes occur during and immediately after deposition.

## **5 THE RECEIVING ENVIRONMENT**

### **5.1 General Location**

The receiving environment is in the townland of Magheraroarty, Gortahork, County Donegal with site access off the adjacent L-1133-1 local road just off the main R257 regional road. Most of the surrounding area consists mainly of residential dwellings/holiday homes and extensively managed grassland. The subject site is within the village of Meenlaragh.

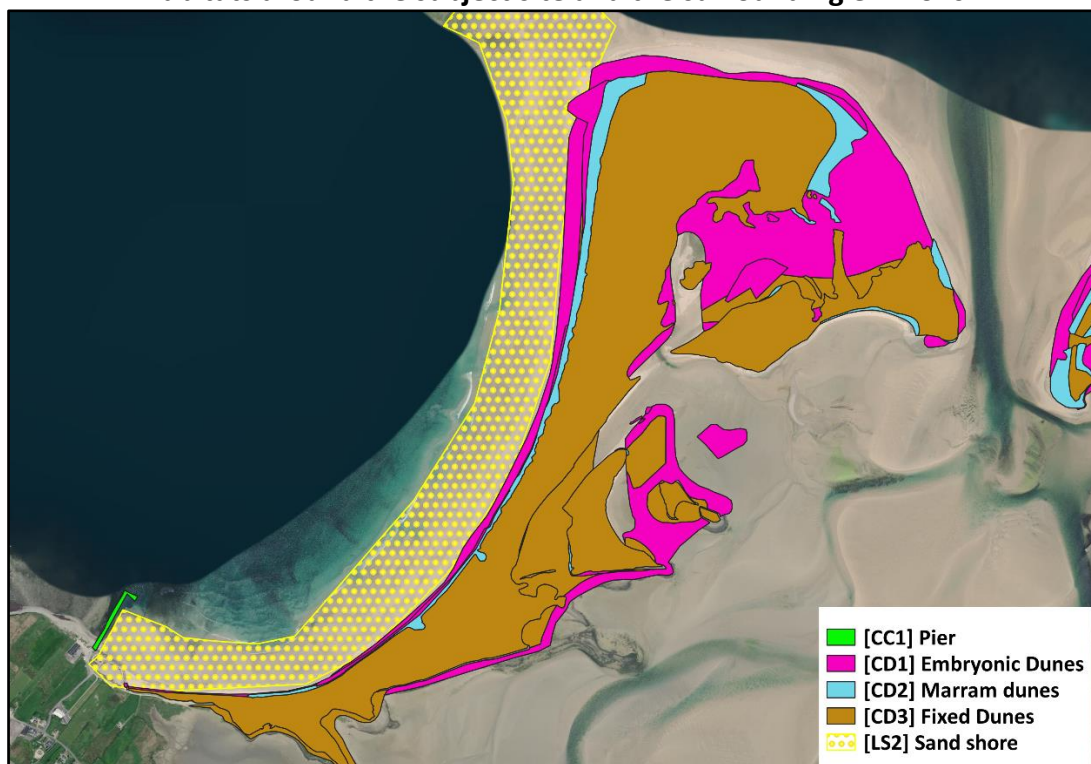
### **5.2 Location in Relation to SAC**

The subject site is within Ballyness Bay SAC and c.60m from the nearest boundary of Falcarragh to Meenlaragh SPA (Map 3).

### 5.3 Site Description

The subject comprises Magheraroarty Harbour and Dooley Strand Beach. Greentrack conducted multiple site walkovers between February and March 2020. A phase 1 habitat survey was conducted using guidelines produced by the JNCC<sup>3</sup> in conjunction with Fossitt's Guide to Habitats in Ireland<sup>4</sup>. The subject site can be termed as a sand shore (LS2) which contains the Annex I habitat of mudflats and sandflats not covered by sea water at low tide (1140). The pier (CC1) is located to the NW of the site where the dredging will take place. Embryonic shifting dunes (CD1) border the strand. Map 5 below shows the habitats around the subject site and the surrounding environs. Bird observation reports were also completed as part of the proposal which were undertaken on 06/02/2020 and 09/03/2020, and a botanical survey of the site was also carried out on the 09/03/2020. The results of these surveys are attached as Appendix III.

**Map 5:  
Habitats around the subject site and the surrounding environs**



Habitat classification data was used to produce the Habitat Map (Map 5). Guidelines from the Heritage Council<sup>5</sup> were used to form the basis of the mapping exercise. A survey area was delineated in the immediate vicinity of the subject site with a view to representing adjacent or proximal habitats. Data gathered was used to produce a thematic habitat illustrating the relative position and scale of habitats in the study area. However, position and scale of habitats shown are approximate only and should be considered only as a broad representation of the study area.

<sup>3</sup> JNCC. (2010) Handbook for Phase 1 Habitat Survey – a Technique for Environmental Audit. Joint Nature Conservation Committee, Peterborough.

<sup>4</sup> J. Fossitt. (2000) A Guide to Habitats in Ireland. The Heritage Council, Dublin

<sup>5</sup> Smith, G. F., O'Donoghue, P., O'Hara, K., Delaney, E (2011) Best Practice and Guidance for Habitat Surveying and Mapping. Heritage Council

## 5.4 Biodiversity

The Ballyness Bay SAC is a biodiverse area with a complex and diverse range of habitats. Abundant areas of sand dunes and mudflat/sandflats as well as areas of saltmarsh, dry and wet grassland and heath are a haven for several species and provide an excellent mix of fauna and flora which adds significantly to the high ecological value of this landscape. This is highlighted by the site synopsis attached as Appendix I. Falcarragh to Meenlaragh SPA is designated for the protection of Corncrake. This summer visitor utilises tall vegetation in the area as nesting habitat. A full site synopsis is attached as Appendix II.

### 5.4.1 Survey Results

The subject site has been classed as predominantly sand shore (LS2) which contains the Annex I habitat of mudflats and sandflats not covered by sea water at low tide (1140). This area is characterised by medium to fine sand, occasional lines of decaying seaweed occur. The pier (CC1) is located to the NW of the site where the dredging will take place. This provides a similar habitat for marine life as typical rocky substrata. Ballyness Bay SAC provides supporting habitat to a variety of Waterfowl. Appendix II details the bird species observed throughout multiple site visits. Most abundant was Light bellied Brent geese occurring in large number in the terrestrial portion of the survey area, frequent Gulls were observed in addition to Oystercatcher, Ringed Plover and Sanderling in the intertidal, the sporadic Red-breasted Merganser was observed in the subtidal.

Embryonic shifting dunes (CD1) amongst other dune habitats border the strand to the south and form part of a larger dune system with both Marram dunes and Fixed dunes present. Appendix III provides a detailed record of plant species recorded at the various dune habitats. The dunes are well vegetated with a rich community of wildflowers and grasses observed within this area. This would provide sheltered habitat for small invertebrates. Marram (*Ammophila Arenaria*) dominates throughout, other commonly occurring species included Sand Sedge (*Carex arenaria*), Red fescue (*Festuca rubra*), Lyme grass (*Leymus arenarius*). The herbaceous component of the dune system is characterised by wood sorrel (*Oxalis acetosella*), Plantain (*Plantago maritima*), creeping buttercup (*Ranunculus repens*) and White Clover (*Trifolium repens*).

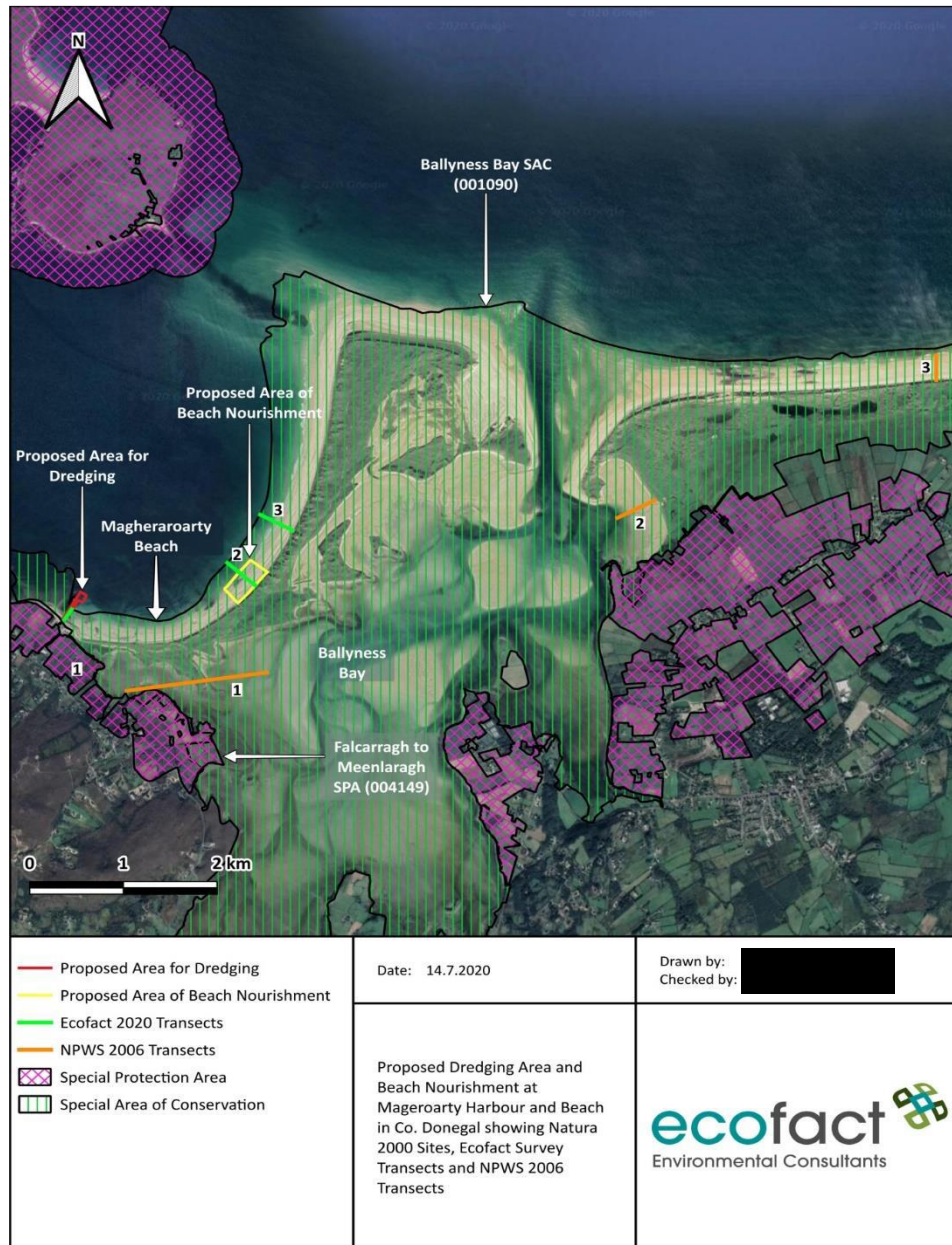
### 5.4.2 Benthic Ecology

Ecofact Consultants undertook a marine intertidal survey <sup>6</sup> in June 2020 in order to establish the benthic communities present in the dredge site and the site for deposition which is attached as Appendix V. Three transects were undertaken as part of the study, the locations of which are shown below in Figure 4. The surveys were completed on the outgoing tide each day using standard intertidal survey methodology.

Transect 1 was located at the proposed dredging area immediately to the east of the pier. Few invertebrates were found on the mid and upper shore areas, apart from occasional sand hoppers (*Talitrus saltator*). Sampling at the edge of the mid-shore channel did not yield any invertebrates. The lower shore area also had low diversity with a few cockles recorded along with an occasional worm (recorded in additional searches). Transect 2 was located at the proposed beach nourishment area immediately to the east of the pier. Few invertebrates were found on the mid and upper shore areas occasional sand hoppers being the exception. The lower shore area again had a very low diversity with a few individual invertebrates recorded only. Transect 3 was located at the reference areas further east along Magheroarty beach. Abundance and diversity of organisms recorded here was low and was similar to the other sites. The report determined that there was limited biodiversity both at the dredging area by the pier and on the shore at the proposed nourishment section.

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<sup>6</sup> Ecofact Consultants, August 2020, Proposed dredging and beach nourishment at Magheroarty pier and beach, Marine Intertidal Survey DRAFT

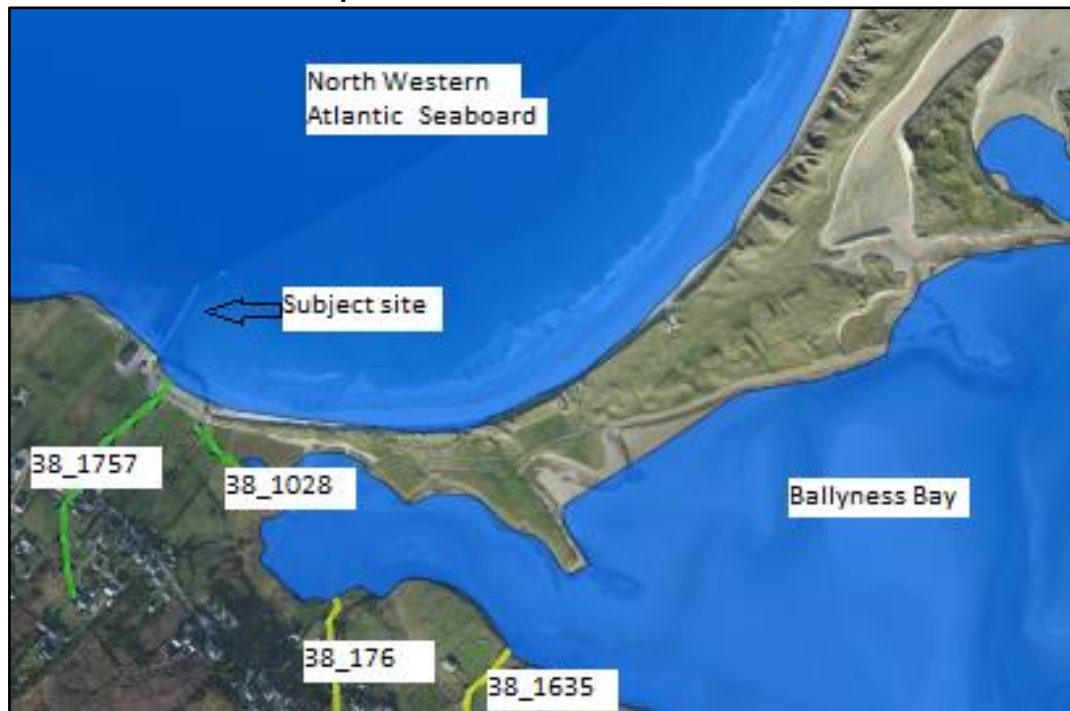


**Figure 3: Transects locations surveyed by Ecofact**

### 5.6 Hydrology

River Basin Management Plans (RBMPs) have been published for all River Basin Districts in Ireland in accordance with the requirements of the Water Framework Directive (WFD). The online EPA Envision map viewer provides access to water quality information at individual waterbody status for all the River Basin Districts in Ireland.

This was accessed on 18/08/2020 with the North Western Atlantic Seaboard (within subject site) assigned a WFD of “high” in 2013-2018 and deemed “Not at risk”. Ballyness Bay (287.6m SE of SS) is currently “Unassigned” but also considered “not at risk”. Stream 38\_1757 Glen Meenacldy (116m SW of the SS) is considered “Not at risk” and has been assigned a WFD Status 2013-2018 of “good”. Stream 38\_1028 (211.4m SE of the SS) is currently “Not at risk” and considered of “good” WFD Status. The 38\_176 and 38\_1635 Owenawillin streams to the SE of the site are both considered to be “Not at risk” but have been assigned “Moderate” WFD Status.

**Map 6: Waterbodies of the local area**

(taken from EPA.ie)

### **5.6.1 Sediment Transport**

Along the Irish Coast, the high-energy waves experienced during storms and high seas create a strong longshore drift and large amounts of sediment transport. The direction of the coastline and the incoming waves determine the direction of the longshore drift. During calmer periods sediment is transported with the tidal currents.

According to an unpublished 1997 report by Kirk McClure Morton, at the entrance to Ballyness Bay, sediment is distributed into the flood and ebb deltas by the strong currents. Flat swells bring sand onshore during periods of calm weather. The beach is then lowered and flattened during storms, and the upper beach surface is eroded. The sand is then deposited on the lower part of the beach and in shallow water just below low tide level. During periods of calm weather following storms, the deposited sand on the lower part of the beach is then brought back up onto the beach through swell waves, completing the cycle. Waves approach Dooley Strand from the North West, at an acute angle of approximately 45 degrees. The material deposited on the beach is moved across to one side, primarily in a northern direction, resulting in a build-up of sand at the northern end of the beach, as is evident with Dooley Spit. The deposition within the harbour, at the southern end of the beach, is assumed to be a result of either/ both:

- Up and down the shore transportation by swash and backwash.
- Along the shore transportation by longshore drift.
- Wind, wave and tidal current action.

It is reasoned the amount of sediment transported and deposited in the harbour is proportional to the speed of the flow of the water along the beach. Therefore, large amounts of sediment are deposited within the harbour during storm events. Although most of the sediment is deposited along Dooley Spit, the sediment deposited within the harbour is substantial, reducing navigable depths for the Tory Island Ferry and commercial fishing fleet, hence the need for the proposed development.



With regards to the potential release of contaminants from sediments into the surrounding environment, it is noted that the material has been determined, following sampling, to be clean brown sand. The sediments analysed were below the lower Irish action limits for organochlorines, PCBs, total extractable hydrocarbons, organotin and  $\Sigma 16$  Polycyclic aromatic hydrocarbons (PAHs). Therefore, sediments within the dredge site are not considered to pose any risk of significant adverse effects to marine water quality.

