Galway Harbour Company

Galway Harbour Extension

Volume 1C

Natura Impact Statement

DOCUMENT AMENDMENT RECORD

Client:	**Galway Harbour Company**
Project:	**Galway Harbour Extension**
Title:	**Volume 1C – Natura Impact Statement**

PROJECT NUMBER: 2139				**DOCUMENT REF: 2139 NIS 02.01.14**			
A	Final – Issued for Planning	BR/JO'M	02.12.13	LEW	12.12.13	JPK	19.12.13
Revision	**Description & Rationale**	**Originated**	**Date**	**Checked**	**Date**	**Authorised**	**Date**
TOBIN Consulting Engineers							

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1.1. GENERAL INTRODUCTION

Galway Harbour Company has for some years, been developing proposals for an extension to the harbour to address severe constraints to its operations within the existing harbour arising from:

- severely restricted access,
- tidal and gated inner harbour,
- uneconomic vessel size capacity,
- channel too shallow,
- port draught and dimensions too limiting,
- inadequate quay length and limited berthage.

The proposed harbour extension will address all of the above constraints and provide improved infrastructure to consolidate existing business, develop new business and services, provide for the international cruise liner business and facilitate the economic growth of the region.

Over the periods 2007-2013, Galway Harbour Company has been in consultation with An Bord Pleanála under section 37B of the Planning and Development Act, 2000, as amended, on the proposals for the harbour extension. An Bord Pleanála determined on the 2nd October 2013 (issued on the 7th October 2013) that the proposed development would be strategic infrastructure within the meaning of section 37A of the Planning and Development Act, 2000, as amended and that any application for permission for the proposed development must be made directly to An Bord Pleanála under section 37E of the Act.

The proposed development on lands to be reclaimed from foreshore and the sea is mainly in an area designated as candidate Special Area of Conservation (cSAC), Special Protection Area (SPA) and proposed Natural Heritage Area (pNHA) by the National Parks and Wildlife Service (NPWS) to the south of the existing Galway Harbour Enterprise Park. It will permit the relocation of the existing harbour related activities and businesses to new quays, jetties, yards and deepwater berths. A 10 year permission is sought.

Proposed Development

The overall development area comprises:

- Harbour extension on *ca*. 27 ha of reclaimed land, breakwaters and revetments.
- Dredging over an area of *ca*. 46.5 ha for approach channels, turning areas and berthage.
- Upgrading of roads and services and provision of a rail link within Galway Harbour Enterprise Park.
- Upgrading of road and services on Lough Atalia Road and improvements at Lough Atalia Road Bridge.

The development includes:-

- 660 metres of commercial quays
- Yardage and storage areas
- Facilities for cruise liner passengers
- Port-related buildings
- Helicopter pad
- Fishing pier and yard

- Nautical centre boat yard
- 216 berth marina
- Wave protection walls
- Twin rail track to connect to Galway/Dublin rail line
- Oil and bitumen transfer pipelines
- Landscaping, amenity areas and public promenades.

A fuller description of the proposed development along with construction method details are presented in Section 2.1.

This Natura Impact Statement [NIS] forms part of the suite of documents supporting the proposal.

The planning application for the Galway Harbour Extension is being made directly to An Bord Pleanála, in accordance with the provisions of Section 37 of the Planning and Development Acts 2000-2010. In this regard, the proposed development represents "Strategic Infrastructure Development" (SID) as defined in Schedule 7 of the Planning and Development Acts 2000-2010, which includes the following type of development within the definition of SID:

> *"A harbour or port installation (which may include facilities in the form of loading or unloading areas, vehicle queuing and parking areas, ship repair areas, areas for berthing or dry docking of ships, areas for the weighing, handling or transport of goods or the movement or trans-port of passengers (including customs or passport control facilities), associated administrative offices or other similar facilities directly related to and forming an integral part of the installation)*
> *(a) where the area or additional area of water enclosed would be 20 hectares or more, or*
> *(b) which would involve the reclamation of 5 hectares or more of land,*
> *(c) or which would involve the construction of one or more quays which or each of which would exceed 100 metres in length, or*
> *(d) which would enable a vessel of over 1350 tonnes to enter within it."*

In addition to meeting the above definition, An Bord Pleanála is satisfied that the proposed Galway Harbour Extension is of "strategic economic importance to the State and West Region". The Board ultimately determined that the proposed development is SID and that the application must therefore be made directly to An Bord Pleanála. This was confirmed by An Bord Pleanála in its determination dated 2nd October 2013.

In making a decision on an SID project under Section 37 of the Planning and Development Acts 2000-2010, An Bord Pleanála may consider any relevant information available and any other relevant matters. In this regard, the main considerations include the following:

- The Environmental Impact Statement (EIS)
- Natura Impact Statement
- Submissions or observations made
- Any reports that the Board requests
- The Oral Hearing report (if any)
- Provisions of the Development Plan
- Provisions of the Regional Planning Guidelines
- Matters in relation to any European Site (Natura 2000)
- National policies and objectives
- The National Interest