### 5.7 Assessment Criteria

The criteria adopted for this assessment is based on a detailed field and desk assessment of the proposed site within the overall Natura 2000 sites and what if any impact this development will have on the qualifying interests as detailed in Table 6.1

## 6 ASSESSMENT OF LIKELY EFFECTS

Table 6.1 and 6.2 provide information on the following elements associated with the identified Natura 2000 sites:

- a) Qualifying Interests
- b) Site Sensitivity and vulnerability
- c) Current Conservation Status
- d) General Threats
- e) Specific Threats from proposed development

**6(a)** The qualifying interests are the features for which the sites have been designated under the Habitats Regulations and covers listed habitats, species and bird populations as detailed in the site synopsis and the Natura 2000 Standard Data Form.

**6(b)** Site sensitivity and vulnerability is based on the sensitivity of the qualifying interests for which the site is designated as detailed in then Natura 2000 Standard Data Form.

**6(c)** The national conservation status as listed in The Status of EU Protected Habitats and Species in Ireland, NPWS, (2019) and the local conservation status of the qualifying interest is listed as detailed in the Natura 2000 Standard Data Form

**6(d)** The general threats are based on information contained within the site synopsis, the Natura 2000 Standard Data Form, field visit and local information.

**6(e)** The screening of potential threats from the proposed project to the qualifying interests is based on field study and analysis of all the information available to Greentrack.

**Table 6.1**  
**Ballyness Bay SAC Number 001090**  
**Site Description and Screening Matrix**

Qualifying Interest	Site Sensitivity	Local <sup>7</sup> and National <sup>8</sup> Conservation Status	General Threats	Potential Threat from Proposed Development
<b>Mudflats and sandflats not covered by seawater at low tide [1140]</b>	Surface and marine water dependant. Moderately sensitive to hydrological change. Moderate sensitivity to pollution. Sensitive to changes in salinity and tidal regime as well as coastal development.	Excellent & Inadequate	The main threat to this habit is from coastal development associated with holiday activity in this area and associated recreational activities. Pollution from farming activity is also a threat.	As seen in Map 4, the subject site (site for beach nourishment) comprises tidal mudflats and sandflats. This qualifying interest could be damaged by mechanical activity during the transportation of sand by dump trucks to the agreed site. Therefore, <b>this qualifying interest is screened in for further studies.</b>
<b>Estuaries [1130]</b>	Surface and marine water dependant. Moderately sensitive to hydrological change. Moderate sensitivity to pollution. Sensitive to changes in salinity and tidal regime as well as coastal development.	Excellent & Inadequate	The main threat to this habit is from coastal development associated with holiday activity in this area and associated recreational activities. Pollution from farming activity is also a threat.	As seen in Map 4, the nearest estuary habitat is 1.8km south of the subject site at Binanea strand. There is a hydrological link to this qualifying interest. However, owing to the dilution effect at this distance and volume of water, there are no pathways for significant direct or indirect effects on this habitat as a result of the proposed project. No negative effects to this qualifying interest are envisaged as a result of the proposed development. Therefore, this qualifying interest is screened out of further studies.
<b>Embryonic shifting dunes [2110]</b>	Coastal development, erosion, overgrazing and recreational activities.	Good & Inadequate	The main threats to this habitat are activities that affect sediment dynamics such as recreation or costal defences.	This qualifying interest is located adjacent to the subject site as shown in Map 4. All sand for the beach nourishment will be dredged from the pier. However, incorrect operational procedures could lead to inaccurate sediment deposition on Dooley Strand.

<sup>7</sup> NPWS, Natura 2000 standard data form.

<sup>8</sup> NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments.

				Therefore, <b>this qualifying interest is screened in for further studies.</b>
<b>Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (White Dunes) [2120]</b>	Coastal development, erosion, overgrazing and recreational activities.	Good & Inadequate	The main threats to this habitat are activities that affect sediment dynamics such as recreation or coastal defences	This qualifying interest is located adjacent to the subject site as shown in Map 4. All sand for the beach nourishment will be dredged from the pier. However, incorrect operational procedures could lead to inaccurate sediment deposition on Dooley Strand. Therefore, <b>this qualifying interest is screened in for further studies.</b>
<b>Fixed coastal dunes with herbaceous vegetation (Grey dunes) [2130]</b>	Coastal development, erosion, overgrazing and recreational activities.	Good & Bad	The main threats to this habitat are recreation and agriculture.	This qualifying interest is located adjacent to the subject site as shown in Map 4. All sand for the beach nourishment will be dredged from the pier. However, incorrect operational procedures could lead to inaccurate sediment deposition on Dooley Strand. Therefore, <b>this qualifying interest is screened in for further studies.</b>
<b>Humid dune slacks [2190]</b>	Coastal development, erosion, overgrazing and recreational activities.	Good & Inadequate	The main threats to this habitat are recreation and agriculture.	As shown in Map 4, this qualifying interest was not observed within the subject site nor in the surrounding environs with the nearest known dune slacks occurring 2.75km NE at Finlays Bar. Due to the distance and lack of any significant avenue of connectivity no negative effects are foreseen, and this qualifying interest is screened out of further studies.
<b>Greyer's Whorl snail (<i>Vertigo geyeri</i>) [1013]</b>	Sensitive to changes in hydrology in microhabitat	Good & Bad	This qualifying interest is threatened by damage or pollution to supporting habitat caused by agricultural practices, coastal development and associated recreational activities leading to hydrological changes.	The proposed development is located approximately 2.56Km West from the nearest known Whorl Snail habitat within this Natura 2000 site in the townland of Ballyness. No direct avenues of connectivity to <i>V.geyeri</i> microhabitat (decaying sedge in wetland/fen grazed by sheep) from the proposed development was identified. No changes in hydrological regime of <i>V.geyeri</i> microhabitat is predicted as a result of the proposed development. Therefore, <i>V.geyeri</i> is screened out of further studies.

**Table 6.2**  
**Falcarragh to Meenlaragh SPA Number 004149**  
**Site Description and Screening Matrix**

Qualifying Interest	Site Sensitivity	Conservation Status	General Threats	Potential Threat from Proposed Development
<p><b>Corncrake</b>  <b>(<i>Crex crex</i>)</b>  <b>[A122]</b></p>	<p>Sensitive to lack of suitable habitat of tall vegetation to allow breeding and feeding of young to take place from April to late September each year.</p>	<p>In severe decline</p>	<p>The main threat to this qualifying interest is from local agricultural activity which prevents the establishment of the required habitat of tall vegetation in the grass fields.</p> <p>Reduction of grassland areas through the construction of “one off” housing is also a threat as this reduces the land available to allow the required habitat to develop.</p>	<p>No suitable vegetation for corncrake habitat occurs within the subject site. High level threats for corncrake in this SPA are Mowing (A03) and Grazing (A04) as described in Natura 2000 standard data form. No such activities (grazing or mowing) are included in this project. This project is to take place in Late March and therefore falls outside the breeding season of corncrake. Due to the lack of removal or alteration of corncrake nesting habitat and the timing of these works no negative effects are envisaged for Corncrake.</p> <p>Furthermore, the ability to achieve the conservation objectives for which the SPA where selected will not be impacted by this development.</p>

## 7 POTENTIAL IMPACTS ON THE INTEGRITY OF THIS NATURA 2000 SITE.

Having established the assessment criteria, the impacts associated with the proposed development on this Natura 2000 site can be assessed against all the qualifying interests and other areas of interest. Table 6.1 has detailed all qualifying interests, general threats and potential threats from the proposed project. This screening matrix has established that the proposed project could impact specific targets which define conservation objectives for the following qualifying interests:

- **[1140] Mudflats and sandflats not covered by seawater at low tide**

The NPWS have published supporting documents for marine habitats at Ballyness Bay <sup>9</sup>. Regarding Target 1 of *habitat area remaining at a stable or increasing level*, the proposed development will represent a temporary annual disturbance of this habitat during dredging of the harbour. However, once dredging has ceased material will become resuspended in the confines of the harbour via natural processes. Habitat area is estimated at c.690ha., the proposed development comprises an area of 0.62ha for dredging, and an intertidal area affected by nourishment of 12.7ha comprising a total of 13.32ha. This represents a temporary annual disturbance of 1.93% of 1140 habitat in the SAC.

Regarding Target 2 To conserve the following community types in a natural condition: Coarse sediment to sandy mud with oligochaetes and polychaetes community complex and Mobile sand community complex. The subject site at the area for dredging and area for nourishment is defined as a Mobile Sand Community Complex. The proposed development represents a temporary disturbance this community complex during annual dredging. However, the community will have the capacity to recover in the area for dredging as sediment becomes re-trapped within the confines of the harbour. Mobile Sand Community complex is interpolated at 570ha. in the SAC, the proposed development represents an annual disturbance of c. 13.32 ha or c. 2.34% of the Mobile Sand Community Complex.

- **[2110] Embryonic shifting dunes, [2120] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) and [2130] Fixed coastal dunes with herbaceous vegetation (grey dunes)**

For the dune systems at Doeey the likely attribute and associated target to be impacted by the proposed development in the absence of mitigation is the target to *Maintain the natural circulation of sediment and organic matter, without any physical obstructions* for the attribute *Physical structure: functionality and sediment supply*. Therefore, mitigation relating to the protection of the dune systems should focus on the careful deposition of the dredged material in the area for nourishment.

The project directly affects 13.32ha of the c1000ha. Ballyness Bay SAC Coastal Cell. This translates to a percentage area of likely impact of 1.33%. Therefore, the project as described will impact a relatively small proportion of the SAC. However, without the implementation of proper mitigation, it is predicted that the proposed development could impact the integrity of the Ballyness Bay SAC through:

- Habitat Loss
- Habitat alteration inter alia water quality impacts and physical disturbance
- Water resource quality
- Species displacement/disturbance

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<sup>9</sup> NPWS (2014), Ballyness Bay SAC site code 001090, Conservation Objectives Supporting Document, Marine Habitats. Version 1

- In Combination with existing/planned developments

The potential impact of the proposed project can now be considered in three phases:

1. Potential negative impacts arising from the pre-development stage
2. Potential negative impacts during the dredging and beach nourishment phase
3. Potential negative impact of the proposed project in combination with that of existing or planned developments.

Table 7.1 now outlines a matrix of threats, source of threats and recommended mitigating measures where applicable.

**Table 7.1  
Mitigation Measures**

Ref:	Construction Stage	Potential Threat	Source of Threat	Recommended Mitigation Measures
1.	Pre-Development Stage	<p>Habitat Loss</p> <p>Habitat alteration</p> <p>Water resource quality</p>	<p>Excessive in faunal/benthic habitat removal due to incorrect site preparation</p> <p>Impacts to sediment dynamics at the dune systems at Dooley arising from inadequate preparation at the pre-development stage</p> <p>Increased sedimentation in receiving waterbodies due to incorrect site preparation. Pollution incidents arising from inadequate maintenance of machinery</p>	<p>a) An Ecological Clerk of Works (ECOW's) must be appointed for the site and will advise on the implementation of the mitigation measures outlined within this Table 7.1. The area for dredging is to be clearly defined. The area for nourishment is to be delineated using a handheld GPS and timber stakes as described in Section 4.2. The haul routes to the area for nourishment are to be outlined using high visibility tape. The haul route should be agreed upon after consulting with the ECOW and considering the conditions at that specific time. All personnel involved in dredging/nourishment are to be briefed by ECOW prior to works commencing. Toolbox talks are to take place to ensure that personnel are aware of ecologically sensitive areas.</p> <p>b) Dump trucks used to haul dredged material should be fitted with low profile tyres prior to entering the foreshore.</p> <p>c) Prior to bringing plant on site, checks for oil/fuel/water leaks are to be conducted in the adjacent car park.</p> <p>d) The plant that shall be used during the works should be thoroughly cleaned before entering and the site</p>

Ref:	Operational phase	Potential Threat	Source of Threat	Recommended Mitigation Measures
2.	Dredging and Deposition of Dredged Material	<p>Habitat Loss</p> <p>Habitat alteration</p> <p>Water resource quality</p> <p>Species disturbance/displacement</p>	<p>Excessive in faunal/benthic habitat removal</p> <p>Increased sedimentation during transport of dredged material to area for nourishment by dump truck/Incorrect deposition of dredged material in the area for nourishment leading to negative effects to the nearby dune systems at Dooley</p> <p>Increased sedimentation during removal of material within the harbour</p> <p>Accidental spillages from machinery through improper management</p> <p>Disturbance to bird species feeding in the area</p>	<p>e) The minimum amount of material to maintain -2.5m CD should be dredged annually. Excess material removal should be avoided.</p> <p>f) Dredging should be carried by competent excavator operators to ensure precise removal.</p> <p>g) Dump trucks should follow the pre agreed haul route to the area for deposition/nourishment.</p> <p>h) Dredged Material is to be deposited evenly across the area for nourishment not exceeding a height greater than 20mm above the surrounding ground level. No dredged material is to be removed off-site, ensuring that the sediment budget at Dooley Strand is not affected.</p> <p>i) When idle, plant must be stored in areas which are less susceptible to possible pollution incidents, or on dedicated areas of hard standing as far away from the watercourses as practical. All static plant must have drip trays placed underneath to prevent ground contamination. Spill kits must be available in case of accidental oil spillage.</p> <p>j) Refuelling of plant must be undertaken in a designated area on an impenetrable surface located as far away from the watercourses as practical. A spill kit must be available for use in case of accidental spillage.</p> <p>k) Plant must be thoroughly inspected and serviced before the commencement of works to ensure it is working efficiently and sustainably.</p> <p>l) Timing of works is to take place after 11.30am and is not to exceed 5 days in early to late March annually, this will help minimise disturbance to local bird species. Two bird surveys were carried out on site and are attached as Appendix III. Mobile plant used at the site must have noise emission levels that comply with the limiting levels defined in EC Directive 86/662/EEC and any subsequent amendments. Any plant that is used intermittently must be shut down when not in use to minimise noise levels. Mufflers must also be applied to all machinery in order to further minimise noise level.</p>



Ref:	In-combination Stage	Potential Threat	Source of Threat	Recommended Mitigation Measures
3.	In-Combination with Existing or Planned Developments	Impacts to Water Quality  Removal of habitat	The project will allow for the use of the harbour by commercial boating  Increased development in the area could lead to scenarios that give rise to pollution	<p><b>m)</b> No increase in the volume of boat activity at the harbour is predicted. All commercial boating activity will be subject to industry guidelines and best practice. No mitigation is required regarding this in-combination effect.</p> <p><b>n)</b> Ionad Pobal Machaire Rabhairtaigh, located adjacent to the subject site, have been granted permission (Ref: 19/50962) to extend the existing car park and construct a children's play area. A Natura impact statement had been submitted along with this proposal, including the assignment of an Ecological Clerical of Works to oversee the work. The work has not yet begun but is unlikely to have any significant in combination effects with the project in question if all mitigation measures and best practice included in the NIS is implemented.</p>

## 8. CONCLUSION

This project involves the removal of deposited material from Magheraroarty Harbour. This represents removal of sub-littoral habitat. However, this sublittoral habitat was found to be of low diversity (Ecofact 2020). With the implementation of the extensive mitigation described in Table 7.1, the removal of this sub-littoral material will not affect the habitat area or community distribution of mudflats or sandflats not covered by seawater at low tide. The habitat will experience a temporary disruption however this will be lessened annually after the cessation the 5-day dredging period as material becomes resuspended in the dredge area adjacent to the harbour.

The material to be removed has been classified as clean brown sand and is below the action limits for metals and PAH's. This material is similar in nature to sand found elsewhere in Dooley Strand. The proposal as described will not alter the sediment budget within Dooley Strand. The deposition of dredged material in the area for beach nourishment will restore sediment to the strand that has been trapped by the physical barrier of the pier. The project directly affects 13.32ha of the c1000ha. Ballyness Bay SAC Coastal Cell. This translates to a percentage area of likely impact of 1.33%. Therefore, the project as described will impact a relatively small proportion of the SAC.

With the implementation of the mitigation described in table 7.1, including the precise deposition in the area for nourishment to a height not greater than 20mm above the original ground level, the functionality of sediment supply will not be significantly affected.

This NIS concludes that proposed development with the implementation of described mitigation will not impact the conservation objectives of this Natura 2000 site and will not negatively affect the integrity of the natura 2000 network.

This Natura Impact Statement has been prepared by Greentrack Consultants with all reasonable care, due diligence and professional application. Greentrack have also sought to implement the best current scientific knowledge on the potential effect this proposal will have on the integrity of the Ballyness Bay SAC. Information contained within this report is based on the interpretation of data collected and has been accepted by Greentrack in good faith.

This NIS is prepared under instruction from the applicant Donegal County Council. Greentrack accept no responsibility to any third party to whom this report is made known or available. Any such third parties rely on this NIS at their own risk.

December 15<sup>th</sup> 2020

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## APPENDIX I – Ballyness Bay Special Area of Conservation Site Synopsis

**SITE NAME: Ballyness Bay SAC**

**SITE CODE: 001090**

Ballyness Bay is situated in north-west Donegal adjacent to the towns of Gortahork and Falcarragh. The underlying geology is mostly pelites, with some smaller areas of limestone and quartzite. This is mostly covered by windblown sand and peat.

Ballyness Bay is a large and very shallow estuarine complex, with extensive areas of sandflats which are exposed at low tide. 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
- [2110] Embryonic Shifting Dunes
- [2120] Marram Dunes (White Dunes)
- [2130] Fixed Dunes (Grey Dunes)\*
- [2190] Humid Dune Slacks
- [1013] Geyer's Whorl Snail (*Vertigo geyeri*)

The intertidal sandflats of Ballyness Bay often have a rich macro-invertebrate fauna, with notable populations of Lugworm (*Arenicola marina*) and Common Cockle (*Cardium edule*). Eelgrass (*Zostera* sp.) is also present. The bay is almost completely cut off from the open sea by two large sand dune covered spits. The Dooley sand dunes are highly dynamic and have grown to a considerable height near the tip of the spit - they contain what is probably the largest unvegetated sand dune in the country. The succession of vegetation types across the spit and the topographical features make this area of special interest. Of particular importance are the fixed dunes which occur along the length of the Dooley sand spit. They are found east of a large band of mobile Marram (*Ammophila arenaria*) dunes. There are some good species-rich areas, which include Common Dog-violet (*Viola riviniana*), Wild Pansy (*Viola tricolor* subsp. *curtisii*), Thyme-leaved Sandwort (*Arenaria serpyllifolia*), Harebell (*Campanula rotundifolia*), Daisy (*Bellis perennis*), Wild Thyme (*Thymus praecox*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Red Fescue (*Festuca rubra*) and Lady's Bedstraw (*Galium verum*). There is also a good variety of moss and lichen species, including *Tortula ruraliformis*, *Brachythecium albicans*, *Rhytidiadelphus squarrosus*, *Homalothecium lutescens* and *Peltigera canina*.

Dunes dominated by Marram are well developed. Also occurring are embryonic dunes, with species such as Lyme Grass (*Leymus arenarius*), Sea Couch (*Elymus farctus*) and Sea Rocket (*Cakile maritima*). The dunes at Drumatinny, by contrast, are quite low but also have areas of fixed dune as well as sandy, machair-type grassland. Humid dune slacks, with species such as Creeping Willow (*Salix repens*) and Jointed Rush (*Juncus articulatus*), are scattered through the dunes at Drumatinny. Areas of saltmarsh, dry and wet grassland and heath add further diversity to the site. The rare whorl snail *Vertigo geyeri*, a species listed on Annex II of the E.U. Habitats Directive, is found at this site.

This site is important for waterfowl. Species counts (all average peaks over 4 seasons, 1994/95 to 1996/97) include Ringed Plover (110), Brent Goose (85), Red-breasted Merganser (12), Wigeon (47), Oystercatcher (87), Curlew (55), Sanderling (47) and Greenshank (7). The populations of Ringed Plover and Sanderling are of national importance. Also occurring is Golden Plover (165, same count period), a species listed on Annex I of the E.U. Birds Directive. Large numbers of Lapwing have been noted sheltering during stormy weather in dune slacks near

Drumatinn. Chough, another species listed on Annex I of the E.U. Birds Directive, have been noted feeding near Binavea Strand.

Land use within the bay comprises fishing and sailing on a small scale; the surrounding dunes and grassland are grazed by sheep and cattle. Ballyness Bay contains several important coastal habitats listed on Annex I of the E.U. Habitats Directive, including the priority habitat fixed dunes. The site is also an important wildfowl site.

## APPENDIX II – Falcarragh to Meenlaragh SPA Site Synopsis

**SITE NAME: FALCARRAGH TO MEENLARAGH SPA**

**SITE CODE: 004149**

Falcarragh to Meenlaragh SPA is located on the eastern and western sides of Ballyness Bay on the north-west coast of Co. Donegal. This large site follows the coastline from Falcarragh to Meenlaragh and encompasses three areas of mixed agricultural grassland. The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Corncrake. Falcarragh to Meenlaragh SPA supports a breeding population of Corncrake (9 pairs - five-year mean peak between 2003 and 2007, based on records of calling males). Falcarragh to Meenlaragh SPA is one of a suite of sites along the western seaboard that is regularly utilised by nationally important numbers of breeding Corncrake. Corncrake winter in southern and eastern Africa, migrating northwards to arrive on their breeding grounds from early April onwards, departing again in August and September. They require the cover of tall vegetation throughout their breeding cycle and are strongly associated with meadows which are harvested annually, where they nest and feed. Annual cutting of these meadows creates a sward which is easy for the birds to move through. Other habitats, which can provide cover for Corncrake in the early and late stages of the breeding season, are also important for this species. Corncrake is listed on the 2010 International Union for Conservation of Nature (IUCN) Red List of Threatened Species. This is due to population and range declines of more than 50% in the last 25 years across significant parts of its range. Falcarragh to Meenlaragh SPA is of high ornithological importance as it supports a nationally important population of Corncrake, a globally threatened species. Corncrake is also listed in Annex I of the E.U. Birds Directive

## APPENDIX III- Greentrack Survey Results

### Bird Observation Report I

<b>Site Name:</b>	Magheraroarty pier
<b>Site Designation:</b>	Falcarragh to Meenlaragh SPA Ballyness Bay SAC
<b>Date:</b>	06/02/2020
<b>Start Time:</b>	10.20
<b>End Time:</b>	12.20
<b>Survey Type:</b>	Low tide, waders and seabirds
<b>Counter:</b>	██████████ (BSc Hons Animal Science UCD, MSc Wildlife conservation and management UCD)
<b>Weather:</b>	Cloud cover: 0-33%, Rain: None, Wind: 1 Calm, Visibility: 1 good, Temperature: 4°C

SPECIES	CODE	Subtidal		Intertidal		Supratidal		Terrestrial		Terrestrial Aquatic	
		F (Foraging) or R (Roosting)									
		F	R	F	R	F	R	F	R	F	R
<i>Great Northern Diver</i>	ND	2									
<i>Cormorant</i>	CA	1									
<i>Light bellied Brent geese</i>	PB								68		
<i>Red-brested merganser</i>	RB	1	1								
<i>Oystercatcher</i>	OC			10		7					
<i>Ringed plover</i>	RP	6		2			3				
<i>Sanderling</i>	SS			5			4		3		
<i>Common gull</i>	CM	3	2						7		
<i>Lesser black-backed gull</i>	LB	2		1					10		
<i>Herring gull</i>	HG		3	11			2	3	7		
<i>Great Black-backed gull</i>	GB		2				2	2	4		



### Bird Observation Report II

<b>Site Name:</b>	Magheraroarty Pier
<b>Site Designation:</b>	Falcarragh to Meenlaragh SPA Ballyness Bay SAC
<b>Date:</b>	09/03/2020
<b>Start Time:</b>	10.30
<b>End Time:</b>	12.30
<b>Survey Type:</b>	Low tide, waders and seabirds
<b>Counter:</b>	██████████ BSc Hons Animal Science UCD, MSc Wildlife conservation and management UCD)
<b>Weather:</b>	Cloud cover: 66-100, Rain: Constant, Wind: 3 breezy, Visibility: 1 good, Temperature: 2°C
<b>Activity:</b>	No walkers or boat activity. Two other cars in the carpark. One car driving along pier. No major disturbances to bird activity.

SPECIES	CODE	Subtidal		Intertidal		Supratidal		Terrestrial		Terrestrial Aquatic	
		F	R	F	R	F	R	F	R	F	R
		F (Foraging) or R (Roosting)									
<i>Great Northern Diver</i>	ND	3						1			
<i>Cormorant</i>	CA					7					
<i>Light bellied Brent geese</i>	PB			10	6	1	1				
<i>Red-brested merganser</i>	RB										
<i>Oystercatcher</i>	OC	14		16							
<i>Ringed plover</i>	RP			1							
<i>Sanderling</i>	SS										
<i>Common gull</i>	CM	2		2	3	1					
<i>Lesser black-backed gull</i>	LB	3	7	8	9	2			5		
<i>Herring gull</i>	HG	7	4						11		
<i>Great Black-backed gull</i>	GB	2	6	7	28	3		9			
<i>Little Tern</i>	LT							2			

## Botanical Survey Coastlands Report Card

Applicant: Donegal County Council

Surveyor: XXXXXXXXXX

Site Location: Magheraroarty Pier

Size of site: 1.92km along the strand

Date of survey: 09/03/2020

### Soil Type:

Mineral	Peat	Sandy
		X

### Habitat type:

Sea cliffs \_\_\_\_\_

Salt Marsh \_\_\_\_\_

Dunes X

Machair \_\_\_\_\_

Grassland \_\_\_\_\_

Heath/Bog \_\_\_\_\_

Others: \_\_\_\_\_

### Ground Cover of vegetation: Estimate % cover

D=Dominant >50%

A=Abundant 25-50%

F=Frequent 5-25%

O=Occasional <5%

<i>Agrostis stolonifera</i>		<i>Alopecurus geniculatus</i>	
<i>Aira Caryophyllea</i> (Silver hair grass)	F	<i>Anacamptis pyramidalis</i>	
<i>Ammophila Arenaria</i> (Marram)	D	<i>Anthoxanthum odoratum</i>	
<i>Anagallis arvensis</i>		<i>Anthyllis vulneraria</i>	
<i>Armeria maritima</i>		<i>Aster tripolium</i>	
<i>Arrhenatherum elatius</i>		<i>Atriplex glabriuscula</i>	
<i>Atriplex laciniata</i>		<i>Blysmus rufus</i>	
<i>Atriplex littoralis</i>		<i>Bolboschoenus maritimus</i>	
<i>Atriplex portulacoides</i>		<i>Carex arenaria</i>	
<i>Atriplex prostrata</i>		<i>Carex distans</i>	
<i>Bellis perennis</i>		<i>Carex kobumugi</i> (Sand Sedge)	A
<i>Beta vulgaris</i>		<i>Carex nigra</i>	
<i>Brachythecium rutabulum</i>		<i>Carex rostrata</i>	
<i>Cakile maritima</i>		<i>Centaurium erythraea</i>	
<i>Calliergonella cuspidata</i>		<i>Cerastium diffusum</i>	
<i>Calystegia soldanella</i>		<i>Cerastium fontanum</i>	
<i>Catapodium marinum</i>		<i>Cirsium arvense</i>	
<i>Centaurea nigra</i>		<i>Cirsium vulgare</i>	
<i>Cirsium arvense</i>		<i>Cochlearia anglica</i>	
<i>Cochlearia danica</i>		<i>Cochlearia officinalis</i>	
<i>Crepis capillaris</i>		<i>Crepis vesicaria</i>	
<i>Cynosurus cristatus</i>		<i>Dactylis glomerata</i>	

<i>Daucus carota</i>		<i>Danthonia decumbens</i>	
<i>Eleocharis palustris</i>		<i>Erophila verna</i>	
<i>Elytrigia juncea</i>		<i>Euphorbia paralias</i>	
<i>Elytrigia repens</i> (Couchs)	<b>F</b>	<i>Euphorbia portlandica</i>	
<i>Eryngium maritimum</i>		<i>Ficaria verna</i> (Lesser celandine)	<b>A</b>
<i>Galium aparine</i>		<i>Festuca rubra</i> (Red fescue)	<b>A</b>
<i>Heracleum sphondylium</i>		<i>Galium verum</i>	
<i>Honckenya peploides</i>		<i>Glaux maritima</i>	
<i>Hylocomium splendens</i>		<i>Holcus lanatus</i>	
<i>Juncus maritimus</i>		<i>Homalothecium lutescens</i>	
<i>Lathyrus latifolius</i> (Broad-leaved everlasting pea)	<b>F</b>	<i>Hydrocotyle vulgaris</i>	
<i>Leontodon autumnalis</i>		<i>Hypochaeris radicata</i>	
<i>Leontodon saxatilis</i>		<i>Juncus articulatus</i>	
<i>Leymus arenarius</i> (Lyme grass)	<b>A</b>	<i>Juncus bufonius</i>	
<i>Limonium binervosum</i> agg		<i>Juncus acutus</i> (Spiny rush)	<b>F</b>
<i>Linum catharticum</i>		<i>Limonium humile</i>	
<i>Luzula campestris</i>		<i>Lotus corniculatus</i>	
<i>Lythrum salicaria</i>		<i>Luzula campestris</i>	
<i>Menyanthes trifoliata</i>		<i>Mentha aquatica</i>	
<i>Molinia caerulea</i>		<i>Oenanthe lachenalii</i>	
<i>Myriophyllum spicatum</i>		<i>Oxalis acetosella</i> (wood sorrel)	<b>A</b>
<i>Peltigera canina</i>		<i>Plantago coronopus</i>	
<i>Phalaris arundinacea</i>		<i>Plantago lanceolata</i>	
<i>Phleum arenarium</i>		<i>Plantago maritima</i> (Plantain)	<b>A</b>
<i>Phragmites australis</i>		<i>Poa pratensis/humili</i>	
<i>Pilosella officinarum</i>		<i>Potentilla reptans</i> (Creeping cinquefoil)	<b>A</b>
<i>Potamogeton pectinatus</i>		<i>Prunella vulgaris</i>	
<i>Puccinellia fasciculata</i>		<i>Puccinellia distans</i>	
<i>Puccinellia maritima</i>		<i>Rubus fruticosus</i> (Bramble)	<b>F</b>
<i>Ranunculus acris</i>		<i>Rhytidadelphus triquetrus</i>	
<i>Ranunculus bulbosus</i>		<i>Rumex crispus</i>	
<i>Ranunculus flammula</i>		<i>Ruppia maritima/cirrhusa</i>	
<i>Ranunculus repens</i> (creeping buttercup)	<b>A</b>	<i>Sagina nodosa</i>	
<i>Rhytidadelphus squarrosus</i>		<i>Salicornia agg</i>	
<i>Rumex acetosa</i>		<i>Sarcocornia perennis</i>	
<i>Salix repens</i>		<i>Sedum acre</i>	
<i>Salsola kali</i>		<i>Selaginella selaginoides</i>	
<i>Samolus valerandi</i>		<i>Senecio aquaticus</i>	
<i>Schoenoplectus tabernaemontani</i>		<i>Senecio sylvaticus</i> (heath groundsel)	<b>A</b>
<i>Scleropodium purum</i>		<i>Sonchus arvensis</i>	
<i>Senecio jacobaea</i>		<i>Sonchus oleraceus</i>	
<i>Spergularia media</i>		<i>Spartina agg</i>	
<i>Suaeda maritima</i>		<i>Spergularia marina</i>	
<i>Syntrichia ruraliformis</i>		<i>Thymus polytrichus</i>	
<i>Taraxacum officinale</i> agg		<i>Triglochin maritimum</i>	
<i>Trifolium arvense</i>		<i>Typha latifolia</i>	
<i>Trifolium dubium</i>		<i>Veronica chamaedrys</i>	

<i>Trifolium pratense</i>		<i>Vicia cracca</i>	
<i>Trifolium repens</i> (White Clover)	<b>A</b>	<i>Viola tricolor</i>	
<i>Tripleurospermum maritimum</i>		<i>Zannichellia palustris</i>	
<i>Tussilago farfara</i>		<i>Zostera marina</i>	
<i>Zostera angustifolia</i>			

% Vegetation Cover	% Bare soil	% Rock	% Sand	Other
<b>100</b>				

% Grass and flowers	% Herb Cover	% Moss cover	% Lichen cover	Other
<b>88.7</b>		<b>11.3</b>		

Quadrat Number	% Vegetation	% Moss	% Other	Species Present	Other Comments
<b>1</b>	75	25	0	1 2 3 4 5 6 11 14	
<b>2</b>	100	0	0	1 6 9 12 13 15 16	Mostly 1
<b>3</b>	100	0	0	1 2 3 7 8 9 12 13 15 16	Mostly 1
<b>4</b>	95	5	0	1 2 3 4 5 10 11 12 13	A lot more trampled – along path
<b>5</b>	66	33	0	1 2 8 9 15	
<b>6</b>	100	0	0	1 5 7 11 13 14 16	Nearly all 1
<b>7</b>	100	0	0	1 7 9 10 14 15	
<b>8</b>	50	50	0	1 2 11 13 14	Vegetation very short – along path
<b>9</b>	100	0	0	1 5 7 11 14	Very long 1
<b>10</b>	100	0	0	1 9 15	Very long 1

## APPENDIX IV - Aquafact Sediment Characterisation Report and Sediment Analysis



**Marine Sediment Characterisation  
Magheraroarty Pier  
Dredging and Disposal Operations**

Produced by

**AQUAFACT International Services Ltd**

For

**Donegal County Council**

**February 2020**

**AQUAFACT INTERNATIONAL SERVICES LTD.,  
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## 1. Introduction

Donegal County Council is applying to the EPA for a Dumping at Sea Licence to carry out dredging at the Magheraroarty Pier and subsequent proposed beach nourishment nearby.

AQUAFAC International Services Ltd. was commissioned by Donegal County Council to carry out a marine sediment characterisation survey of the dredge area at Magheraroarty Pier.

## 2. Materials & Methods

### 2.1. *Sample Processing*

On the 21<sup>st</sup> January 2020, 3 sediment stations were sampled for physical and chemical analysis as per a request from the Marine Institute (see Appendix 3). AQUAFAC's Lencraft rib was used to carry out the sampling. Figure 2.1 shows the station locations and Table 2.1 shows the station coordinates.

One grab sample was taken at each of the stations and the samples were divided as follows:

1. Into labelled 1l plastic bags for water content, density and sediment grain size analysis;
2. Into 120ml amber glass jars for organochlorine, PCB (polychlorinated biphenyl), PAH (polycyclic aromatic hydrocarbon), total extractable hydrocarbon, TBT (tributyl tin) and DBT (dibutyl tin) analysis;
3. Into 500ml plastic pots for metal, total organic carbon and carbonate analysis;





Figure 2.1: Location of chemistry sampling sites

Table 2.1: Coordinates of stations sampled for physical and chemical analysis.

Station	Longitude	Latitude	Depth (m)	Determinand Required
S1	-8.17377	55.14704	2.8	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g
S2	-8.17317	55.14765	2.0	1, 2, 3, 4a, 4b, 4c, 4f
S3	-8.17268	55.14798	1.2	1, 2, 3, 4a, 4b, 4c, 4f

## 2.2. Sample Processing

Once back in the lab, all sediment samples for the analysis of organics and contaminants were sent to the SOCOTEC Laboratories in Burton on Trent. AQUAFACt carried out the particle size analysis, moisture and density content as described below.

### 2.2.1. Particle Size Analysis (PSA)

AQUAFACt carried out the PSA analysis in-house using the following methodology:

1. Approximately 100g of dried sediment (previously washed in distilled water and dried) was weighed out and placed in a labelled 1L glass beaker to which 100ml of a 6 percent hydrogen peroxide solution was added. This was allowed to stand overnight in a fume hood.