1.2. BACKGROUND TO APPROPRIATE ASSESSMENT

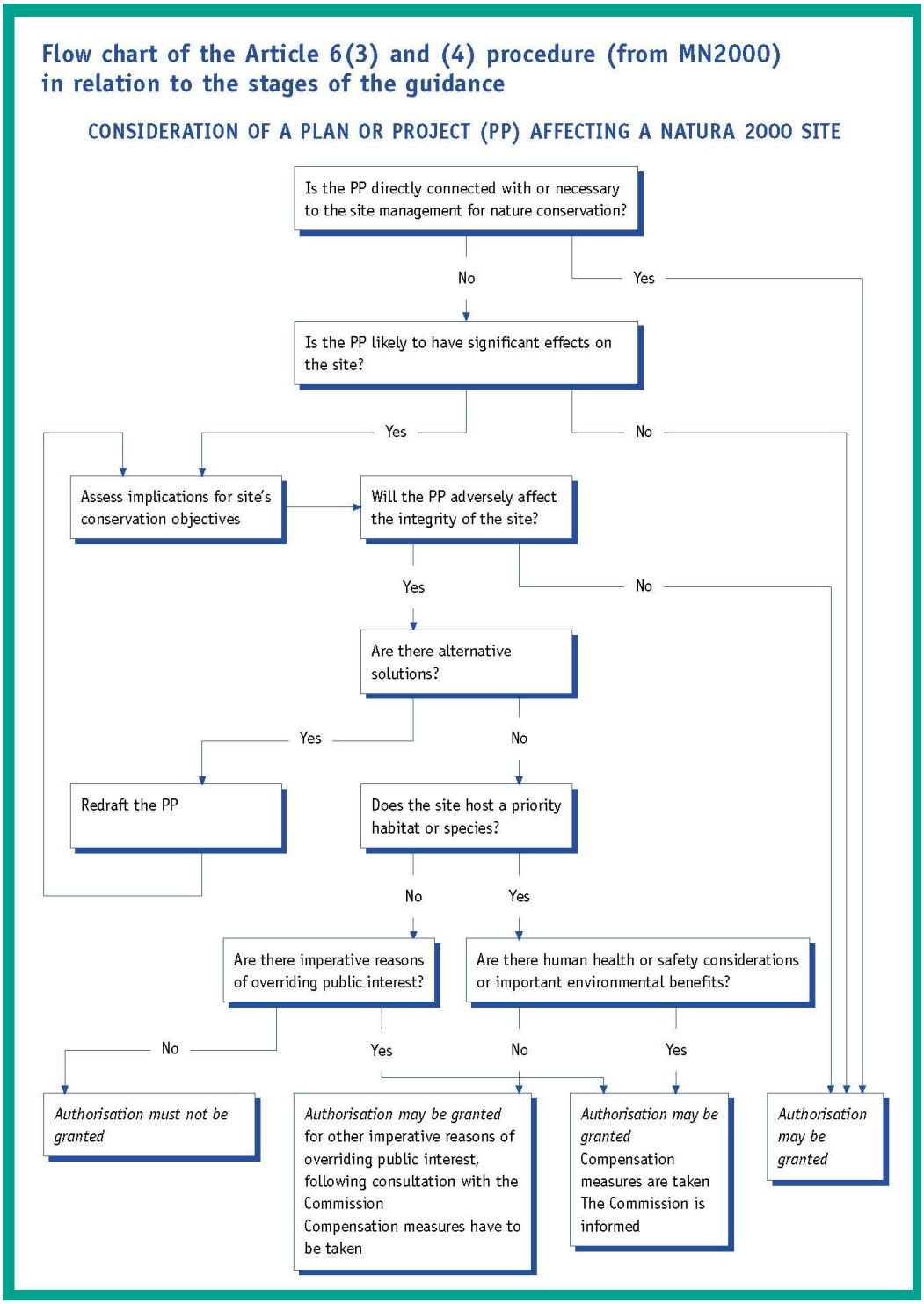
1.2.1. Regulatory Context

The Appropriate Assessment process arises out of the EU Habitats Directive and Birds Directive which were transposed into Irish legislation by the Planning and Development Act, 2000 as amended by the Planning and Development (Amendment) Act, 2010 and the Wildlife Acts of 1976 and 2000 as well as the European Communities (Natural Habitats) Regulations, 1997, 1998 and 2005 and the European Communities (Birds and Natural Habitats) Regulations 2011.

The EU Habitats Directive requires an 'Appropriate Assessment' (AA) to be carried out where a plan or project is likely to have a significant impact on a Natura 2000 site. Natura 2000 sites include Special Areas of Conservation (SAC) and Special Protection Areas (SPA). Appropriate Assessment is referred to in Articles 6(3) and 6(4) of the EU Habitats Directive.

> *6(3) Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.*
>
> *6(4) If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.*
>
> *Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest*

The EU Commission flowchart outlining the manner in which Appropriate Assessment should be considered is provided on the following page.



This NIS has been prepared in accordance with the following guidance documents:

- Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (DEHLG 2009, Revised February 2010)
- EU Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC (EC, 2007);
- 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 (EC, 2002); and
- Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (EC, 2000).

Should a decision be reached to the effect that it cannot be said with sufficient certainty that the proposed activity will not have any significant effect on the Natura 2000 sites, then, as is stated above, it is necessary and appropriate to carry out an appropriate assessment of the implications of the activity for the sites in view of their conservation objectives.

The guidance for Appropriate Assessment (DEHLG, 2009, revised February 2010) states:

"AA is an impact assessment process that fits within the decision-making framework and tests of Articles 6(3) and 6(4) and, for the purposes of this guidance, it comprises two main elements. Firstly a ***Natura Impact Statement – i.e. a statement of the likely and possible impacts of the plan or project on a Natura 2000 site (abbreviated in the following guidance to "NIS")*** *must be prepared. This comprises a comprehensive ecological impact assessment of a plan or project; it examines the direct and indirect impacts that the plan or project might have on its own or in combination with other plans and projects, on one or more Natura 2000 sites in view of the sites' conservation objectives. Secondly, the competent authority carries out the AA, based on the NIS and any other information it may consider necessary. The AA process encompasses all of the processes covered by Article 6(3) of the Habitats Directive, i.e. the screening process, the NIS, the AA by the competent authority, and the record of decisions made by the competent authority at each stage of the process, up to the point at which Article 6(4) may come into play following a determination that a plan or project may adversely affect the integrity of a Natura 2000 site".*

It is the responsibility of the competent authorities, in this instance An Bórd Pleanála, to make a decision as to whether or not the proposed development (alone and in combination) should be permitted, taking into consideration any potential impact upon the Natura 2000 sites in question

1.2.2. Appropriate Assessment (AA) Process

It is stated within the EU guidelines that "where, without any detailed assessment at the screening stage, it can be assumed (because of the size or scale of the project or the characteristics of the Natura 2000 site) that significant effects are likely, it will be sufficient to move directly to the appropriate assessment (Stage Two) rather than complete the screening assessments explained below."

The Commission's methodological guidance (EC, 2002) promotes a four-stage process to complete the AA, and outlines the issues and tests at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required.

The four stages are summarised diagrammatically in Figure 1.1 below.

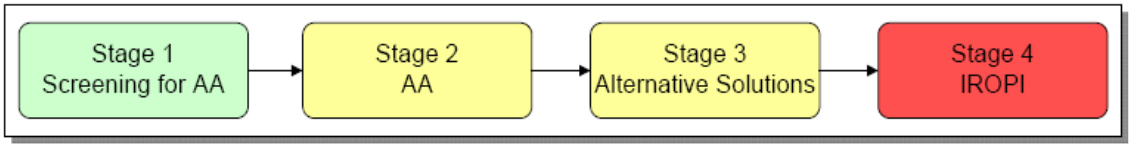


Figure 1.1 - Stages in the AA process (Source: DEHLG, 2009).

1.2.2.1. Stage 1. Screening for Appropriate Assessment

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

i. whether a plan or project is directly connected to or necessary for the management of 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 is needed in circumstances where the process ends at the screening stage on grounds of no impact.

1.2.2.2. Stage 2. Appropriate Assessment

This stage considers whether the plan or project, alone or in combination with other projects or plans, will have an adverse effect on the integrity of a Natura 2000 site, and includes any mitigation measures necessary to avoid, reduce or offset negative effects. The proponent of the plan or project will be required to submit a **Natura Impact Statement**, i.e. the report of a targeted professional scientific examination of the plan or project and the relevant Natura 2000 sites, to identify and characterise any possible implications for the site in view of the site's conservation objectives, taking account of in combination effects. This should provide information to enable the competent authority to carry out the appropriate assessment. If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must proceed to Stage 4, or the plan or project should be abandoned. The AA is carried out by the competent authority, and is supported by the NIS.

1.2.2.3. Stage 3. Alternative Solutions

If Stage 2 demonstrates that the project would have adverse effects on the integrity of a Natura 2000 site, Stage 3 must examine any alternative solutions or options that could enable the plan or project to proceed without adverse effects 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, it is necessary to progress to Stage 4.

1.2.2.4. Stage 4. Imperative Reasons of Overriding Public Interest (IROPI)/Derogation

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.

The extra protection measures for Annex I priority habitats come into effect when making the IROPI case[1]. 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 for the Arts, Heritage and the Gaeltacht.

1.3. BACKGROUND TO THE PROPOSED DEVELOPMENT

1.3.1. Historical Background

The original medieval port of Galway was located in the River Corrib adjacent to the present-day Spanish Arch as shown [1] in Figure 1.2 below. Also shown are the Claddagh Quays [2], Mud Dock [3] (which exists to present day) and a natural lagoon [4] to the east.

In the 1800s, the port was moved south east into the natural lagoon east of Long Walk and South of the city.