2. The beaker was placed on a hot plate and heated gently. Small quantities of hydrogen peroxide were added to the beaker until there was no further reaction. This peroxide treatment removed any organic material from the sediment which can interfere with grain size determination.
3. The beaker was then emptied of sediment and rinsed into a 63µm sieve. This was then washed with distilled water to remove any residual hydrogen peroxide. The sample retained on the sieve was then carefully washed back into the glass beaker up to a volume of approximately 250ml of distilled water.
4. 10ml of sodium hexametaphosphate solution was added to the beaker and this solution was stirred for ten minutes and then allowed to stand overnight. This treatment helped to dissociate the clay particles from one another.
5. The beaker with the sediment and sodium hexametaphosphate solution was washed and rinsed into a 63µm sieve. The retained sample was carefully washed from the sieve into a labelled aluminium tray and placed in an oven for drying at 100°C for 24 hours.
6. The dried sediment was then passed through a Wentworth series of analytical sieves (>8,000 to 63µm; single phi units). The weight of material retained in each sieve was weighed and recorded. The material which passed through the 63µm sieve was also weighed and the value added to the value measured in Point 5 (above).
7. The total silt/clay fraction was determined by subtracting all weighed fractions from the initial starting weight of sediment as the less than 63µm fraction was lost during the various washing stages.
8. The following range of particle sizes: <63µm, 63<125µm, 125<250µm, 250<500µm, 500<1000µm, 1000<2000µm, 2000<4000µm and 4000<8000µm were reported.

#### 2.2.2. Moisture Content & Density

Moisture content was taken as the percentage weight difference between the wet and dried sediment. Sediment density was calculated by placing a fixed volume (100 ml) of sediment in a volumetric cylinder and weighing the contents.

### 2.2.3. Chemical Analysis

The following methodologies were employed by SOCOTEC Burton-upon-Trent:

- Total Solids: Calculation (100%-Moisture Content). Moisture content determined by drying a portion of the sample at 120°C to constant weight.
- Total Hydrocarbons: Solvent extraction and clean up followed by GC-FID analysis.
- Organotins: Solvent extraction and derivatisation followed by GC-MS analysis.
- Metals: Aqua-regia extraction followed by ICP analysis.
- PAH analysis: Solvent extraction and clean up followed by GC-MS analysis.

All testes were carried out on the <2mm fraction.

The Limits of detection can be seen in Table 2.2.

**Table 2.2: Limits of Detection**

Parameter	Unit	LOD
Hydrocarbons	µg/kg	100
Mercury	mg/kg	0.01
Aluminium	mg/kg	10
Arsenic	mg/kg	1
Cadmium	mg/kg	0.1
Chromium	mg/kg	0.5
Copper	mg/kg	2
Lead	mg/kg	2
Lithium	mg/kg	0.5
Nickel	mg/kg	0.5
Zinc	mg/kg	3
OCP	µg/kg	0.1
PAH	µg/kg	1
PCBs	µg/kg	0.08
DBT/TBT	mg/kg	0.001

## 3. Physical / Chemical Results

### 3.1. Parameter Code 1

Table 3.1 shows the visual inspection information, which includes colour and sediment type.

**Table 3.1: Visual Inspection**

Station	Description
S1	Brown clean sand
S2	Brown clean sand
S3	Brown clean sand

**3.2. Parameter Code 2**

The water content and density results can be seen in Table 3.2. Values ranged from 1.53 (S2) to 1.55g/ml (S1 and S3) for density and from 33.79 (S1) to 37.68% (S2) for moisture content.

**Table 3.2: Moisture content and density**

Station	Density (g/ml)	Moisture Content (%)
S1	1.55	33.79
S2	1.53	37.68
S3	1.55	35.23

### 3.3. Parameter Code 3

Table 3.3 shows the granulometry results broken down into % gravel (>2mm), sand (<2mm >63µm) and mud (<63µm). Gravel ranged from 0.2 (S2) to 3.7% (S1), sand ranged from 93.1% (S1) to 98.6% (S3) and silt-clay ranged from 1.1% (S3) to 3.6% (S2).

**Table 3.3: Granulometry results**

Station	% Gravel (>2mm)	% Sand (<2mm - > 63µm)	% Silt-Clay (<63µm)
S1	3.7	93.1	3.3
S2	0.2	96.2	3.6
S3	0.4	98.6	1.1

### 3.4. Parameter Code 4

#### 3.4.1. Code 4a

Table 3.4 shows the total organic carbon results. Values ranged from 0.20 (S3) to 0.66% (S1).

**Table 3.4: Total organic carbon results**

Station	TOC %
S1	0.66
S2	0.27
S3	0.20

#### 3.4.2. Code 4c

Table 3.5 shows the metal results. Mercury (Hg) levels ranged from 0.01 (S3) to 0.04mg/kg (S1). Aluminium (Al) levels ranged from 4,900 (S2) to 7,900mg/kg (S1). Arsenic (As) levels ranged from 1.6 (S3) to 3.3mg/kg (S1). Cadmium (Cd) levels were below the limits of detection at all three stations (<0.1mg/kg). Chromium (Cr) levels ranged from 7 (S3) to 10.1mg/kg (S1). Copper (Cu) levels ranged from 2.3 (S3) to 4.8mg/kg (S1). Results for Lithium (Li) levels ranged from 4.58 (S3) to 5.34mg/kg (S1). Lead (Pb) levels ranged from 3.5 (S2) to 6.1mg/kg (S1). Nickel (Ni) levels ranged from 3.3 (S3) to 5mg/kg (S1). Zinc (Zn) levels ranged from 11.1 (S2) to 38.2mg/kg (S1).

The guidance values for metals (Cronin *et al.*, 2006) can be seen in Table 3.6 below. All heavy metals

were below the lower level guidance values.

**Table 3.5: Metal results.**

Station	Hg mg/kg	Al mg/kg	As mg/kg	Cd mg/kg	Cr mg/kg	Cu mg/kg	Li mg/kg	Pb mg/kg	Ni mg/kg	Zn mg/kg
S1	0.04	7900	3.3	<0.1	10.1	4.8	5.34	6.1	5	38.2
S2	0.03	4900	1.8	<0.1	7.2	2.5	4.64	3.5	3.9	11.1
S3	0.01	7210	1.6	<0.1	7	2.3	4.58	4.2	3.3	11.2

**Table 3.6: Proposed metal guidance values for sediment quality guidelines (Cronin *et al.*, 2006).**

Metal	Lower level	Upper Level
As (mg/kg)	9*	70*
Cd (mg.kg)	0.7	4.2
Cr (mg/kg)	120	370
Cu (mg/kg)	40	110^
Pb (mg/kg)	60	218
Hg (mg/kg)	0.2	0.7
Ni (mg/kg)	21	60
Zn (mg/kg)	160	410

\* ERL (rounded up) – No background Irish data

\* In some locations natural levels of arsenic will exceed this value and in such instances this guidance value will not be appropriate.

^ PEL as ERM considered high

### 3.4.3. Code 4d

Tables 3.7 and 3.8 show the organochlorines including  $\gamma$ -HCH (Lindane) and PCB results. All organochlorines tested for were <0.1 $\mu$ g/kg. All PCB's were <0.08 $\mu$ g/kg.

The guidance values for organochlorines and PCBs (Cronin *et al.*, 2006) can be seen in Table 3.9 below. All PCBs are below the lower guidance level. HCB and  $\gamma$ -HCH were below the lower guidance level.

**Table 3.7: Organochlorine results.**

Station	DDE-pp ug/kg	DDT-pp ug/kg	Dieldrin ug/kg	HCH Alpha ug/kg	HCH Gamma ug/kg	HCB ug/kg	DDD-pp ug/kg
S1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

**Table 3.8: PCB Results.**

Station	PCB 028 ug/kg	PCB 052 ug/kg	PCB 101 ug/kg	PCB 118 ug/kg	PCB 138 ug/kg	PCB 153 ug/kg	PCB 180 ug/kg
S1	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08

**Table 3.9: Proposed organochlorine and PCB guidance values for sediment quality guidelines (Cronin *et al.*, 2006).**

Parameter	Lower level	Upper Level
γ-HCH (Lindane) (µg/kg)	0.3	1
HCB (µg/kg)	0.3	1
PCB (individual congeners of ICES 7) (µg/kg)	1	180
PCB (Σ ICES 7) (µg/kg)	7	1260

**3.4.4. Code 4e**

Table 3.10 shows the total extractable hydrocarbon results. The value for station was 21.7 mg/kg. This is below the lower guidance level of 1000mg/kg (1 g/kg) (Cronin *et al.*, 2006).

**Table 3.10: Total extractable hydrocarbon results.**

Station	Hydrocarbons mg/kg
S1	21.7

**3.4.5. Code 4f**

Table 3.11 shows the dibutyl and tributyl tin results. The results for DBT were <0.001 mg/kg for station S2 and <0.005 mg/kg at S1 and S3. Values for TBT were <0.001 mg/kg for station S2 and <0.005 mg/kg at S1 and S3. The guidance values for the sum of TBT and DBT range from a lower level of 0.1 to an upper level of 0.5mg/kg (Cronin *et al.*, 2006). All are below the lower limit.

**Table 3.11: Dibutyl and tributyl tin results.**

Station	DBT mg/kg	TBT mg/kg
S1	<0.005	<0.005
S2	<0.001	<0.001
S3	<0.005	<0.005

---

### 3.4.6. Code 4g

Table 3.12 shows the PAH results. Acenaphthylene, Anthracene, Benzo (a) anthracene, Benzo (a) pyrene, Benzo (k) fluoranthene, Dibenzo (a,h) anthracene, Fluorene and Naphthalene were all <1µg/kg. Acenaphthene was 3.27µg/kg. Benzo (b) fluoranthene was 2.59µg/kg. Benzo (ghi) perylene was 1.85µg/kg. Chrysene was 2.87µg/kg. Fluoranthene was 5.94µg/kg. Indeno 1, 2, 3 – cd pyrene was 1.93µg/kg. Phenanthrene was 2.89µg/kg. Pyrene was 4.96µg/kg.

The lower level guidance values for the sum of all 16 PAHs is 4000 µg/kg (Cronin *et al.*, 2006). Station 1 was below the lower limit.



**Table 3.12: PAH results.**

Sample Number	S1
PAH Acenaphthene ug/kg	3.27
PAH Acenaphthylene ug/kg	<1
PAH Anthracene ug/kg	<1
PAH Benzo a anthracene ug/kg	<1
PAH Benzo (a) pyrene ug/kg	<1
PAH Benzo (b) fluoranthene ug/kg	2.59
PAH Benzo ghi perylene ug/kg	1.85
PAH Benzo k fluoranthene ug/kg	<1
PAH Chrysene ug/kg	2.87
PAH Dibenzo a,h anthracene ug/kg	<1
PAH Fluoranthene ug/kg	5.94
PAH Fluorene ug/kg	<1
PAH Indeno 1,2,3 – cd pyrene ug/kg	1.93
PAH Naphthalene ug/kg	<1
PAH Phenanthrene ug/kg	2.89
PAH Pyrene ug/kg	4.96

---

#### 4. Discussion/Conclusion

The sediments analysed were below the lower Irish action limits for metals, organochlorines, PCBs, total extractable hydrocarbons, organotins and  $\Sigma 16$  PAH's (see Appendix 2 for Annex 1 action level limits table).

The suitability of the spoil for disposal at sea will be determined by the Marine Institute.

#### 5. References

Cronin, M., McGovern, E., McMahon, T. & R. Boelens. 2006. Guidelines for the assessment of dredge material for disposal in Irish waters. Marine Environmental and Health Series, No. 24, 2006.

**Appendix 1**  
**MI Sediment Analysis Requirement**

Dumping at Sea Analytical Requirements



Rinville  
Oranmore  
Co Galway  
Tel: 091 387200

[Redacted]

Marine Section  
Donegal Co. Co.

18/12/2019

[Redacted]

A proposed sampling and analysis plan is detailed below to cover dredging at the Magheraroarty Pier and subsequent proposed beach nourishment nearby.

Three samples are recommended. You should give your contractor a copy of this plan. You will need to draw their attention especially to Section 3 and Section 4 to confirm that they are capable of meeting the quality assurance standards required.

If you need clarification on anything, please don't hesitate to contact me.

Best regards,

[Redacted]

[Redacted]

Marine Environment Chemist

*Dumping at Sea Analytical Requirements*

**1.0 Sample location and analyses required:**

Three surface samples, as listed in Table 1 below) should be taken<sup>1</sup>. Sample locations are also shown on the chart in Figure 1 at the end of this document.

**Table 1.** Locations and details of proposed samples

Sample No.	Depth	Longitude (° W)*	Latitude (° N)*	Parameters for analysis
1	Surface	-8.17377	55.14704	1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 4g
2	Surface	-8.17317	55.14765	1, 2, 3, 4a, 4b, 4c, 4f
3	Surface	-8.17268	55.14798	1, 2, 3, 4a, 4b, 4c, 4f

\* Positions in decimal degrees, WGS84

**2.0 Parameter Code:**

1. Visual inspection, to include colour, texture, odour, presence of animals etc
2. Water content, density (taking into account sample collection and handling)
3. Granulometry including % gravel (> 2mm fraction), % sand (< 2mm fraction) and % mud (< 63µm fraction).
4. The following determinants in the sand-mud (< 2mm) fraction \* :
  - a) total organic carbon
  - b) carbonate
  - c) mercury, arsenic, cadmium, copper, lead, zinc, chromium, nickel, lithium, aluminium.
  - d) Organochlorines:
    - HCH and γ-HCH (Lindane),
    - DDT metabolites (pp'DDT, pp'DDE, pp'DDD).
    - ICES 7 PCB congeners (to be reported as the 7 individual congeners - 28, 52, 101, 118, 138, 153, 180)
  - e) total extractable hydrocarbons.
  - f) tributyltin (TBT) and dibutyltin (DBT)
  - g) Polycyclic aromatic hydrocarbons (PAH) - Acenaphthene, Acenaphthylene, Anthracene, Benzo (a) anthracene, Benzo (a) pyrene, Benzo (b) fluoranthene, Benzo (ghi) perylene, Benzo (k) fluoranthene, Chrysene, Dibenz (a,h) anthracene, Flourene, Fluoranthene, Indeno 1,2,3 - cd pyrene, Naphthalene, Phenanthrene, Pyrene.
  - h) Toxicity tests (Microtox or whole sediment bioassay) using appropriate representative aquatic species. (This requirement will depend on the results of the chemical analyses.)

<sup>1</sup> Further sampling and analysis, at depth if necessary, may be required in the event that problem areas of heavy contamination are identified as a result of the initial testing.

*Dumping at Sea Analytical Requirements*

*\*where the gravel fraction (> 2mm) constitutes a significant part of the total sediment, this should be taken into account in the calculation of the concentrations.*

**3.0 Important notes:**

- 3.1 The required detection limits for the various determinants are given in Table 2. below.
- 3.2 Details of the methodologies used must be furnished with the results. This should include sampling, sub sampling and analytical methods used for each determinant.
- 3.3 Appropriate marine CRM are to be analysed during each batch of analyses and the results to be reported along with sample results.
- 3.4 Blanks & in-house references to be run with each sample batch, and reported with sample results.

**Table 2.** Maximum limits of detection required

Contaminant	Concentration	Units (dry wt)
Mercury	0.05	mg kg <sup>-1</sup>
Arsenic	1.0	mg kg <sup>-1</sup>
Cadmium	0.1	mg kg <sup>-1</sup>
Copper	5.0	mg kg <sup>-1</sup>
Lead	5.0	mg kg <sup>-1</sup>
Zinc	10	mg kg <sup>-1</sup>
Chromium	5.0	mg kg <sup>-1</sup>
Nickel	5	mg kg <sup>-1</sup>
Total extractable hydrocarbons	10.0	mg kg <sup>-1</sup>
TBT and DBT (not organotin)	10	µg kg <sup>-1</sup>
PCB – individual congener	0.1	µg kg <sup>-1</sup>
OCP – individual compound	0.1	µg kg <sup>-1</sup>
DDT metabolite	0.1	µg kg <sup>-1</sup>
PAH – individual compound	10	µg kg <sup>-1</sup>

**4.0 Reporting requirements**

Reports should include the following information

*Dumping at Sea Analytical Requirements*

- 4.1 Results of testing should be reported in EPA spreadsheet format, which can be found [here](#).
- 4.2 Spreadsheet results to include:
  - Tabulated geophysical/chemical test results
  - Clear expression of units
  - Indication of wet weight or dry weight basis
  - Location of samples in decimal degrees WGS84 (latitude/longitude).
  - Date of sampling
  - Treatment of samples and indication of sub sampling, compositing etc.
  - Summary method details
  - CRM results
  - QA /QC
  - Other quality assurance information (e.g. accreditation status)
  - Project details.
- 4.3 If determinant is not detected, report less than values, and indicate LoD/ LoQ used.
- 4.4 Testing laboratories may be asked to provide additional details of method performance including limit of detection, precision, bias

Dumping of Site Analytical Requirements



Figure 1. Sample positions at Magheraroarty Harbour



**Appendix 2**  
**Annex 1 Action Level Limits**

**ANNEX 1: TABLES**

**Table B.1 Results of sediment chemistry analysis of the material to be dumped at sea, with reference to Irish Action Levels** *Note 1*

Parameter	Units (dry wt) <i>Note 2</i>	Lower Action Limit	Upper Action Limit	S1	S2	S3
Arsenic	mg kg <sup>-1</sup>	9	70	3.30	1.80	1.60
Cadmium	mg kg <sup>-1</sup>	0.7	4.2	<0.1	<0.1	<0.1
Chromium	mg kg <sup>-1</sup>	120	370	10.10	7.20	7.00
Copper	mg kg <sup>-1</sup>	40	110	4.80	2.50	2.30
Lead	mg kg <sup>-1</sup>	60	218	6.10	3.50	4.20
Mercury	mg kg <sup>-1</sup>	0.2	0.7	0.040	0.030	0.010
Nickel	mg kg <sup>-1</sup>	21	60	5.00	3.90	3.30
Zinc	mg kg <sup>-1</sup>	160	410	38.20	11.10	11.20
∑ TBT & DBT <i>Note 3</i>	mg kg <sup>-1</sup>	0.1	0.5	<0.01	<0.002	<0.01
γ-HCH (Lindane) <i>Note 4</i>	µg kg <sup>-1</sup>	0.3	1	<0.1	N/A	N/A
HCB <i>Note 5</i>	µg kg <sup>-1</sup>	0.3	1	<0.1	N/A	N/A
PCB (individual congeners of ICES 7) <i>Note 6</i>	µg kg <sup>-1</sup>			<0.08	N/A	N/A
PCB 028	µg kg <sup>-1</sup>			<0.08	N/A	N/A
PCB 052	µg kg <sup>-1</sup>			<0.08	N/A	N/A
PCB 101	µg kg <sup>-1</sup>			<0.08	N/A	N/A
PCB 138	µg kg <sup>-1</sup>			<0.08	N/A	N/A
PCB 153	µg kg <sup>-1</sup>			<0.08	N/A	N/A
PCB 180	µg kg <sup>-1</sup>			<0.08	N/A	N/A
PCB 118	µg kg <sup>-1</sup>			<0.08	N/A	N/A
PCB (∑ ICES 7) <i>Note 6</i>	µg kg <sup>-1</sup>	7	1260	<0.56	N/A	N/A
PAH (∑ 16) <i>Note 7</i>	µg kg <sup>-1</sup>	4000		<34.3	N/A	N/A
Total Extractable Hydrocarbons	g kg <sup>-1</sup>	1.0		0.0217	N/A	N/A

Exceed Lower Irish Action Limit
Exceed Upper Irish Action Limit

**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, Dibenz(ah)anthracene, Benzo(ghi)perylene, Indeno(123-cd)pyrene.

# Proposed dredging and beach nourishment at Magheraroarty pier and beach

## Marine Intertidal Survey to inform Appropriate Assessment



Version: 7<sup>th</sup> September 2020 (FINAL)



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## 1.0 INTRODUCTION

Ecofact was commissioned by Donegal County Council to undertake a Marine Survey at Magheraroarty Harbour in County Donegal. The survey was requested to inform Appropriate Assessment (AA) of proposed dredging and beach nourishment works at Magheraroarty Harbour.

The proposed project involves dredging at Magheraroarty Pier and deposition of dredged material onto the adjacent strand as beach nourishment, on an annual basis over a period of 5 years. Annual dredging activity at Magheraroarty Pier has been carried out previously as ongoing maintenance of the harbour. These works have not been subject to AA. The site of the proposed works is within the Ballyness Bay Special Area of Conservation (SAC) and adjacent to the Falcarragh to Meenlaragh Special Protection Area (SPA). The location of the proposed works areas and the local Natura 2000 sites are shown in Figure 1 and 2 below.

Donegal County Council wants to apply for a foreshore licence for continuing these works. In the licence application process a screening for Appropriate Assessment was carried out which determined there was a need for a Natura Impact Statement (Appropriate Assessment) for the proposed project. The current report is intended to inform the NIS for the proposed works. It is noted that the dredging and beach nourishment works had already taken place in early June 2020 in advance of the current survey and assessment. This was not known at the time of the current survey.

### 1.1 Project description

The proposal is for the annual dredging and beach nourishment at Magheraroarty Pier, Dooley Strand in County Donegal. Magheraroarty Harbour is used by the Tory Island Ferry, commercial fishing boats and local charter boats. In order to maintain safe, navigable depths, which is a charted depth of -2.5m for the Tory Island Ferry, and the use of the slipway, dredging in the Magheraroarty Harbour is required on an annual basis. Annual maintenance dredging and beach nourishment have been undertaken at Magheraroarty, under licence, since 2008. However no AA have ever been completed.

The proposed works comprise the removal of up to a maximum of 20,000 tonnes of sediment a year from the foreshore at the pier for a 5-year period. The dredging will be undertaken in a foreshore area of 0.85ha where there is an accumulation of deposited sediment. The sediment at Dooley Strand has been classified as clean and uncontaminated (Doran Consulting, 2013). The removed material, which is expected to comprise mainly of recently deposited sand with no significant sub-benthic community present in it, shall be deposited on an intertidal area of 7.3ha on Dooley Strand. The proposed deposition area is subject to erosion from wave and wind action and longshore drift. It is understood that by depositing the dredged material to the shore it is being returned to its original location where it had been eroded from. The material will be evenly spread over the 7.3ha intertidal, deposition area on Dooley Strand.

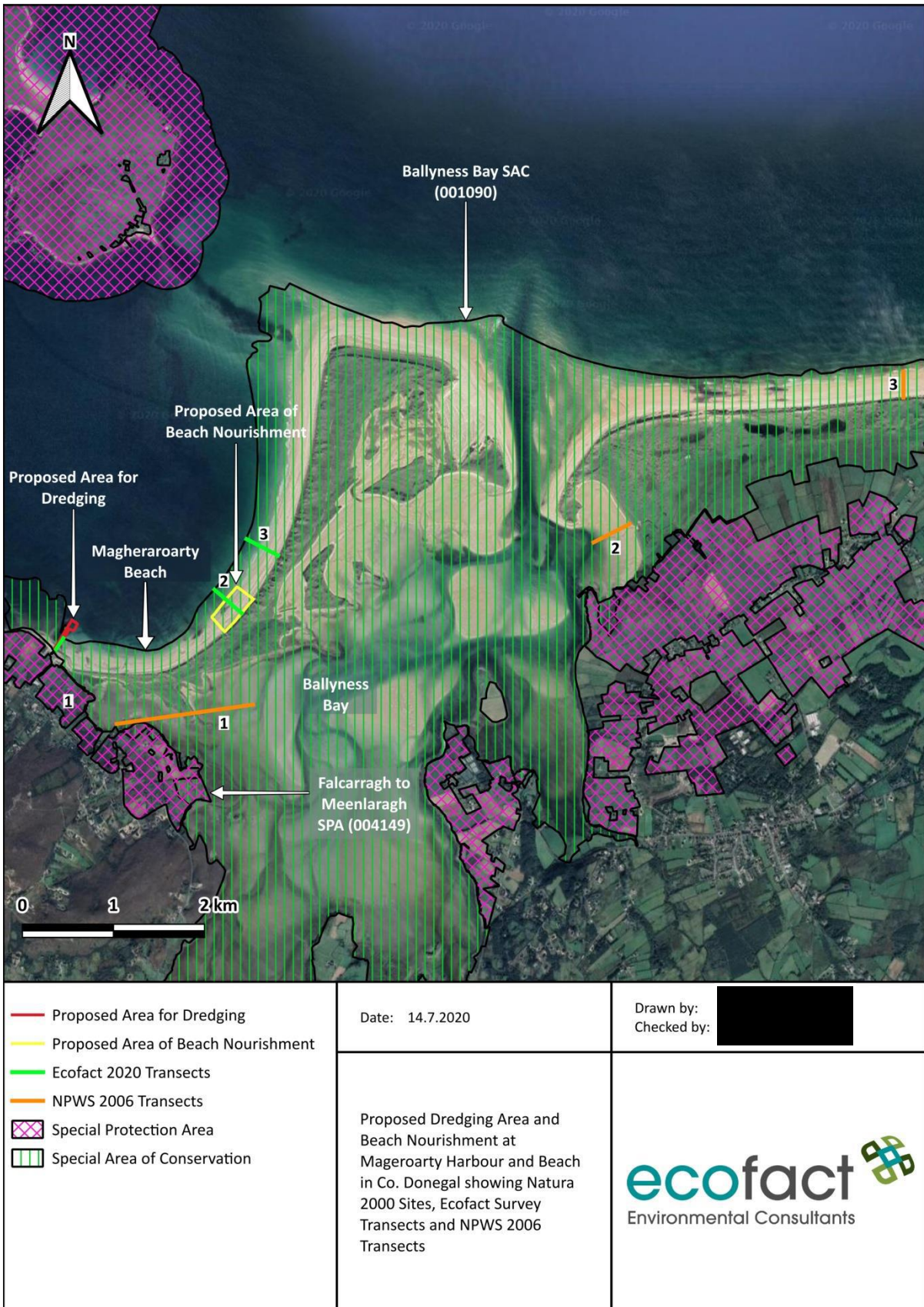
It is proposed that the dredging and deposition works will take place during March / April each year. The build up of material deposited during winter storms can then be removed and the navigable depths will be reinstated for the use of the harbour during the busy summer season. The works will take place during spring tides to ensure the efficient removal of material and deposition on the foreshore can take place.

There are two options proposed for the dredging and deposition works: either a land-based procedure or a marine based procedure. The land-based option involves a tracked excavator loading the material onto a dump truck to be transported along the foreshore at low-mid tide and dumped at the proposed disposal site on the adjacent beach in the intertidal zone. This method minimises the potential for sediment plumes and is a controlled and precise method of removing the material. This method has



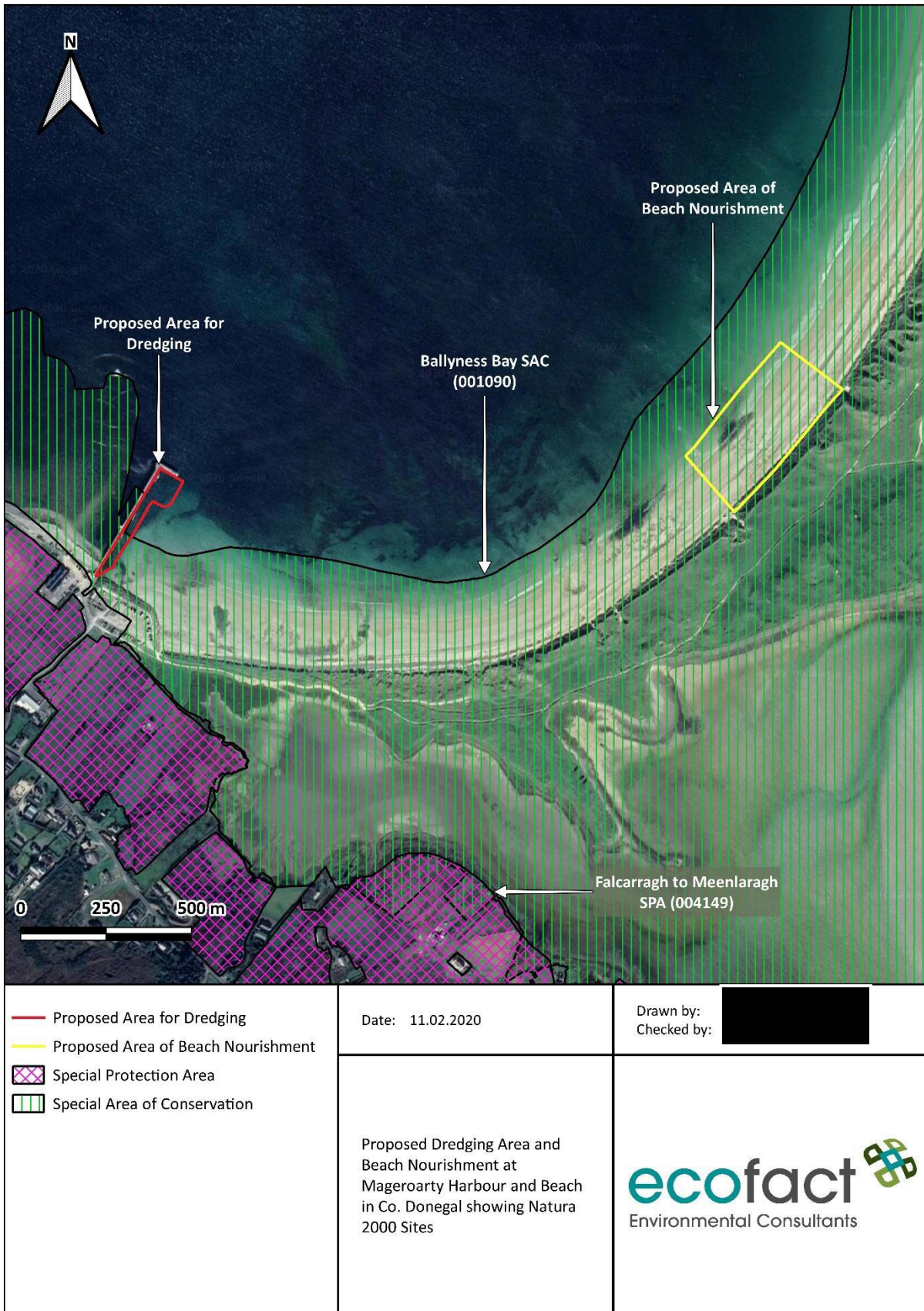
been used in the previous dredging activity in the harbour and has proved successful and efficient. The marine based option involves the removal of material by a long reach excavator on a barge and transported to and deposited at the agreed deposition area during high tide, either by pumping or dumping the material in the intertidal zone. This method would provide a controlled and precise way of removing the material and eliminating the need for plant on the foreshore (Doran Consulting, 2013).

A Screening for Appropriate Assessment report was carried out by Greentrack Environmental Consultants in 2019 for the proposed dredging works (Greentrack Environmental Consultants, 2019). The surveys carried out for this report included a walkover by two ecologists. The subject site is classified as a sand shore (LS2) which contains the Annex I habitat of mudflats and sandflats not covered by seawater at low tide [1140] (Greentrack Environmental Consultants, 2019). The report also notes that Embryonic shifting dunes border the strand and no flora or fauna of interest was noted in the area due to the nature of the site. The Screening for Appropriate Assessment notes the potential threat to this mudflats and sandflats habitat through mechanical activity during the transportation of sand by dump trucks to the agreed site. The report therefore recommended that a Natura Impact Statement be carried out for the proposed dredging works at Magheraroarty pier (Greentrack Environmental Consultants, 2019). This has not been completed to date and further dredging and beach nourishment works took place at this site in advance of the current survey.



**Figure 1** Location of the proposed dredging and beach nourishment areas at Magheraroarty harbour and beach, also showing survey transect positions.





**Figure 2** Proposed dredging and beach nourishment areas at Magheraroarty harbour and beach, with Natura 2000 sites and aerial photography.



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## 2.0 METHODS

The current assessment included a detailed desk-based assessment and a site visit and survey on the 8<sup>th</sup> and 9<sup>th</sup> June 2020. The desk study included a review of previous surveys at the site, and the sources used in the study are listed in the references section.

The site was visited during calm / bright weather conditions during a spring tide cycle. A walkover survey of the site and surrounds was first undertaken survey first to visually assess marine habitats and the ecology of the general area, and also to select a suitable reference (control) site(s) for sampling.

Three transect areas were selected and these are indicated on Figure 1. The surveys were completed on the outgoing tide each day and 5 sub-sites (replicate samples) and extensive qualitative surveys were completed in each site/area. The survey was undertaken using standard intertidal survey methodology using a 0.25 m<sup>2</sup> quadrat and trowel to dig to a depth of 15cm. Sieving was completed in the field and macroinvertebrates were counted and identified in the field when possible, or fixed in isopropanol for subsequent identification in the laboratory. During the current survey, five replicate samples were taken at each transect.

The features of the sample sites were recorded and evaluated. These features included surface relief, firmness, stability, sorting and anoxic layer. Furthermore, notes were made if any mounds/ casts, burrows/holes, tubes, algal mats etc. were present and the physical attributes of each site were recorded.

It is noted that dredging works had taken place at the site immediately prior to the visit and this was not known at the time. There was no obvious evidence of dredging and beach “nourishment” works at the time of the survey. There was no machinery on the site and there was not an elevated area of sand / substrate at the receptor site. However, water quality and visibility was very poor and underwater cameras could not be used. It is not clear if this was due to the dredging that occurred or related to previous unsettled weather. The pier area also had anoxic substrates exposed which was likely to have been evidence of dredging. However, at the time this was attributed to the large build-up of rotting seaweeds at this location. Very few macroinvertebrates were recorded however at any of the sites. At the time this was attributed to the general sandy nature of the site, which is a beach, and this the probably primarily the reason for the low numbers of fauna recorded. During the walkover survey far more suitable areas for marine invertebrates were recorded in the main Ballyness Bay area with very high densities of worms and casts visible along with high densities of cockles and other molluscs.



## 3.0 RESULTS

### 3.1 Desk Study

#### 3.1.1 Magheraroarty Pier

Magheraroarty pier is the location for the proposed dredging works and beach nourishment. This pier is located within Magheraroarty harbour and is located to the western end of the strand. Site access to the pier is off the adjacent L11331 local road which is just off the main R257 regional road. Most of the surrounding area consists of residential dwellings / holiday homes and extensively managed grassland. The subject site itself is within the village of Meenlaragh.

Magheraroarty pier is the point at which some touristic ferry crossings embark for trips to Tory Island and Inishbofin Island. The pier is frequently used for these trips all year round. The pier is also used frequently by small numbers of fishermen. The Department of the Marine and Natural Resources granted a dredging licence / foreshore lease in 2001, which included dredging works as well as an extension of the existing pier, new sheet piled walls, new wave walls, new decking and marshalling area and associated works (Department of the Marine and Natural Resources, 2001). This application also notes that an EIS was completed for the works in 2001 by Kirk McClure Morton, Consulting Engineers on behalf of Donegal County Council. This EIS is not available online and was not reviewed as part of the current assessment. Doran Consulting also completed a Foreshore Licence Application for Magheraroarty Pier in 2013 (Doran Consulting, 2013). This foreshore licence application was for the following activities: remove recently deposited sand from Magheraroarty harbor and deposit the material on Dooley strand as beach nourishment. This application was for a period of 5 years annual dredging, permitting 20,000 tonnes of material to be dredged from the harbor per annum (Doran Consulting, 2013). No Appropriate Assessment has been completed – and one is required to bring these works into compliance with the EU Habitats Directive.

According to the County Donegal Development Plan 2018-2024, the subject site is based in a Structurally Weak Rural Area. Planning no. 19/50962 includes for the proposed extension to the car park at the Magheraroarty Community Centre and the construction of a children's play area which is located c. 180m from the subject site. This planning application was granted and was subject to a Natura Impact Statement.

In relation to other activities in the general area, there are multiple licenses for the use of Ballyness Bay for private, commercial and industrial shellfish production. These licenses have been for the production of Oysters in Ballyness Bay SAC, and there has been some opposition to the granting of these licenses. An appeal has been put forward by 'Save Ballyness Bay' action group, including multiple submissions by An Taisce and ecologists. An Taisce has reviewed the multiple licenses and have submitted concerns over traffic across protected habitats, as well as disturbance to Grey Seals and the mobile sand community.