[1] IROPI reasons that may be raised for sites hosting priority habitats are those relating to human health, public safety or beneficial consequences of primary importance to the environment. In the case of other IROPI, the opinion of the Commission is necessary and should be included in the AA

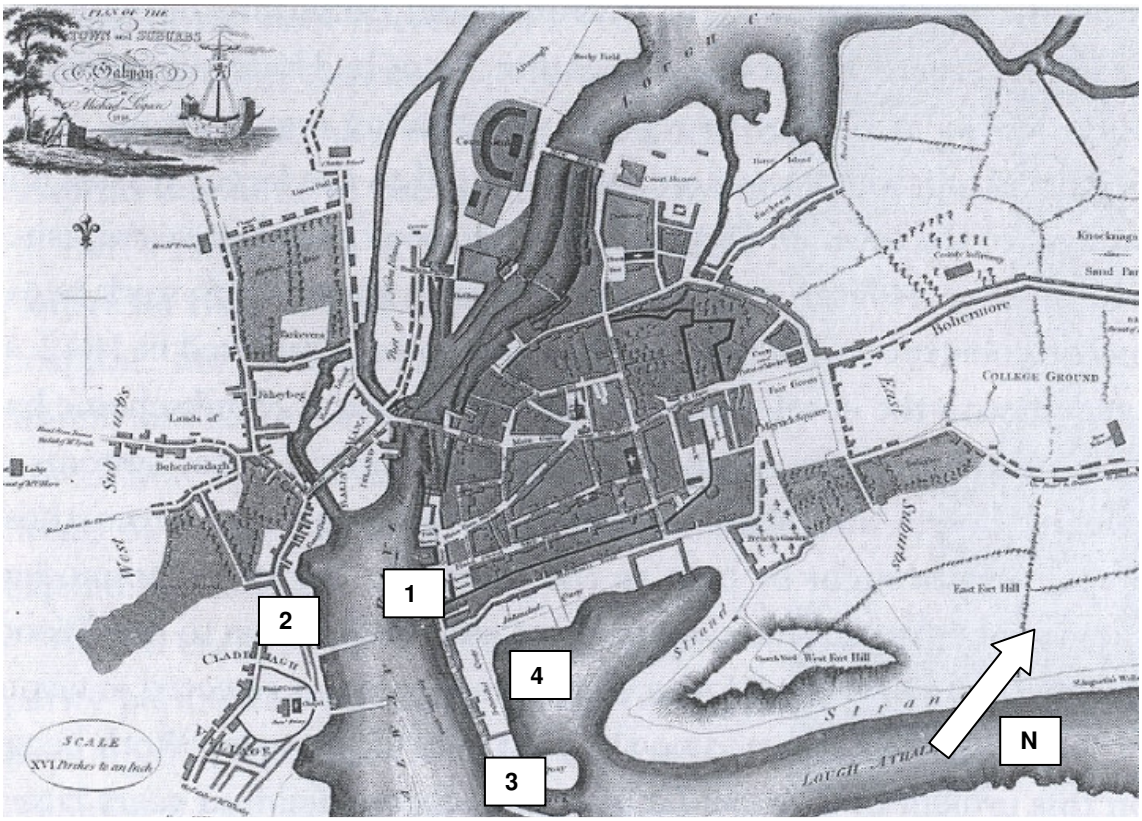


Figure 1.2 Map of Galway from the 1820s

Under the Harbours Act of 1835, a new commercial harbour largely to the current configuration was developed in the natural lagoon mentioned earlier which is shown [1] on the extract of a 1945 OS map of Galway Harbour in Figure 1.3. Also to be noted is the railway line and rail bridge over Lough Atalia [2] and the Port Sanitary Intercepting Hospital [3] at Rinmore Point to the east. Further development was undertaken in 1964 involving deepening of the enclosed dock area, relocation of the dock gates and provision of extra quay area.

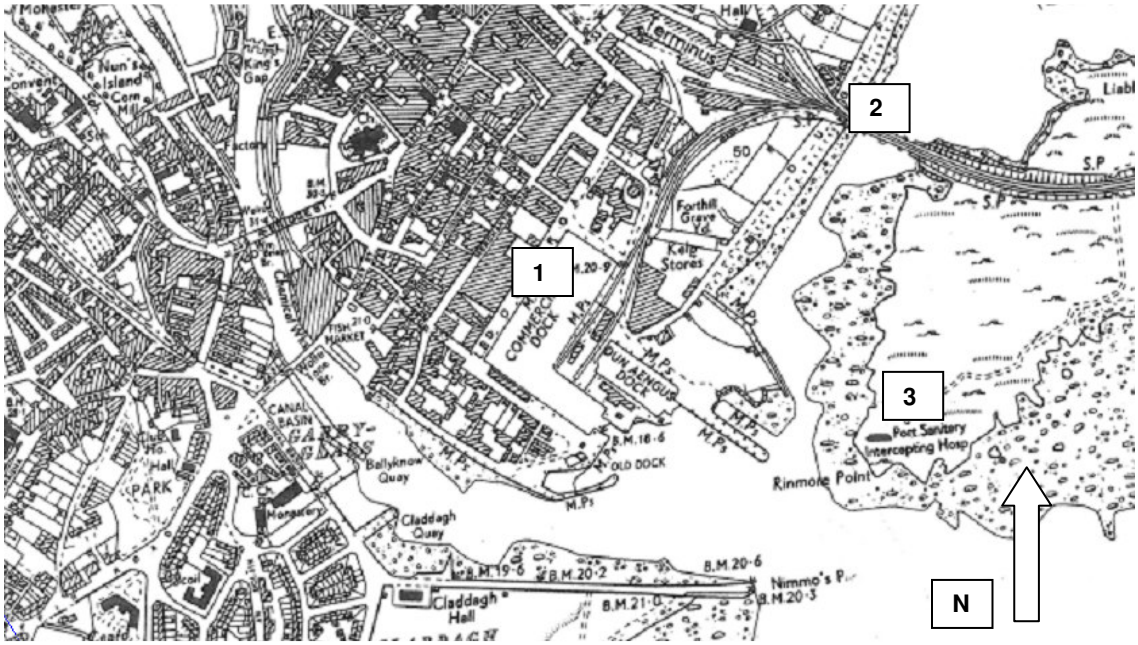


Figure 1.3 - OS Map showing Galway harbour in 1945.

In 1995, planning permission was granted to develop the Galway Harbour Enterprise Park (GHEP) [3] on the lands formerly occupied by the Port Sanitary Intercepting Hospital located to the east of the existing commercial harbour.

Figure 1.4 below is an aerial photo taken in 2011 which shows the GHEP and within it the existing oil and bitumen storage terminals which currently are significant components of Galway Harbour Company's business.

Figure 1.4 - Galway Harbour and the GHEP lands as per aerial photo 2011.

The historical shift of harbour business has been to the south east from locations [1] to [2] to [3]. The present Galway Harbour extension proposal is to go further to the south east to location [4].

1.3.2. Need for the Project

Galway City is the largest city, in the West of Ireland. The city is located in County Galway, which is the largest county in the province of Connacht, which is made up of the counties shown in blue in Figure 1.5. Galway is located to the south centre of the province and the centre of the wider west region which branches into the neighbouring provinces. Galway City was established where the River Corrib meets Inner Galway Bay and was a settlement with a natural sheltered harbour since historical times.