#### 3.1.2 Designated Sites

##### 3.1.2.1 *Ballyness Bay SAC 001090*

Ballyness Bay SAC is located in north-west Donegal, adjacent to the towns of Falcarragh and the village of Gortahork. This SAC is a large and very shallow estuarine complex, with extensive areas of sandflats which are exposed at low tide. This SAC is designated for the presence of Estuaries, Tidal Mudflats and



Sandflats, Embryonic Shifting Dunes, Marram Dunes (White Dunes), Fixed Dunes (Grey Dunes), Humid Dune Slacks and Geyer's Whorl Snail (*Vertigo geyer*). The intertidal sandflats are noted in the site synopsis to often have a rich macro-invertebrate fauna with notable populations of Lugworm *Arenicola marina* and Common cockle *Cardium edule* (now *Cerastoderma edule*). Ballyness bay is almost completely cut off from the sea by two large sand dune covered spits. The Dooney sand dunes are highly dynamic and have grown to a considerable height near the tip of the spit. The site synopsis notes that they contain what is probably the largest unvegetated sand dune in the country. The fixed dunes that occur along the length of the Dooney sand are found east of a large band of mobile Marram *Ammophila Arenaria* dunes and are of particular importance. The site synopsis described the dunes dominated by Marram as being well developed (NPWS, 2013). It is noted that the conservation objectives document for the SAC illustrate the presence of the Mudflats and Sandflats habitat at the proposed dredging site and area for 'beach nourishment' (NPWS, 2014a).

Both of the beaches in the site are used for recreational purposes. Beach buggies and quad bikes are driven across the dunes. The Dooney dunes in particular are used for camping. Sea angling and sailing occur on a small scale in the Bay with servicing piers at Magheraroarty and at Ballyness. Some littering occurs on the dunes and beaches. A football pitch has been developed at the Magheraroarty end of the Dooney dunes. A well-worn track runs the length of the Dooney Peninsula. It is used for access to livestock, as well as by recreational users. Other tracks intersect to allow traffic access to the dunes. Licensed fishing for salmon by draft netting (ring netting) takes place in Ballyness Bay. Lobster potting and crabbing boats also use the pier to land catches. Mussels are also collected from certain areas of Ballyness Bay (NPWS, 2005).

The Ballyness Bay SAC is also considered to be important for waterfowl. Species of note include the Ringed Plover, Brent Goose, Red-breasted Merganser, Wigeon, Oystercatcher, Curlew, Sanderling and Greenshank. The populations of Ringed Plover and Sanderling are of national importance. Large numbers of lapwing have been recorded as well as Golden Plover and Chough. Land use within the bay comprises fishing and sailing on a small scale with the surrounding dunes and grassland grazed by sheep and cattle (NPWS, 2013). The Standard Data Natura 2000 form for the SAC notes the threats and pressures currently having an impact on the qualifying interests. This document notes that walking, horseriding and non-motorised vehicles are currently having a high impact on the SAC. The threats and pressures listed as having a medium impact on the SAC are as follows: grazing, removal of beach materials, sports pitches, urbanized areas and human habitation, discharges and marine and freshwater aquaculture (NPWS, 2019). In the Ballyness Bay SAC Conservation objectives supporting document for coastal habitats it is noted that the Dooney Sand dunes, which are also sometimes referred to as the Magheraroarty Dunes, are highly dynamic and have grown to a considerable height near the tip of the spit. The habitat maps included in the conservation objectives are based off results from the Coastal Monitoring Project (CMP) and the Sand Dunes Monitoring Project (SDMP), as listed in the document (NPWS, 2014b). Table 1 below details the total area of each sand dune habitat within the SAC obtained from NPWS (2014a).

**Table 1** Total areas of Sand dune habitats in Ballyness Bay SAC obtained from NPWS (2014b).

Habitat	Ballyness (CMP)	Dooney (SDM)	Total area (ha) of habitat within the SAC Boundary
Embryonic shifting Dunes	2.26	4.81	7.07
Shifting dunes along the shoreline with <i>Ammophila arenaria</i>	14.15	8.98	23.13
Fixed coastal dunes with herbaceous vegetation	90.95	97.04	187.99
Humid dune slacks	13.87	-	13.87
<b>Total</b>	<b>121.23</b>	<b>110.83</b>	<b>232.06</b>

**Table 2** Qualifying Interests of Ballyness Bay SAC.

Qualifying Interest	Code
Estuaries	1130
Mudflats and sandflats not covered by seawater at low tide	1140
Embryonic shifting dunes	2110
Shifting dunes along the shoreline with <i>Ammophila Arenaria</i> (white dunes)	2120
Fixed coastal dunes with herbaceous vegetation (grey dunes)	2130
Humid dune slacks	2190
Geyer's Whorl Snail <i>Vertigo geyeri</i>	1013

### 3.1.2.1.1 NPWS Conservation Plan – Ballyness Bay

NPWS have completed a conservation plan for Ballyness Bay SAC in Co. Donegal for the period of 2005-2010 (NPWS, 2005). This conservation plan was set out when the SAC was just a candidate SAC, and it provides a very detailed description of the SAC, its qualifying interests and main conservation objectives. The main management issues listed for the SAC at this time were dumping, erosion, grazing and supplementary feeding, reclamation, recreation and sewage disposal. The main strategies employed at the time for achieve the objectives set out by NPWS were to implement sustainable grazing practices, regulate the access to the Dooley peninsula by recreational users, increase control of other damaging practices including supplementary feeding, dumping and littering, monitor potential damaging activities to all the habitats and the status of animal species and to liaise with various organizations and groups regarding the management of the site (NPWS, 2005).

The physical and biological features of Ballyness Bay are discussed in detail in the conservation plan. Physical features are discussed under climate, geology and geomorphology, soils and soil processes and hydrology and water quality. Table 3 below provides the details given for Annex I habitats in the SAC, their percentage coverage and a detailed description.

In terms of Fauna present at the site, a BIOMAR survey was carried out for invertebrates (NPWS, 2005). The sand flat / mud flat fauna present were considered to be typical of these types of habitat types. The invertebrate species recorded in Ballyness Bay during the BIOMAR sampling are provided in Table 4 below.

Salmon are noted to be present in the Tullaghobegly River, which enters Ballyness Bay just west of Falcarragh. Sea trout is also noted to occur within rivers in the site. Common frog is noted as being present and are known to breed within waterbodies on the site. A long list of bird species is noted in the conservation plan to occur within the site. However, it is specifically noted that Grey Plover and Sanderling are present in nationally important numbers (population >1% of the national population). During the BIOMAR survey, Sandwich tern and little tern were recorded using Drumnatinny beach. Chough are noted to use the short grassland habitats and up to 60 Greenland White-fronted Geese were counted on the edge of the site at Drumnatinny during the spring of 1998. Large numbers of lapwing have been recorded breeding on the dune slacks as well as a pair of Buzzards. Common seal is regularly seen at the site as well as Otters. A porpoise carcass was noted on the beach near Keadew during a site visit in 1998. Irish hare, foxes and rabbits are also present on the site (NPWS, 2005).

The conservation plan for Ballyness bay details the specific land use for the site which is given as the following: grazing, recreation / tourism, dumping / littering, dredging, removal of beach material, seaweed harvesting, fishing / shellfish harvesting, marram grass harvesting and tracks / access. It is noted in the plan that both dune systems are used for grazing livestock. The Dooley dunes are used to graze 30-50 sheep. Small numbers of cattle are also sometimes grazed here. It is noted that localized



overgrazing does occur on Drumatinny dune and ring-feeders were still used in 2003. For recreational purposes, the beaches are mostly used in July and August. The Dooley dunes are used for camping as well as numerous campfire locations throughout the peninsula, particularly at the Magheraroarty end. Beach buggies, quad bikes are touring caravans also use the area. Sea angling and sailing are also noted to occur in Ballyness Bay but on a small scale, with activity noted on Magheraroarty pier. New abandoned cars were noted to be appearing despite local parish council groups organizing clean ups before the summer

**Table 3** Annex I habitats in the Ballyness Bay SAC, as detailed in the NPWS conservation plan (NPWS, 2005).

Annex I Habitat	Coverage within SAC	Description
Fixed Coastal Dunes with herbaceous vegetation [2130]	15% of total site area or 185ha	The site is dominated by the large sand dune system of the Dooley peninsula. This system is extremely dynamic, with substantial sand movement, both by wind and water action. Fixed coastal dunes occur along the length of the Dooley peninsula. They are surrounded by mobile dunes on the seaward side and other habitats such as saltmarsh and sand flat on the Ballyness Bay side. The typical plant species of the fixed dunes include Marram Grass ( <i>Ammophila arenaria</i> ), Red Fescue ( <i>Festuca rubra</i> ), Ribwort ( <i>Plantago lanceolata</i> ), Creeping Thistle ( <i>Cirsium arvense</i> ), Common Ragwort ( <i>Senecio jacobaea</i> ), Thyme ( <i>Thymus drucei</i> ) and the mosses, <i>Tortula ruralis</i> and <i>Homalothecium</i> sp. There are also fixed dunes across the Bay, at Drumnatiny. The vegetation is similar to that described above. These dunes have been fenced.
Mudflats and sandflats not covered by water at low tide [1140] and Estuaries [1130]	(60% of total site area or 742ha)	Most of Ballyness Bay is exposed at low tide, leaving extensive sand flats. Lugworm ( <i>Arenicola marina</i> ) casts are abundant and the flats are important for foraging waders. These sand flats are generally un-vegetated, but green algae ( <i>Enteromorpha</i> sp.) and wracks ( <i>Fucus</i> spp.) occasionally occur. Several small Eelgrass ( <i>Zostera</i> sp.) beds also occur in the northern part of Ballyness Bay. Permanent water channels occur where the rivers (described below) enter and flow through the Bay. These represent the estuarine habitat. The intertidal areas provide important feeding and roosting habitat for wintering and resident seabirds and waterfowl.
Mobile dunes (including shifting dunes along the shoreline (2110) and embryonic shifting dunes (2120))	(4% of total site area or 49ha)	There are considerable areas of mobile dunes in the Dooley system. This includes one of the largest un-vegetated sand dunes in the country. Constant movement of sand prevents the establishment of vegetation. This dune, known locally as 'Big Dune', is currently eroding at a considerable rate. The seaward side of the dunes form steep un-vegetated sand cliffs. Behind these, the patchy vegetation is dominated by Marram Grass. Other species include Red Fescue, Colt's-foot ( <i>Tussilago farfara</i> ) and Red Clover ( <i>Trifolium repens</i> ). The mobile dunes at Drumnatiny are also dominated by Marram Grass.
Humid dune slacks (2190)	(1% of total site area or 12ha)	An area of wet dune slack lies adjacent to the dry grassland described below. The dominant grass species here are Creeping Bent ( <i>Agrostis stolonifera</i> ) and Crested Dog's-tail ( <i>Cynosurus cristatus</i> ). Sedge species ( <i>Carex</i> spp.) and Silverweed ( <i>Potentilla anserina</i> ) are also common. Part of this area floods in winter. The dune slacks provide feeding habitat for Greenland White-fronted Geese and Barnacle Geese and roosting habitat for other waders and wildfowl during bad weather.

seasons. Littering and dumping are noted to also occur throughout the site. Dredging at Magheraroarty pier is specifically mentioned as well as spoil being dumped on adjacent land. Small scale removal of beach material is also noted in the plan. On the eastern side of the Dooley peninsula, some seaweed



harvesting is noted to occur. Licensed fishing for salmon by draft (ring netting) is said to take place in Ballyness Bay, as well as crab/lobster fishermen operating from Magheraroarty pier. Mussels are also collected from certain areas of Ballyness Bay. Marram grass is harvested during the winter from Dooley on a small scale. Regarding tracks and access, well-worn tracks are used to gain access to livestock, as well as by recreational users (NPWS, 2005).

**Table 4** Invertebrate species recorded in Ballyness Bay during BIOMAR Sampling for the Ballyness Bay Conservation Plan (NPWS, 2005).

Location	Species
Drift Line / saltmarsh	<i>Orchestia gammerillus</i>
	<i>Talorchestia dishayesii</i>
	<i>Ligia oceanica</i>
Mid shore sand flat	<i>Sigalica mathildue</i>
	<i>Arenicola marina</i>
	<i>Clymenaria clyperata</i>
	<i>Urothae brevicornis</i>
	<i>Haustoris arenarius</i>
	<i>Cerastoderma edule</i>
	<i>Angulus tenuis</i>
Lower shore	<i>Glycera tridactyla</i>
	<i>Arenicola marina</i>
	<i>Clyminera clypeata</i>
	<i>Haustoris arenarius</i>
	<i>Crangon crangon</i>
	<i>Angulus tenuis</i>
	<i>Ammodytes lobianus</i>
<i>Nephtys longosetosa</i>	

The conservation plan also outlines the conservation value of the Ballyness Bay cSAC. This provides clarity on the status of protected habitats and species in the Bay and their importance nationally and internationally. It is noted in the plan that Ballyness Bay SAC represents between 2-15% of the total area of the 'fixed dunes with herbaceous vegetation' habitat in Ireland. This occurs along the Dooley peninsula and at Drumnatunny. This habitat is surrounded by the 'mobile dunes including shifting dunes along the coastline with *Ammophila arenaria* (white dunes)' habitat and the 'Embryonic shifting dunes' habitat. The plan notes that this area includes one of the largest unvegetated sand dunes in Ireland, representing <2% of the total habitat in the country. The Humid dune slacks near the fixed dune habitat at Drumnatunny is considered to be a good example and represents >2% of the total area of this habitat in the country. Part of this area is noted to flood in winter and therefore creates suitable habitat for wintering birds such as Barnacle geese. The intertidal mudflats and sandflats at the site are noted to represent 2-15% of this habitat in Ireland, with the estuary's habitat representing <2% of this habitat in Ireland. Several eelgrass beds are noted to occur in the intertidal zone and are said to support a rich macro-invertebrate fauna. The importance of the site for avian fauna is also noted again, with nationally important numbers of Grey Plover and Sanderling (NPWS, 2005).

The conservation plan also sets out conservation objectives for the site, which have now been superseded with an earlier version in 2014 (NPWS, 2014a). Furthermore, the plan explores the management issues with the site, which are noted as the following: Corncrake conservation, dumping, erosion, grazing, lack of information for the public, reclamation, recreation, sewage disposal and supplementary feeding. Corncrake have since been designated in the nearby Falcarragh to Meenlaragh SPA, discussed individually below. Dumping is noted to be likely polluting the habitats at the site. Erosion is noted to occur on the Dooley dune system and peninsula, exacerbated by the use of this area by



traffic, quad bikes, etc. Overgrazing is noted on the Drumnatiny dune system. The public are noted to not be aware of its designation and the ecological importance of the site, in 2005. Regarding reclamation, an area of the Dooley peninsula was noted to be flattened and reseeded to be used as a football pitch. Recreation is noted to exacerbate erosion and littering as well as disturbance, particularly to bird species. Untreated sewage from Gortahork and Falcarragh flows into Ballyness Bay and the feeding stations for cattle and sheep and noted to contribute to trampling of the habitats at the site (NPWS, 2005).

NPWS set out specific strategies to achieve the conservation objectives set out in the conservation plan for the Ballyness Bay cSAC. Again, it is noted that these conservation objectives have been superseded (NPWS, 2014a). The most recent conservation objectives for Ballyness Bay SAC are provided in Table 5. Nonetheless, the specific strategies for the conservation plan comprise the following: manage grazing on commonages; manage grazing on private land; regulate access to Dooley peninsula; monitor rabbit grazing; evaluate impact of and treat sewage discharge; monitor dumping on site margins; maintain mudflats, sandflats and estuary habitats; control supplementary feeding; maintain beach, saltmarsh, shingle, scrub, woodland, reedbed and drainage ditch; maintain rivers and streams; prevent further dumping; maintain the status of other notable species; maintain the status of chough; liaise with interested parties and liaise with REPS planners (NPWS, 2005). Finally, the conservation plan details the Zoning for the site, into natural zones, active management zones, intensive use zone and impact zones to help with management of the site (NPWS, 2005).

**Table 5** Conservation objectives for Ballyness Bay SAC (NPWS, 2014a). Specific attributes and targets for each qualifying interest can be found in the conservation objectives document.

Qualifying Interest	Conservation Objective
Estuaries [1130]	To maintain the favourable conservation condition of Estuaries in Ballyness Bay SAC (defined by a specific list of attributes and targets)
Mudflats and sandflats not covered by seawater at low tide [1140]	To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Ballyness Bay SAC (defined by a specific list of attributes and targets)
Embryonic shifting dunes [2110]	To maintain the favourable conservation condition of Embryonic shifting dunes in Ballyness Bay SAC (defined by a specific list of attributes and targets)
Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (White dunes) [2120]	To maintain the favourable conservation condition of Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (White dunes) in Ballyness Bay SAC (defined by a specific list of attributes and targets)
Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	To restore the favourable conservation condition of Fixed coastal dunes with herbaceous vegetation (grey dunes) in Ballyness Bay SAC (defined by a specific list of attributes and targets)
Humid dune slacks [2190]	To maintain the favourable conservation condition of Humid dune slacks in Ballyness Bay SAC (defined by a specific list of attributes and targets)
Geyer's Whorl Snail <i>Vertigo geyeri</i> [1013]	To maintain the favourable conservation condition of Geyer's Whorl Snail <i>Vertigo geyeri</i> in Ballyness Bay SAC (defined by a specific list of attributes and targets)

**Table 6** Qualifying Interests of Falcarragh to Meenlaragh SPA and conservation objectives (NPWS, 2020).

Qualifying Interest	Code	Conservation Objectives
Corncrake	A122	To maintain or restore the favourable conservation condition of the bird species in this SPA





### 3.1.2.2 Falcarragh to Meenlaragh SPA

The Falcarragh to Meenlaragh SPA is located on the eastern and western sides of Ballyness Bay on the north-west coast of Donegal. This large site encompasses three areas of mixed agricultural grassland. This SPA is designated for the presence of the Annex II Corncrake. This site has supported a breeding population of Corncrake, with 9 pairs being the five year mean peak between 2003 and 2007. This site is regularly used by nationally important numbers of breeding Corncrake (NPWs, 2014c).

Corncrake migrate northwards from southern and eastern Africa to reach their breeding ground from early April onwards, and leave in August and September. This species requires a cover of tall vegetation throughout their breeding cycle and are strongly associated with meadows that are harvested annually. This protected bird is listed on the 2010 International Union for Conservation of Nature (IUCN) Red List of Threatened Species. This is due to the population and range declines of more than 50% in the last 25 years across significant parts of its range (NPWS, 2014c).

The Standard Data Natura 2000 form for the SPA notes the threats and pressures currently having an impact on the qualifying interests. This document notes that mowing / cutting of grassland as well as grazing are having a high impact on Corncrakes in the SPA. Cultivation and discontinuous urbanization are noted as having a low impact on the SPA (NPWS, 2018).

### 3.1.3 Intertidal Mudflats and Sandflats Survey

In 2006, a survey of the Intertidal mudflats and sandflats in Ireland as undertaken by NPWS (Aquafact International Services Ltd., 2006). This survey included selected shores within the 8 cSAC sites: Boyne Coast and Estuary, Baldoyle Bay, South Dublin Bay, Ballyteigue Burrow, Great Island Channel, Clew Bay Complex, Ballyness Bay and Lough Swilly. The aim of the project was to collect sediment samples at 8 locations for biological and granulometric analyses, record field data for each location including latitude and longitude and sediment characteristics such as colour, surface texture, qualitative description, depth of redox and biological features, make a photographic record of each site, carry out biological analyses of four samples per station to quantitatively document the species present, prepare a set of voucher specimens of all taxa recorded to be housed in the National Museum of Ireland, prepare a per sample species list, carry out particle size analysis of one sample per station, carry out organic carbon analysis of one sample per station and to prepare a report containing all the results (Aquafact International Services Ltd., 2006).

One of these sites surveyed as part of the project was Ballyness Bay in Co. Donegal which included 3 transects, each with three stations within the transect, of the lower shore, mid shore and upper shore. Two of these transects were situated in Ballyness Bay itself while one transect was located on Tramore beach just west of the mouth of the Ray River.

Transect 1 in this survey was located within Ballyness Bay and is very sheltered, almost completely enclosed on its northern face by a long sand dune peninsula that broadens to the north-east leaving only a narrow draining gap. This transect was located on the southern end of a peninsula which separates the transect from Maheroarty beach where the proposed development site is. At transect 1 revealed a band of algae on the upper shore ranging from the 2m wide band of *Pelvetia canaliculata* to a narrow band of mixed *Fucus cernoides* and *Fucus spiralis* followed by a band c. 20m wide of *Ascophyllum nodosum* (70%) and *Fucus ceranoides* (20%). Fauna observed at transect 1 during the survey included numerous green crabs *Carcinus maenas* on the upper shore, tubes of spionids and some clumps of mussels *Mytilus edulis*. The report notes that no talitrids were recorded from the strand line, but 4 specimens were recorded from the core samples taken in the upper shore station. The total



number of fauna recorded was 26, 11 and 9 for the upper, mid and lower shores of transect 1 respectively. Flora diversity was noted as 3, 1 and 0 respectively for the upper, mid and lower shores. For transect 1, total organic carbon ranged from 0.07% to 0.24%. Sediment type was found to be mostly medium sand and fine sand.

Transect 2 was located near the opening gap of Ballyness Estuary, in an area consisting of sandflats backed by sand dunes dominated by marram. Some cobbles were recorded on the lower shore with attached *Fucus vesiculosus*. No other algae were evident and very few fauna were recorded during the transect. The only signs of faunal activity were the casts of the lugworm *Arenicola marina* present in low densities. Talitrid amphipods were abundant on the strand line. Transect 2 had total organic carbon results ranging from 0.07% to 0.16% and the majority of sediment types recorded were medium sand, fine sand and coarse sand. Fauna diversity at Transect 2 was recorded as 0, 8 and 6 respectively, while no flora were recorded at any site.

Transect 3 was located in the eastern end of a long strand backed by a sand dune system and extending from the outer side of the gap of Ballyness Bay and ending c. 5km east. The narrow strand is completely exposed north to the Atlantic Ocean. Talitrid amphipods were recorded on the strand line and a sample was collected. The results of transect 3 showed that numerous specimens of the buoy barnacle *Dosima fascicularis* were observed stranded along the lower shore. Transect 3 was located off Finlay's bar or Tramore beach, which was the most exposed out of the three transects. Total organic carbon was not carried out for this site, but the sediment type was found to be dominated by medium sand, following by fine sand and coarse sand. Fauna diversity ranged from 1, 0, 0 and 1 for the shoreline, upper, mid and lower shores respectively.

Table 7 details the species recorded during the 2006 Aquafact survey in Ballyness Bay, and which transect these species were recorded at (Aquafact International Services Ltd., 2006). The report states that overall, the fauna recorded from the different substrate types was typical for Irish coastal waters and substratum types. It also notes that species numbers were the lowest overall at the upper and mid shore stations for the exposed shore off Ballyness. This shore is the closest habitat type to Magheraroarty beach.

### 3.1.4 Water Quality

The coastal area near Magheraroarty and the pier is considered to be 'Not At Risk' according to the water framework directive. The Coast Water Quality for the period 2010-2012 was noted as 'Unpolluted', according to the EPA online maps. Additionally, the Coastal Waterbody WFD status for the period of 2013-2018 was noted as 'High'.

The Gortahork Wastewater Treatment Plant (Registration Number A0295-01) discharges into Ballyness Bay and provides primary treatment. The design population equivalent (p.e.) is given as 380 while the agglomeration was noted to be treating a p.e. of 424 in 2011 (Irish Water, 2011). It was noted in the Inspectors Report that a screening should be carried out for the plant to assess the potential impact of the discharge on the designated sites downstream.

The Falcarragh Wastewater Treatment Plant (Registration Number D0343-01) also discharges into Ballyness Bay. The storm water overflow is located in a stream tributary of the River Ray (Irish Water, 2015). The EPA Inspectors report notes that has a design p.e. of 1,225 and an actual p.e. of 1,722. This indicates that the plant is currently overloaded, with the treatment type listed as 'none'.



**Table 7** Summary of the fauna recorded at each transect in Ballyness Bay during the 2006 survey (adapted from Aquafact, 2006).

Taxon Name	Transect 1	Transect 2	Transect 3
<b><u>Annelida</u></b>			
<b>Polychaeta</b>			
<i>Arenicola marina</i>		✓	
<i>Hediste diversicolor</i>	✓		
<i>Nephtys cirrosa</i>			✓
<i>Nephtys sp.</i>	✓		✓
<i>Nephtys hombergii</i>	✓		
<i>Scoloplos armiger</i>	✓	✓	✓
<i>Aricidea catherinae</i>	✓		
Spionidae	✓		
<i>Malacoceros vulgaris</i>	✓		
<i>Pygospio elegans</i>	✓	✓	✓
<i>Spio sp.</i>	✓	✓	
<i>Capitella capitata</i>	✓		
<i>Capitellidea giardia</i>	✓		
<i>Manayunkia aestuarina</i>	✓		
Annelida Clitellata			
Tubificidae sp.	✓	✓	
<i>Tubificoides spp.</i>	✓		
<i>Tubificoides benedii</i>	✓		
<i>Tubificoides pseudogaster</i>		✓	
Enchytraeidae indet.	✓		
<b><u>Arthropoda</u></b>			
<b>Crustacea, Malacostraca</b>			
Crangonidae		✓	
<i>Crangon crangon</i>		✓	✓
<i>Synchelidium maculatum</i>	✓		
<i>Talitrus saltator</i>	✓		
<i>Chaetogammarus marinus</i>	✓		
<i>Megaluropus agilis</i>	✓		
<i>Corophium sp.</i>	✓		
<i>Corophium arenarium</i>	✓		
<i>Jaera albifrons</i>	✓		
<i>Carcinus maenas</i>	✓		
<i>Urothoe brevicornis</i>			✓
<i>Bathyporeia tenuipes</i>			✓
<i>Bathyporeia gracilis</i>			✓
<b><u>Mollusca</u></b>			
<b>Bivalvia</b>			
<i>Angulus tenuis</i>	✓	✓	✓
<i>Cerastoderma edule</i>		✓	
<i>Macoma balthica</i>		✓	
<i>Parvicardium minimum</i>	✓		



## 3.2 Site Survey, June 2020

The site of the proposed works at Magheraroarty Harbour determined that there was very limited biodiversity both at the dredging area by the pier and on the shore at the proposed nourishment section. Only a few species recorded along both the transect at the nourishment area and the control transect during the intertidal surveys. It was predominantly polychaete worms (lower shore) and sand hoppers (upper shore) that were found. Water quality at the pier seemed poor, with low visibility and a greyish colour observed. The substrate by the pier at low tide appeared to be grey, anoxic sand. There was seaweed left on the shore by the pier when the tide was out. The seaweed was decaying and possible enriching the area at this part of the harbour. There were no obvious signs that beach nourishment had taken place on the shore.

### 3.2.1 Transect 1

Transect 1 was located at the proposed dredging area immediately to the east of the pier. This area is backed by rock armouring and a car park to the south, and the pier to the west. There is a deep channel adjoining the pier and it was only found out after the survey that this area had been dredged immediately prior to the site visit. There was no visual evidence that dredging had taken place. However, the water in the channel was very turbid and there were exposed anoxic sediments. There was also a large amount of rotting seaweed at in this area and at the time of the visit the anoxic sediments and visibly poor water quality was attributed to this. There were no machine tracks or any evidence that dredging has already taken place so the survey was completed. The substrate was dominated by fine sand and there was extensive areas of unattached seaweeds. The site was surveyed on the outgoing spring tide. The substrate consisted of fine sand and this is the western side of Magheroarty beach. Very few invertebrates were found on the mid and upper shore areas, apart from occasional sand hoppers (*Talitrus saltator*). Sampling at the edge of the mid-shore channel (dredged area) did not yield any invertebrates. The lower shore area also had a very low diversity with a few cockles recorded along with a very occasional worm (recorded in additional searches).

### 3.2.2 Transect 2

Transect 2 was located at the proposed beach nourishment area immediately to the east of the pier. This area is backed by sand dunes. Again it was only found out after the survey that dredged material had been placed here immediately prior to the site visit. However, there was no visual evidence that this work had taken place. As with Transect 1, there were no machine tracks or any evidence that dredging has already taken place, so the survey was completed. The substrate at this transect was also dominated by fine sand. The site was surveyed on the outgoing spring tide. The substrate consisted of fine sand and this is Magheroarty beach. Almost no invertebrates were found on the mid and upper shore areas - only occasional sand hoppers. The lower shore area again had a very low diversity with a few individual invertebrates recorded only. This is not unusual for sandy beaches like this – but the fauna here was likely to have been even more impoverished due to the fact that beach nourishments works has been undertaken prior to the survey. However, again there was no visual evidence of this and during the survey we did not see any evidence of machine tracks, elevated beach areas or any other evidence that works had taken place. The main difference between this area and areas of the beach to the west of this was the absence of beach-cast seaweed debris. However, this was also considered to be a natural occurrence as the beach areas to the east of the proposed nourishment area are also clean. Water clarity at this site was poor however – and no underwater photos could be taken due to the turbidity. However, it was clear that at low tide that the subtidal substrates in this area were the same as those surveyed.



### 3.2.3 Transect 3

Transect 3 was located at the reference areas further east along Magheroarty beach. This was a similarly impoverished sandy area backed by the sand dunes. Despite this being a reference area the numbers and diversity of organisms recorded here was also very low and was similar to the other sites. Although this area could have potentially been affected by the recent beach nourishment works, there was no evidence of this and no signs of any impacts or use of machinery and movement of dredged material in the previous days. There were extensive sand ripples on the lower shore in this area and this was probably the only difference between here and transect 2. Table 8 provides a list of the macroinvertebrates recorded in the transects and there are no significant differences in the results obtained.

Overall the results obtaining show that both biodiversity and biomass were very low in the surveyed transects, and much lower than the 2006 survey. However, different areas were surveyed in 2006 and these areas (especially the Ballyness Bay area) are clearly far more important for marine invertebrates than the beach area.

**Table 8** Fauna recorded at each transect during the June 2020 survey.

Taxon Name	Transect 1 (Pier)	Transect 2 (Receptor)	Transect 3 (Reference)
<b>Annelida</b>			
<b>Polychaeta</b>			
<i>Arenicola marina</i>		*	*
<i>Nephtys sp.</i>	*		*
<i>Scoloplos armiger</i>			*
<i>Pygospio elegans</i>	*		*
<b>Arthropoda</b>			
<b>Crustacea, Malacostraca</b>			
<i>Crangon crangon</i>			*
<i>Talitrus saltator</i>	*	*	*
<i>Corophium sp.</i>	*	*	*
<i>Carcinus maenas</i>	*		
<i>Bathyporeia spp.</i>		*	*
<b>Mollusca</b>			
<b>Bivalvia</b>			
<i>Angulus tenuis</i>			*
<i>Cerastoderma edule</i>	*		*

### 3.2.4 Other observations

Multiple trails were noted across the sand dune habitat, appeared to have been worn and exposed by walkers. During the site survey vehicles were noted in the bay which seemed most likely to have gained access by traversing the dunes. Semi-commercial bait digging appeared to be taking place and vans had driven out on the beach on low tide. Livestock were present grazing the dunes. Rabbits were very abundant across the dunes also. The back strand area (Ballyness bay) was clearly much more important for marine invertebrates than the areas surveyed on Magheroarty beach. Thousands of lugworm casts were visible on the beach and significant densities of cockles were present. This area was not sampled as (1) it is not affected by the dredging / beach nourishment works, and (2) it is not a similar habitat to areas affected on Magheroarty beach.



## 4.0 DISCUSSION

### 4.1 Diversity on sandy beaches

The site of the proposed works at Magheraroarty Harbour has very limited infaunal biodiversity and biomass. Sandy shore beaches are harsh environments that can be difficult to survive in due to their transient nature with wind, water and sediment constantly in motion. They are high-energy environments with significant exposure to wind and wave action which drives sand transport. This causes loose and mobile substrate which makes it difficult for vegetation to establish itself. Species in this environment also have to endure and adapt to tides and high salinity levels.

Beaches are considered to be physically controlled environments because they lack biogenic structures and are extremely dynamic. Aquatic and semi-terrestrial sandy-beach species essentially must be adapted to adapt. These species are unable to modify their environment to their advantage; the adaptations of these species are dictated by the harsh and complex cycles of changing environmental conditions (McLachlan & Defeo, 2018). Although there are biological factors playing some role in interspecies interaction and distribution in the sandy shore environment, such as commensalism, predation, competition etc., the influence of these are limited to a small scale and don't determine the overall community structure. The physical factors are considered to override the biological factors in general. The physical environmental conditions that shape sandy beach communities can be extremely harsh and complex and overall, there is a correlation between decreased exposure of the beach with increased diversity (Little, 2000). The dynamic habitats of sandy shores means that only some species are specifically adapted to these environments and sandy beaches therefore have a restricted number of common species (McLachlan & Defeo, 2018; Little, 2000).

Sandy beach habitats can have high levels of diversity in terms of types of organisms but they tend to have low biomass (Little, 2000). Differences in adaptations can result in variation in macrofauna communities between different beaches but generally sandy shore habitats display little uniqueness or endemism (McLachlan, 1991). McLachlan (1991) also noted that coastal dunes are 'geologically young' systems due to the exposure to varying conditions and the dynamic coastal environment in general. As a result of the continuous changeability there would have been little time for the development of unique species in individual coastal dune habitats.

Studies have shown that in general a sandy beach would not typically have more than 20 or 30 macrofauna species present, and in fact would often have much less. Dominant macrofauna include crustaceans, polychaetes, and mollusks. Regarding meiofauna, nematodes and harpacticoid copepods are the most common.

The sandy shore environment is harsh and naturally does not support major biodiversity and there is very little richness and / or abundance of macrofauna present. It is noted that dredging and beach "nourishment" works took place immediately before the current intertidal survey which could potentially affect the results. However, for the other aforementioned reasons similar results would be expected should there have been no dredging.

The NPWS' intertidal survey recorded higher levels of diversity in Ballyness Bay, however the locations of the transects away from the exposed shore was likely the reason for this. Transect 3 of the NPWS survey was on exposed shore to the north-east of the proposed works area, similar to the habitat at the proposed nourishment site, and the lowest diversity of the NPWS survey was recorded at the mid and



upper sections on this transect. However, this site is also closer to where the river flows out and has many physical differences from the sites in the current survey.

It is also acknowledged that with such limited macrofauna community along the intertidal area at the proposed works site there would not be suitable food availability to support waterbirds either. During the current walkover survey far more suitable areas for marine invertebrates were recorded in the main Ballyness Bay area with very high densities of worms and casts visible along with high densities of cockles and other molluscs. This area would be potentially important for wintering birds – and is already being disturbed by people walking with loose dogs. During the current survey semi-commercial bait digging was observed with vans driving out on the intertidal area and extensive digging of lugworm taking place.

## 4.2 Beach Nourishment

Beach nourishment, also referred to as beach or sand replenishment comprises the artificial placement of sand onto eroded shore with the aim to maintain the amount of sand present in the foundation of the coast. The main function of beach nourishment is to compensate for natural erosion and protect coastal areas from storm surges. It can also serve economic purposes by maintaining wide beaches for tourism and recreational use (ERDC, 2007). Beach nourishment is also used to protect sand dunes and enhance dune defences; it can raise the beach level, protecting frontal dunes from wave impact and erosion and can promote aeolian deflation and frontal dune growth. Beach nourishment has been widely practiced in Europe since the early 1950s and is common practice in the Netherlands, Germany, Spain, France, Italy and Denmark and on a small scale in the UK (Pye *et al.*, 2007; Matias *et al.*, 2005).

The process involves dredging sand / sediment from a source and depositing it at the eroded site. The deposited material can be spread on the shore surface to be naturally distributed by wind action on the shore and dunes. Generally, the dredged material should match the sediment type of the deposition site in terms of quality, composition and grain-size etc. for it to be effective in maintaining the natural processes and biota. An example of a case in Hel Peninsula in Poland highlighted the importance of this when sand was dredged from a nearby beach and the grain size was much smaller than that of the deposition site. As a result, the sand was easily dispersed, and erosion continued even with large amounts of sediment deposited. Sand from open sea sites and nearby breakwaters proved more effective after investigation.