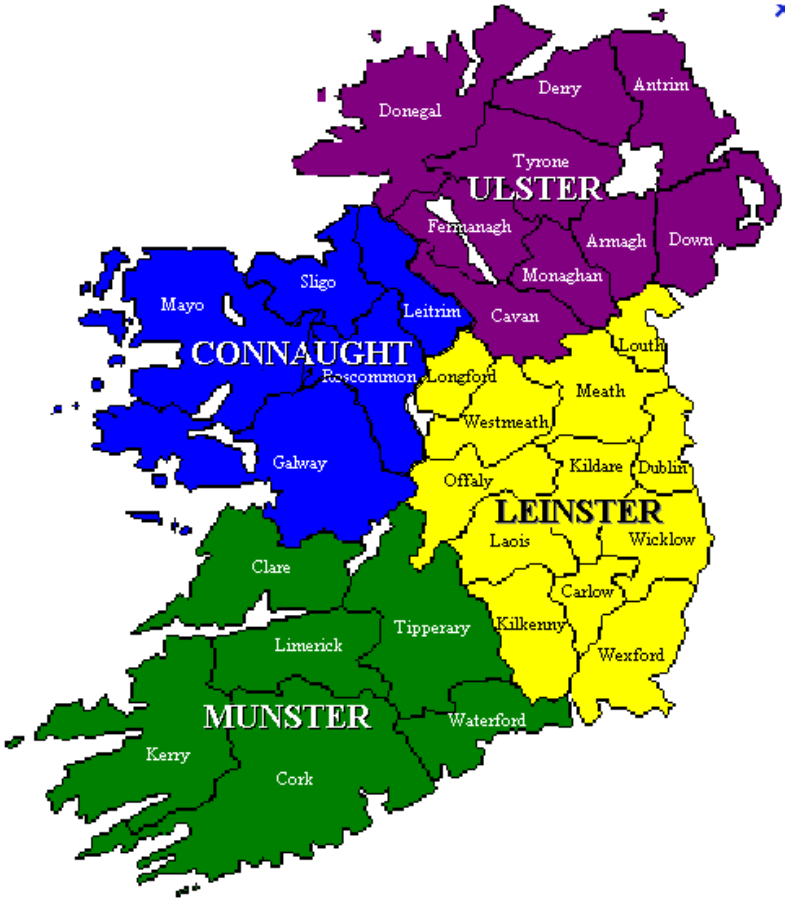


Figure 1.5 - Map of Ireland.

The harbour has continued to have direct links to the growth of the city throughout the ages and is currently located on the southern edge of the inner city and in the eastern section of Galway Bay, thus being in an ideal sheltered, safe location, for a harbour inland from the extremities of the west coast and for distribution to the city and environs, county, province and the wider west region.

Figure 1.6 presents the location of Galway Harbour and its associated hinterland.

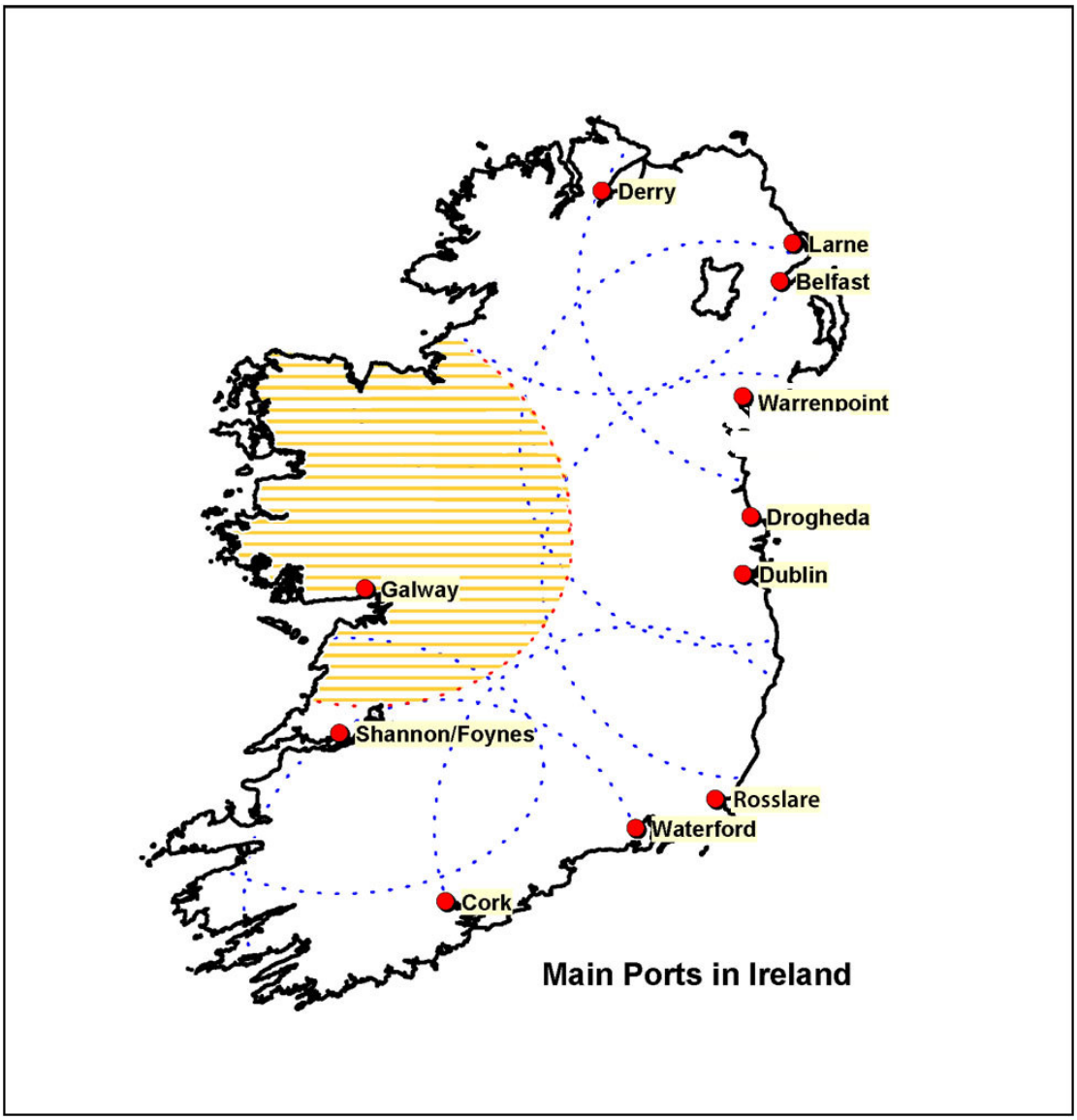


Figure 1.6 - Galway Harbour and its hinterland.

Figure 1.7 on the following page which is an extract from Map 10: West Region of the National Spatial Strategy shows Galway harbour's context in terms of the region. It shows Galway as a Gateway City which is important in terms of regional development and it also notes Galway as a Transit Port. The main transport corridors are all shown. Galway has direct links with the east of the country via the M6 motorway which comes to the east of the city, to the north of the region via the N17 to Sligo, to the south via the N18 towards Limerick. There are other National primary routes to serve west of the county and the remainder of the Region as National Transport Corridors.