The characteristics of the sediment used as nourishment material for the beach and dunes can also influence aeolian transport rates, in turn influencing beach levels and dune development. Van der Wal (2000) demonstrated that aeolian transport from nourished beaches in The Netherlands was lower than that of unnourished beaches due to the nourishment material being more poorly sorted and coarser in nature compared to the native sand. This indicates the need to assess and consider the grain size and distribution characteristics of nourishment material. Mangor *et al.* (2001) suggests that the nourishment sediment should be as coarse as, or coarser than, the native sand so that it is not immediately eroded too easily.

Beach nourishment can be viewed as a productive way of re-using material that has been extracted for another purpose including port dredging to facilitate navigation. <https://climate-adapt.eea.europa.eu/metadata/adaptation-options/beach-and-shoreface-nourishment/#source>

Using the material dredged from the harbour at Magheraroarty for the nourishment of the adjacent beach may be a useful way to utilise the dredged material for maintaining the beach and coastal dune habitats if done in the appropriate way. The material should be a suitable sediment match to that of the deposition



area as it is understood to comprise mainly of the eroded material from the adjacent shore which has accumulated at the pier due to littoral drift.

Ideally coastal systems and dune habitat should be allowed to respond naturally to changes in forcing factors and sediment supply conditions. However, where beaches are affected by strong negative beach sediment budget, dune dissipation is likely to occur if nourishment with fine-grained sand and artificial dune profiling are not undertaken. The placement of the nourishment material should be carefully considered to ensure the benefits of the nourishment are achieved. According to Magnor (2001), there are three main methods of nourishment placement: backshore; beach; shoreface. Placement of the nourishment material at the backshore at the foot of the dunes is generally aimed at preventing dune erosion. Placement of the material on the main beach is typically used to supply an increased sediment budget for recreational value and maintenance. Placing the material at the outer part of a beach, generally on the seaward side of a barrier, shoreface nourishment, can help to strengthen the coastal profile and also add to the overall sediment budget (Mangor, 2001).

The method of deposition can also vary. The proposal presents two options: to transport the material along the shore with dumper trucks at low tide; or to pump the material into the intertidal zone at high tide. The first method would minimise the risk of sediment plumes in the water and has been used for the previous dredging activity at the site. However, the second would mean that there would be no machinery traversing and disturbing the sandy shore.

According to Pye *et al.* (2007) a detailed Geomorphological Evaluation Study should be undertaken at dune sites to assess the requirements and identify the most appropriate methods of the proposed dredging and nourishment and the best management strategy of the vulnerable habitat, taking nature conservation and other interests into account. It is also advised that systemic monitoring programmes should be in place to identify early warning of dune changes. The importance of beach change modelling in predicting the performance of beach nourishment projects is becoming increasingly apparent (Galofre *et al.*, 1995). Depending on the scale of projects several models may be used to analyse the various processes acting on the sediment movement of a beach due to the complexity of the coastal environment.

Dunes are dynamic habitats, the nature and extent of dune habitat depends on the balance of environmental forcing factors (wind, wave, tide, sediment supply, precipitation); and dunes are influenced by fluctuations in these factors. Human activity can also have an influence on dune habitat. Anthropogenic influences, such as the construction of structures like harbour walls, piers, jetties, pipelines etc., can impede long-shore drift and affect erosion and accretion dynamics and alter sediment supply and mobility. This interferes with the natural sediment supply to the dune system.

Pye *et al.* (2007) discusses how beach nourishment is implemented in different ways depending on the site and the specific requirements. Often, the purpose of beach nourishment being carried out is to sustain and enhance the flood defence value of frontal dunes. It can be used as a method of reducing wave attack of the frontal dune by raising the beach levels. Beach nourishment can also promote aeolian deflation and frontal dune growth. The sediment deposits for the replenishment of the beach may be placed directly in the fore-dune area in order to raise the level of low spots. Alternatively it may be deposited behind the frontal dune ridge to create a secondary line of defence. On shores that are particularly exposed to wind, nourishment material is placed on the upper beach, allowing natural aeolian processes to transport it into the dunes. Deflation is enhanced by placing the nourishment material in multiple small mounds on the mid and upper beach. This creates instability in the local wind field and causes increased turbulence to move the sand, and supply the sediment to the dunes. In





situations where little or no dune ridge is present, an entire wash over dune or low barrier dune system may be constructed by large-scale beach nourishment and re-profiling using heavy machinery.

### 4.3 Dredging and nourishment in Natura 2000 sites

Activities requiring consent (ARCs) are specific activities which have the potential to damage a Special Area of Conservation (SAC) or Special Protection Area (SPA), collectively termed 'European sites' or 'Natura 2000 sites'. The NPWS lists 38 ARCs, ranging from "Reclamation, including infilling" to "Lighting up caves, buildings or other places used by bats for roosts". The specific ARC(s) for a particular Natura 2000 site depends on the habitats and / or species for which the site is designated. ARCs are not prohibited but consent must be granted prior to the activity by the Minister for Culture, Heritage and the Gaeltacht ('the Minister') or by another relevant public authority to which the consent function for that activity falls. The requirement for prior consent ensures that the Minister (or the relevant competent authority) completes the necessary environmental assessment to determine if the activity can take place and if any conditions should be attached to any granted consent. It is an offence to carry out an ARC without prior consent.

The terms 'notifiable actions', 'notifiable activities' and 'operations requiring consent' were used before the term 'activities requiring consent' was adopted. These terms often appear on older statutory instruments or on the information included in the site pack sent to landowners of sites not yet formally designated. The terms 'notifiable actions', 'notifiable activities' and 'operations requiring consent' have the same meaning as 'ARCs'; these are all terms used for activities that require the consent of the Minister or another relevant public authority before the activity can be carried out. NPWS have listed the 'notifiable actions' associated with certain habitats and species; including those specific sand dunes and machair habitat. As stated in the Notice of Notifiable Actions for sand dunes or machair "Under STATUTORY INSTRUMENT 94 of 1997, made under the EUROPEAN COMMUNITIES ACT 1972 and in accordance with the obligations inherent in the COUNCIL DIRECTIVE 92/43/EEC of 21 May 1992 (the Habitats Directive) on the conservation of the natural habitats and species of wild fauna and flora, all persons must obtain the written consent, of the Minister for The Environment and Local Government before performing any of the operations on, or affecting, the specified habitats where they occur on lands / waters within the candidate Special Area of Conservation". The listed notifiable actions related to protected sand dune habitat is as follows:

#### SECTION A

*THE MINISTER FOR THE ENVIRONMENT AND LOCAL GOVERNMENT IS REQUIRED TO BE NOTIFIED IN RELATION TO THE FOLLOWING ACTIVITIES AND SUCH ACTIVITIES SHOULD NOT PROCEED WITHOUT PRIOR CONSENT*

- *causing erosion by any means (e.g. driving vehicles, riding horses etc.)*
- *grazing of livestock above a sustainable density (as defined in approved farm plans)*
- *grazing by livestock treated within the previous week with a pesticide which leaves persistent residues in the dung*
- *supplementary feeding of stock (e.g. with hay, silage, concentrates, roots etc.)*
- *cropping or removal of plants*
- *reclamation, infilling, ploughing or land drainage*
- *reseeding, planting of trees or any other species*
- *application of fertiliser, lime or organic materials*
- *dumping, burning or storing any materials*
- *use of any pesticide or herbicide*
- *alteration of the banks, bed or flow of watercourses*



- *operation of commercial recreation facilities (e.g. pony trekking)*
- *introduction (or re-introduction) into the wild of plants or animals of species not currently found in the area*
- *any other activity of which notice may be given by the Minister from time to time*

#### SECTION B

(NO REQUIREMENT TO NOTIFY IF ALREADY LICENSED BY ANOTHER MINISTER/BODY)

- *construction of fences or embankments*
- *removal of soil, mud, gravel, sand or minerals*
- *construction of buildings or sewerage facilities*
- *construction of roads or car parks or access routes*
- *developing leisure facilities including golf courses, sports pitches, caravan or camping facilities*

The proposed dredging and beach nourishment activity at Magheraroarty Pier would fall under Section A of the above list. It is therefore essential that the relevant assessments (NIS and Appropriate Assessment) are carried out and the appropriate consent and licence is obtained before the commencement of the proposed works.

## 4.4 Other Dune Management Considerations

The use of beach nourishment in sand dune protection is often used in combination with other methods (ERDC, 2007). For example, hard structures such as groins can be put in place to help shore and dune stabilisation. These structures can help reduce the movement of sediment along the shore and slow down local erosion. Again, it is noted however, that like nourishment material placement, these structures must be strategically placed based on an understanding of the processes of sediment movement on the particular beach, informed by the relevant surveying and modelling. Integrating hard structure with beach nourishment may be an effective method of reducing the shore erosion as efficiently as possible. If hard structures were found to be effective enough, they may even reduce / eliminate the need for dredging over time. Beach change modelling can help to predict the performance and influence such mitigation may have; but ongoing monitoring should also be practiced to account for changes in the coastal processes as the coastal environment can be unpredictable (Galofre, 1995).

Grazing, which can be considered a human activity too, is another important contributing factor the maintenance and also to the loss of sand dunes. The right balance on grazing levels is important as over-grazing leaves dunes exposed and vulnerable to erosion while under-grazing can result in scrub and bracken encroachment and loss of dune habitat also. There is a significant rabbit population of the coastal dunes at Ballyness Bay as well as the presence of grazing livestock. Rabbits are a non-native species in Ireland. Rabbits were introduced to sand dune habitat in the past and used to raise rabbits as a food source. Rabbits then became naturalised on sand dunes across the country. The influence of rabbits on dunes, however, varies greatly depending on the population density, there may be positive negative or neutral impacts from rabbit grazing. Rabbits can have positive influence on dunes where other grazing animals are absent, and the rabbit population is not excessive. Rabbit grazing of the sand dunes helped to maintain the habitat and reduced the rate of succession towards scrub. The reduction in rabbit populations due to myxomatosis and rabbit haemorrhagic disease resulted in vigorous grass growth and scrub development on dunes in Ireland (Provoost et al., 2011). On the other hand, if rabbit populations are uncontrolled overgrazing and burrowing can be problematic and cause damage to sand dune structures. Hunting of rabbits in such cases can be used, and has had positive results, as a management strategy to prevent overgrazing and excessive rabbit-damage to dunes (Delaney *et al.*, 2013). Similarly, livestock grazing can be beneficial to dune habitat however it is essential to establish the appropriate overall level of grazing as localised over-grazing can be detrimental, affecting the dunes



structure and vulnerability as well as impacting natural the vegetation structure (Howe, Wales Coastal Ecosystem Group Priority Action). There are significant numbers of rabbits at the Ballyness Bay site.

Other human activities impacting sand dune ecology and geomorphology in the past and currently are crop growing, military use, recreation and coastal defence. Recreational use of the sand dunes in Ballyness Bay was apparent in the current survey with multiple walking trails worn across the dunes. Driving of vehicles on the sand dunes may also be impacting the dunes in the designated site. According to a 2013 monitoring survey of sand dunes in Ireland (Delaney *et al.*, 2013), the most frequent reason for deterioration of sand dune habitat was continued loss of habitat due to anthropogenic activities. This highlights the need for control and management of such activities at Ballyness Bay.



## 5.0 CONCLUSIONS

There was very little species present on the sandy shore areas surveyed with low species richness and abundance at both the transect at the proposed nourishment area and the reference transect surveyed just north of it. The areas surveyed will probably provided limited feeding opportunities suitable for wading birds associated with the SPA due to the fact that there is limited food availability on the beach with the limited sandy shore macrofauna community. There is more suitable habitat on the landward side of the dunes at Magheraroarty harbour which provides better feeding opportunities for wintering birds.

It is considered that the proposed dredging and beach nourishment works would not be directly impacting wildlife significantly if relevant mitigation measures were in place for the project as the site. It is noted however, that the proposed works would be affecting the overall coastal processes and the associated habitat. Therefore, the protection and maintenance of the coastal habitats, in particular the sand dune habitat, and the Natura sites which are of importance to wildlife near the proposed works is essential. The proposed beach nourishment should be done in a way that most effectively provides protection and maintains a sediment replenishment source for the dunes. At the time of the survey dredging and nourishment had recently taken place (not known at the time of the survey) but there was no evidence of the nourishment on the shore, it may have been rapidly flattened by the spring tides. This raised the question of whether the proposed nourishment would raise the beach level enough to successfully serve the function of protecting the dunes. Other surveying and beach change modelling may be necessary to determine this.

In order to ensure the most effective and valuable method of carrying out the beach nourishment is applied there must be cognisance of the characteristics of the beach such as beach shape, the type of native sand, berm height and width, dune height and off-shore slope etc.; and the behaviour of the system in terms of erosion and accretion patterns, and sediment dispersal processes, including the volume, rates causes sediment movement etc. (ERDC, 2007). Detailed and targeted surveys and modelling of such features and processes would inform the engineering of the project to ensure that it is carried out with minimal adverse impacts, particularly on the water quality and the natural flow and sediment movement, and maximum beneficial effects in terms of protecting and stabilising the dune habitat.

Also, the beach nourishment activity should be integrated into a larger scale plan for the management of the dunes at Ballyness Bay. Incorporating some hard structure erosion mitigation such as groins could have positive impacts and help to reduce the littoral drift and erosion along the shore. It is also acknowledged that another major threat to the dunes at Ballyness Bay is impacts from anthropogenic recreational activity. Walking trails traverse the dunes along multiple paths in all directions. There is no designated walking route over the dunes. Fencing and marking out a designated walking route over the dunes would help to confine and contain the activity thereby limiting or controlling the impacts on the dunes. Vehicles driving over the dunes is more damaging and likely causing destabilising and erosion impacts. This activity should also be curtailed. Grazing by livestock (and rabbits) should be maintained but in a controlled manner, with careful management and rotation to maintain the dune grassland while preventing over-grazing or damage due to over-use and trampling from the livestock.



## **5.0 RECOMMENDATIONS**

### **5.1 Appropriate Assessment**

It has been determined from the Screening for Appropriate Assessment that the proposed project at Magheraroarty Harbour requires an Appropriate Assessment (Greentrack Environmental Consultants, 2019). It is therefore noted that the required NIS must be complete before any more of the proposed dredging and beach nourishment works are carried out. If the proposed works were to commence prior to the completion of the NIS and / or without the relevant Foreshore Licence being obtained this practice would be an offence under the European Communities (Birds and Natural Habitats) (Amendment) Regulations (2015).

### **5.2 Mitigation during dredging**

It is important that strict water quality protection measures are in place for the duration of the dredging and nourishment works. Silt curtains should be used around dredging and nourishment areas to prevent additional aggravated sediment becoming suspended in the water of the harbour.

It is advised that works should not take place during the winter period as there is potential to impact on the wintering bird populations in the general area.

### **5.3 Investigate Sediment Processes and Specific Requirement**

It is recommended that further surveys should be carried out on the coastal processes and the characteristics of the harbour at Magheraroarty. These can help in understanding the movement of sediment, predict affects and determine the most beneficial approach.

A detailed Geomorphological Evaluation Study should be undertaken to assess the requirements and identify the most appropriate management strategy for the beach and the dunes. Scientific evidence should be gathered to inform and support the methods of the dredging and nourishment activity, including to determine whether the nourishment material should be transported via machinery on the shore or pumped from a barge, and increase the probability of success. Beach change modelling should be used based on the information obtained to predict the performance of the beach nourishment project.

### **5.4 Additional Mitigation**

It is strongly recommended that a long-term integrated management plan is put into place at Ballyness Bay to protect the sand dunes habitat in particular. Beach nourishment would be a part of the overall management strategy, but additional measures should be incorporated. It is recommended that walking on the dunes should be restricted to a designated marked and fenced route. This will help to ensure greater area of the sand dunes habitat may be left undisturbed by human activity. Also measures should be taken to prevent access onto the dunes by vehicles; erecting of barriers is a straight forward measure that can deal with this issue.

Rabbits and livestock grazing maintain dune grassland and prevent scrub encroachment. However, excessive over-grazing can cause major damage to dune habitat also. The grazing of the dunes should be carefully monitored. Livestock grazing should be limited and managed appropriately to prevent over-grazing. If the rabbit population becomes excessive and problematic culling may be required to prevent significant damage and over-grazing.



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## PLATES



**Plate 1** The marine intertidal survey was completed during low water of spring tides on the 8<sup>th</sup> and 9<sup>th</sup> June 2020.



**Plate 2** The subject pier area was dredged prior to the visit. This was not known at the time of the visit and there was no visual evidence that dredging had taken place.



**Plate 3** The subject pier (alternative view).



**Plate 4** The subject pier. Water quality / visibility was poor and there was a large accumulation of rotting seaweeds. Sediments were anoxic.



**Plate 5** beach area to the east of the pier looking towards the pier.



**Plate 6** Some localised mixed substrate on the beach (not affected by the dredging) has higher biodiversity than the subject transect areas.



**Plate 7** Other example of a localised mixed substrate area on the beach (not affected by the dredging).



**Plate 8** Looking east to the 'beach nourishment area'. Sand and dead seaweed and very impoverished fauna.



**Plate 9** The 'beach nourishment area'. It is understood that sand had been placed here immediately prior to the survey. But most areas of the beach had a very impoverished fauna.



**Plate 10** The 'beach nourishment area' looking east to the reference survey area.



**Plate 11** Reference survey area at low tide on the 8<sup>th</sup> June 2020. This area was not disturbed but also had a very impoverished faunal community.



**Plate 12** Upper shore near the reference survey area, with sand dunes visible in the background,



**Plate 13** The Ballyness Bay area (back shore area behind Magheraroarty beach).



**Plate 14** The Ballyness Bay area – vans had driven out on the shore during low tide with several people engaged in bait digging.



**Plate 15** The Ballyness Bay area – this area is significantly more important for marine intertidal fauna than the Magheraroarty beach area. Very high densities of *Arenicola marina* were present.