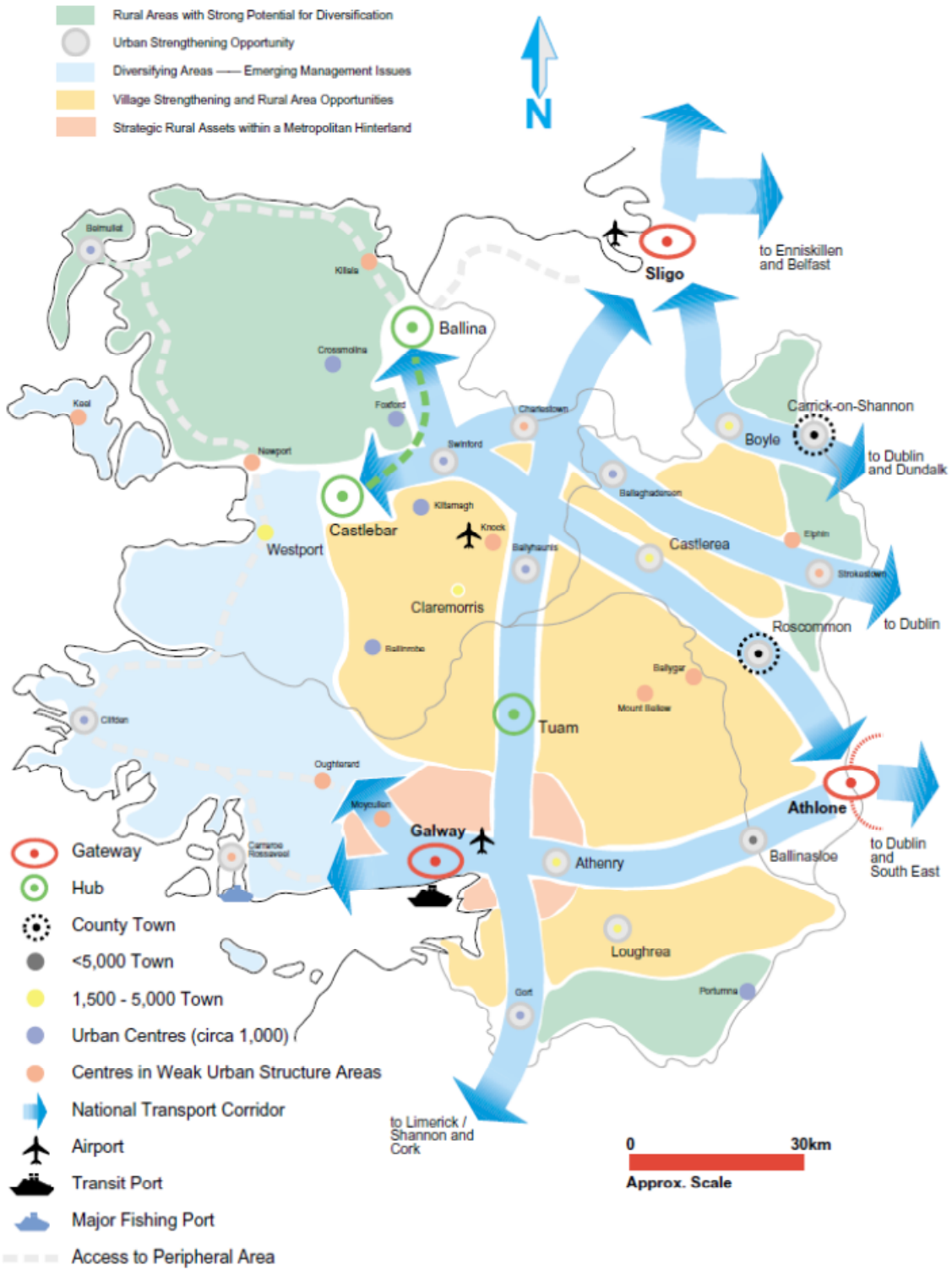


Figure 1.7 - Galway and surrounding region.

At present the existing Galway docks are restricted by several factors.

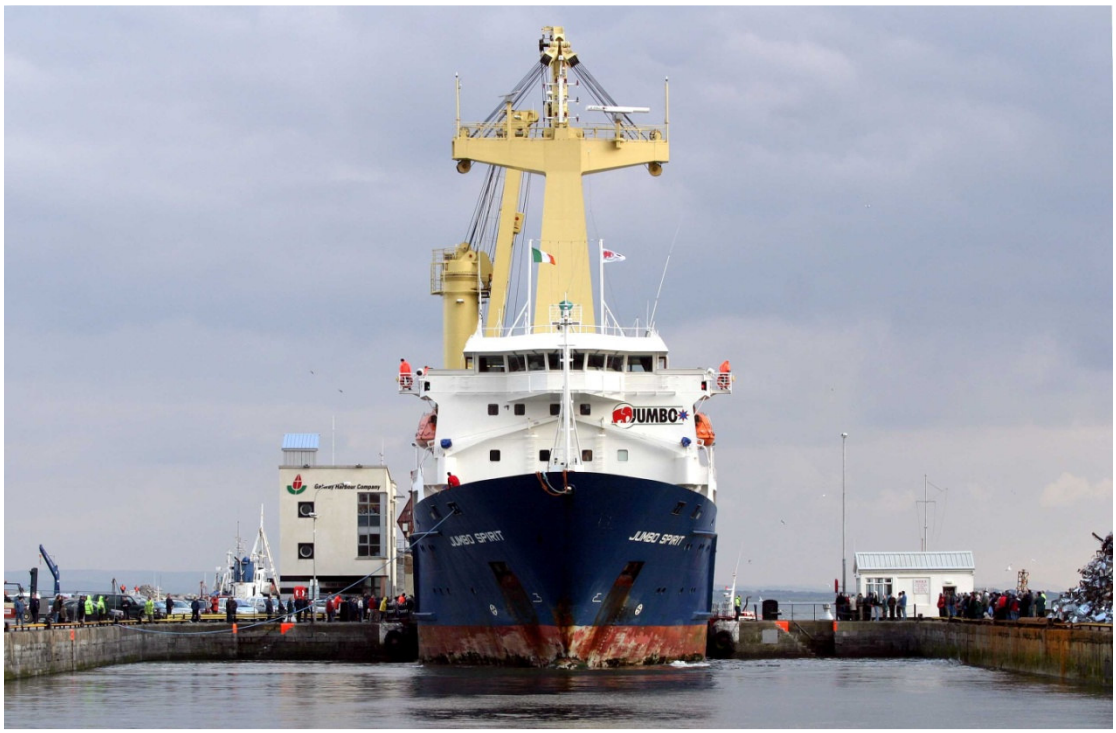


Figure 1.8 - Width restriction on large ships entering Galway Harbour.

The dock gates are 18.9 m wide and the dredged channel leading up to the dock gate is only 3.4 m below Chart Datum. Both these factors limit the size of vessel which can use the dock, to approximately 5,000 t. Figure 1.8 shows the 18.6m wide, 5,000 tonne heavy load carrier 'Jumbo Spirit' vessel with just centimetres to spare entering Galway Harbour. This highlights the current width restriction.

The dock facility is **tide dependant**, *i.e.* the gates can only be opened approaching high tide which leaves a two-hour window twice daily where ships can enter and leave the dock.

Figure 1.9 - A ship entering Galway Harbour at High Tide.

The **approach channel** is -3.4m CD so even on a high tide, there is limited draft available in the harbour. The photograph in Figure 1.9 shows a ship entering the docks on high tide.

There is **limited berthage** for larger vessels in the inner docks due to its enclosed nature.

Navigation into the docks is quite difficult due to the outflow of the River Corrib shown with a white arrow in Figure 1.9, requiring expert pilotage and navigation. The River Corrib outlet can be seen on the above figure just below Nimmo's Pier on the right hand side of the photograph.

Currently there is very **little serviced land** available for harbour related industry, storage and facilities, as the adjacent lands are zoned for city rather than harbour development and the vacant lands at the G.H.E.P. are largely required for relocation of existing harbour clients and business, access and a future rail link.

The delivery, discharge and storage of **oil** within the city centre requires relocation seawards on public health and safety grounds.

The above restrictions have led the Galway Harbour Company to propose the new harbour extension detailed herein.

In summary, the existing harbour is constrained by:

- Narrow gate width into enclosed harbour area
- Access limited due to tidal draught
- Shallow draught of approach channel and inner dock area
- Restricted berthage area
- Difficult navigation at entry point
- Limited back up land availability
- Handling oil in a city centre location

1.3.3. Site Description, Alternatives and Proposed Harbour Layout

Figure 1.10 - Proposed development site showing existing landmark features.

1	Existing Gated Harbour
2	Long Walk
3	GHEP Road Bridge
4	Claddagh Quays
5	South Park
6	Mouth of River Corrib
7	Existing Harbour Channel
8	Mutton Island

Lough Atalia*	**9**
Railway Bridge	**10**
Lough Atalia Channel	**11**
Ballyloughan Beach	**12**
Renmore Lough*	**13**
Renmore Beach	**14**
GHEP New Oil Tanks	**15**
Hare Island	**16**

* Lough Atalia and Renmore Lough are defined as “lagoon” by NPWS and as such, fall under the category of a “priority habitat” under the EU Habitats Directive.

Galway Harbour is located on the northern shore of Galway Bay and immediately adjacent to and in the southern part of the inner city. The existing harbour includes the enclosed gated docks and surrounding inner harbour lands which are effectively city centre lands and the lands at Galway Harbour Enterprise Park (GHEP). The existing gated docks are shown just north of the mouth of the River Corrib in the aerial photograph in Figure 1.10. The GHEP is in the centre of the photograph with the new oil tanks clearly visible just right of centre in this site. It is proposed to develop an all tide, larger vessel harbour by reclamation of lands in a seaward direction out from the existing GHEP lands and facilities, *i.e.* out into the sea in the southern part of this Figure 1.10. The new quays will be formed at the outer end where deeper water exists naturally.

Galway Bay is bounded by County Galway to the north and by County Clare to the south. At its widest, it measures *ca* 60 km and extends westwards over *ca* 70 km. In the inner part of the bay

in the vicinity of the proposed harbour extension, water depths do not exceed 10m. The River Corrib flows in to the sea through Galway City and plays a prominent role in regulating salinities. The Corrib is historically known for Atlantic salmon which use it to access spawning beds upstream of Lough Corrib. The maximum tidal range is *ca* 6m. When the tide is low, extensive areas of intertidal habitat are exposed. These include mud and sand flats and exposed rocks. The mud and sand flats provide good feeding habitats for wetland birds such as gulls, waders, ducks and geese and small islands *e.g.* Rabbitt and Hare act as roosting sites for these same species. Habitats below low water include extensive areas of muddy sands and some rocky areas. As noted above, Lough Atalia and Renmore Lough are classified as lagoons. Terrestrial habitats include salt marsh, stony banks and managed grasslands.

The immediate site of the proposed development is located adjacent to the existing Galway Harbour Enterprise Park [GHEP] in the townland of Renmore, Galway. The proposed development is shown on the photograph in Figure 1.11 which shows the development in the context of the existing Harbour, Galway City and Inner Bay.

Figure 1.11 - Proposed development in context of existing harbour.

The proposed development has been superimposed onto aerial photography in Figures 1.11 and 1.12. This shows the aerial plan of the development in the wider context of the city and environs. The new harbour extension is shown sheltered between the adjacent islands with Mutton Island to the west and Hare Island to the east.

Figure 1.12 shows the layout of the development with all of the proposed facilities quays, yards, marina *etc*.

Figure 1.12 - Aerial view of plan of proposed development.

Figure 1.13 on the following page shows the existing and proposed development in the wider context of Inner Galway Bay and it is further shown that the site is located within the Galway Bay Complex cSAC (site code:000268) (see Figure 1.14 & 1.15) and Inner Galway Bay SPA (site code 004031) (see Figure 1.16 & 1.17). The Qualifying Interests (QI) of the cSAC and the Special Conservation Interests of the SPA can be seen on pages 22 and 25 respectively.

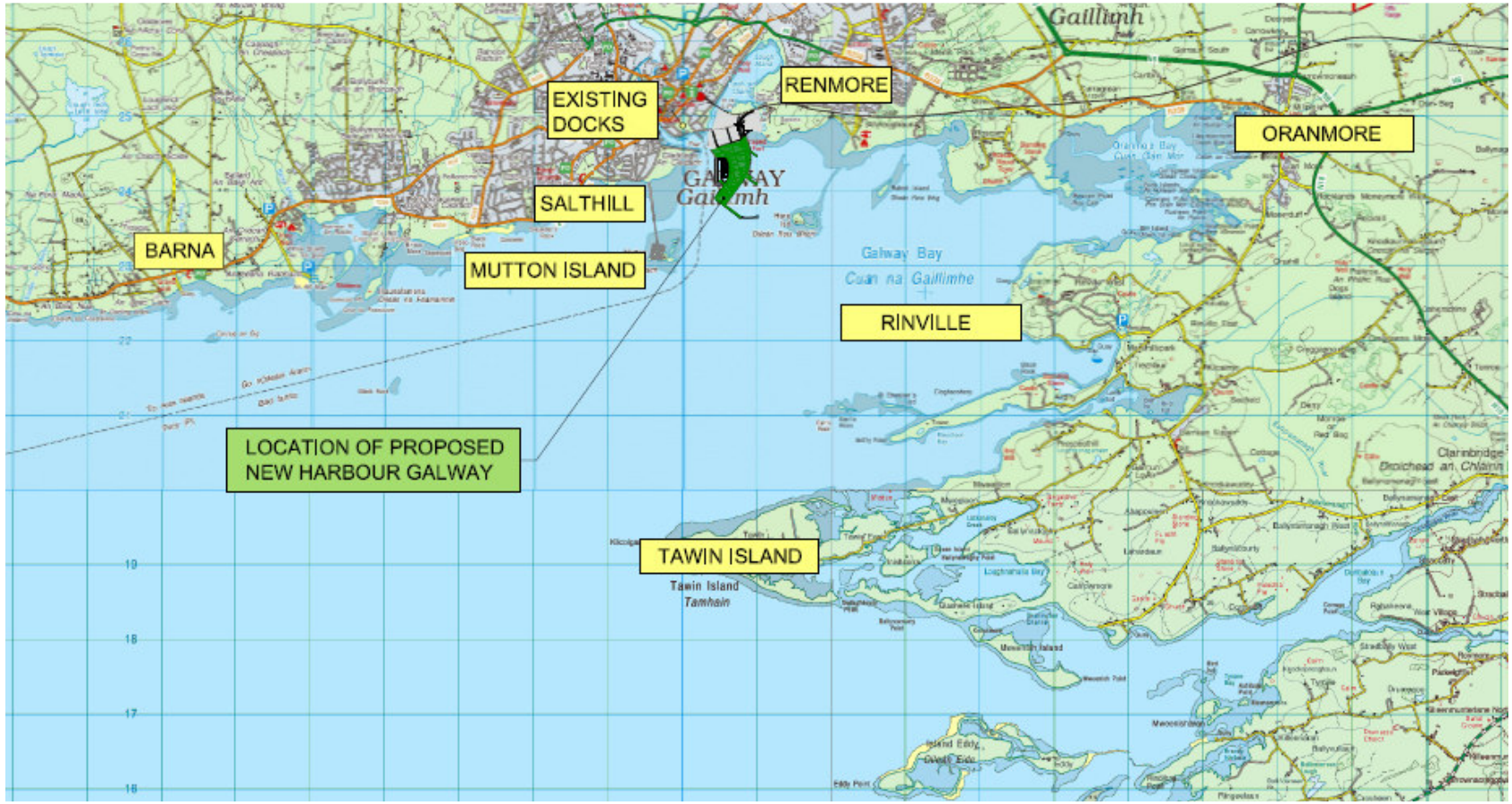


Figure 1.13 - Showing location of proposed development in Inner Galway Bay.

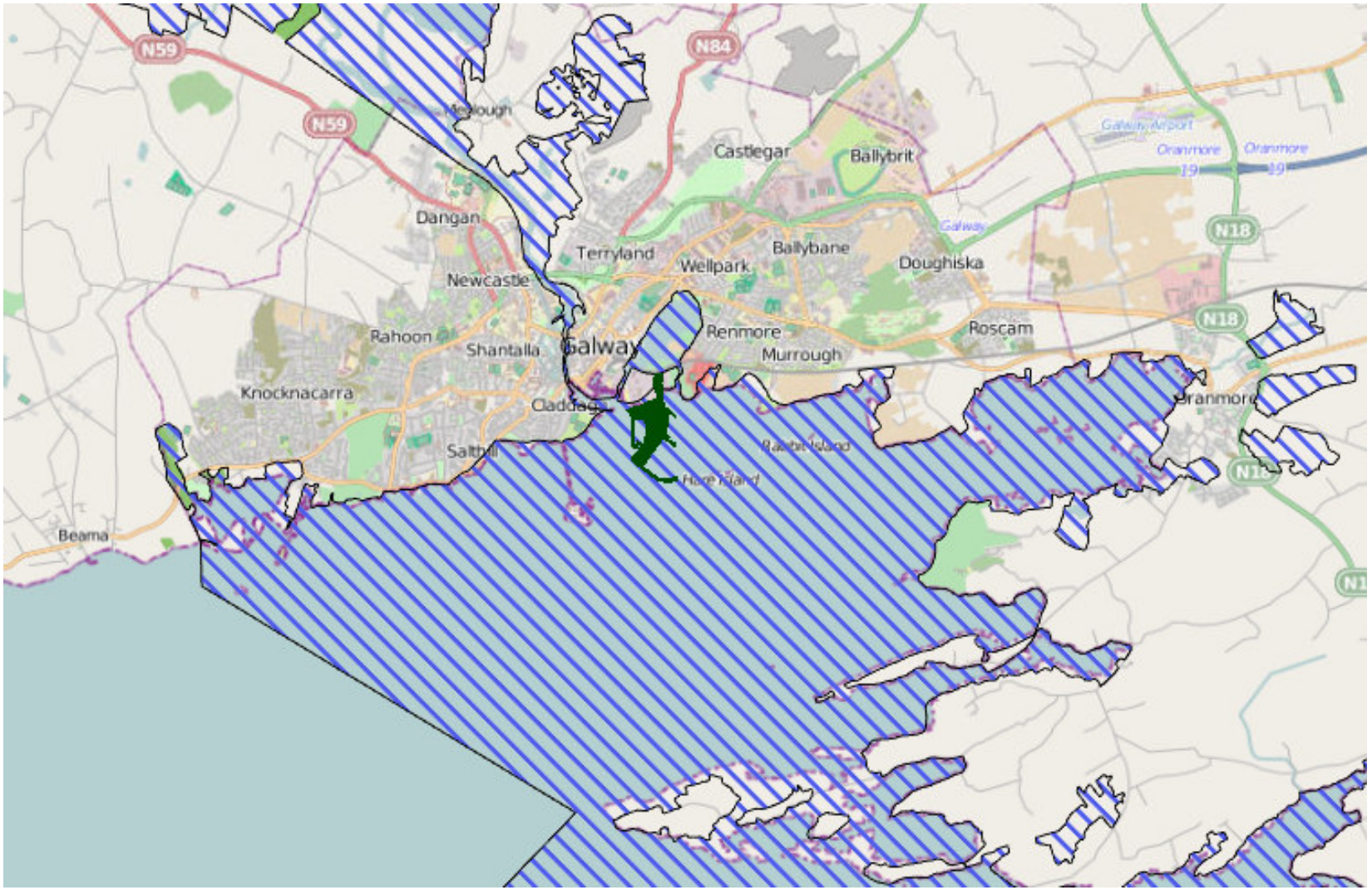


Figure 1.14 - Galway Bay Complex and Lough Corrib cSAC

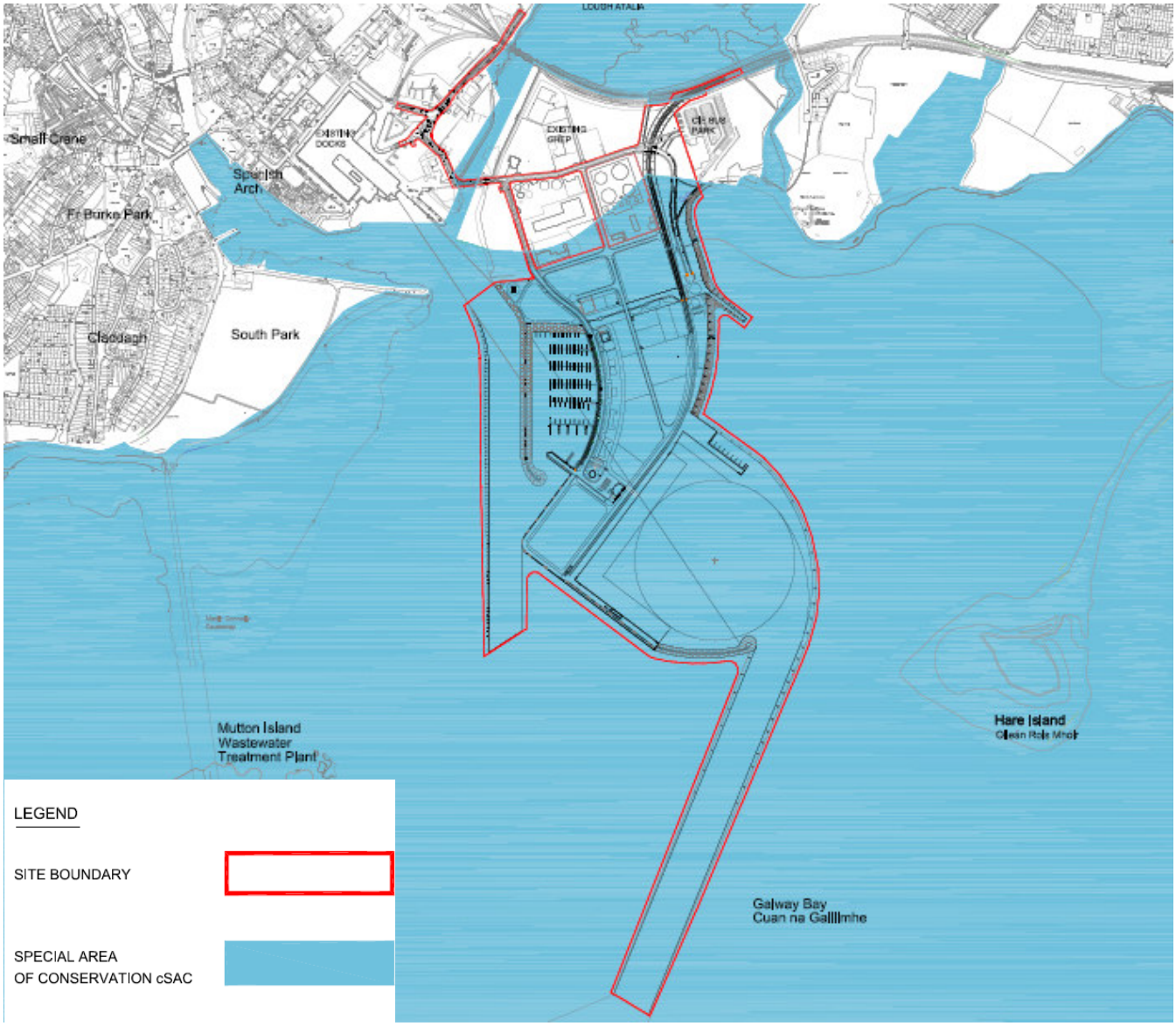


Figure 1.15 - Galway Bay Complex cSAC

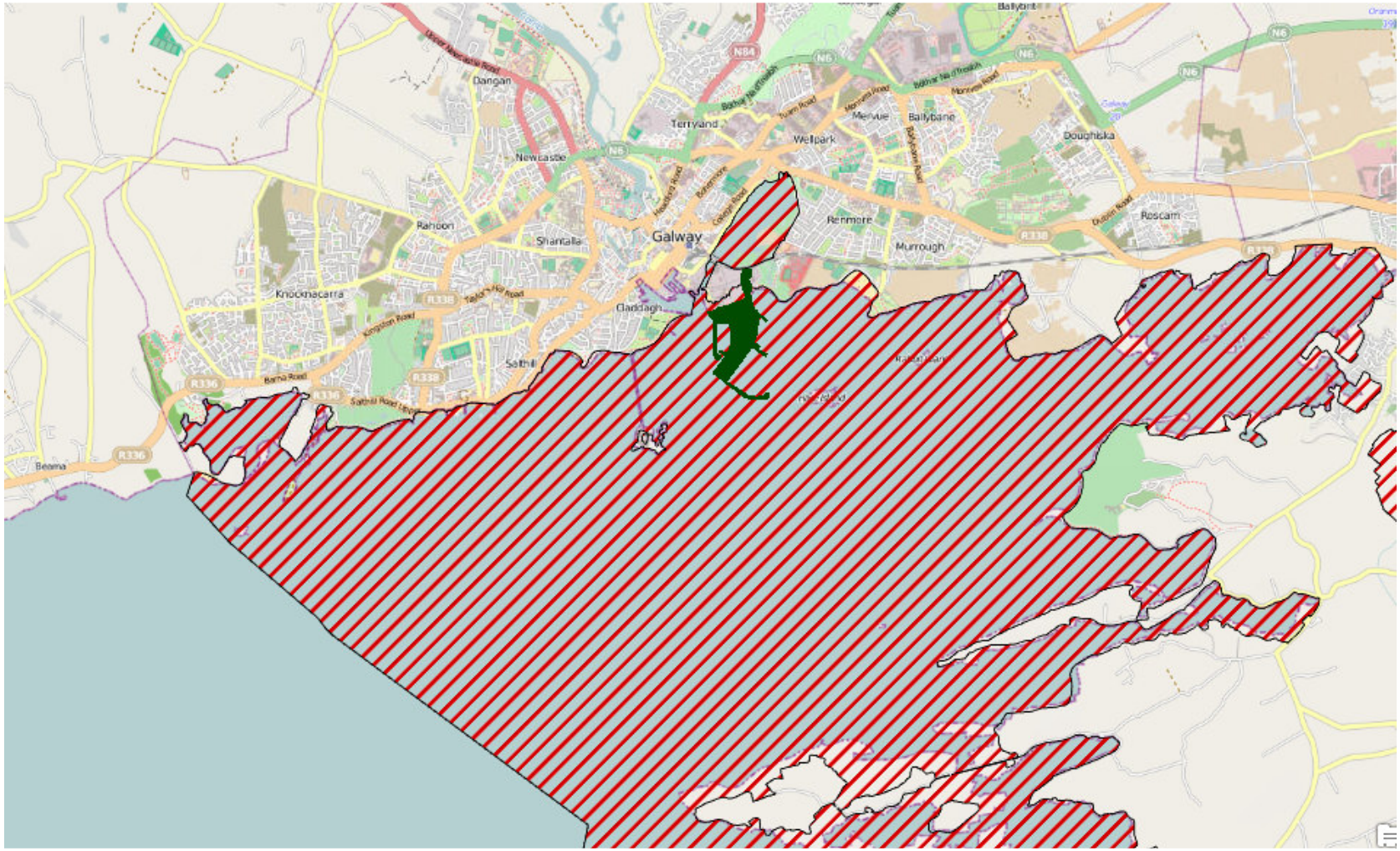


Figure 1.16 – Inner Galway Bay SPA

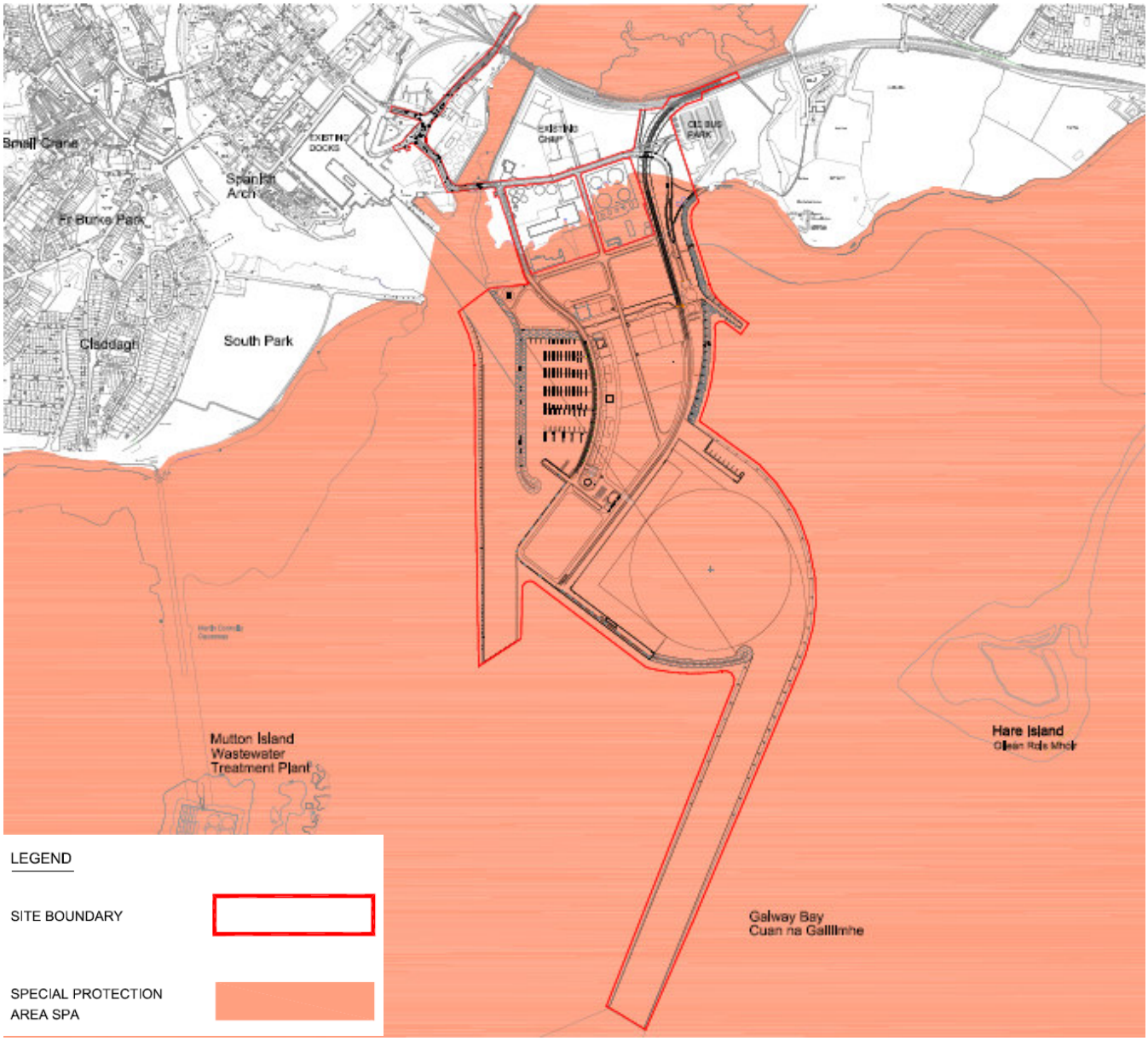


Figure 1.17 – Inner Galway Bay SPA

The QIs taken from the conservation objectives of the Galway Bay cSAC (source: NPWS, 2013b) are:

- [1140] Mudflats and sandflats not covered by seawater at low tide,
- [1150] * Coastal lagoons,
- [1160] Large shallow inlets and bays
- [1170] Reefs,
- [1220] Perennial vegetation of stony banks
- [1310] *Salicornia* and other annuals colonising mud and sand,
- [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*),
- [1355] Otter *Lutra lutra*,
- [1365] Harbour seal *Phoca vitulina*,
- [1410] Mediterranean salt meadows (*Juncetalia maritimi*),
- [3180] * Turloughs,
- [5130] *Juniperus communis* formations on heaths or calcareous grasslands,
- [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia*)(*important orchid sites),
- [7210] Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae*,
- [7230] Alkaline fen

* indicates a priority habitat

Figures 1.18 and 1.19 shows the QI habitats and QI species (taken from NPWS conservation objectives habitat mapping www.npws.ie/mapsanddata/habitatspeciesdata/) in the area of the proposed development respectively.

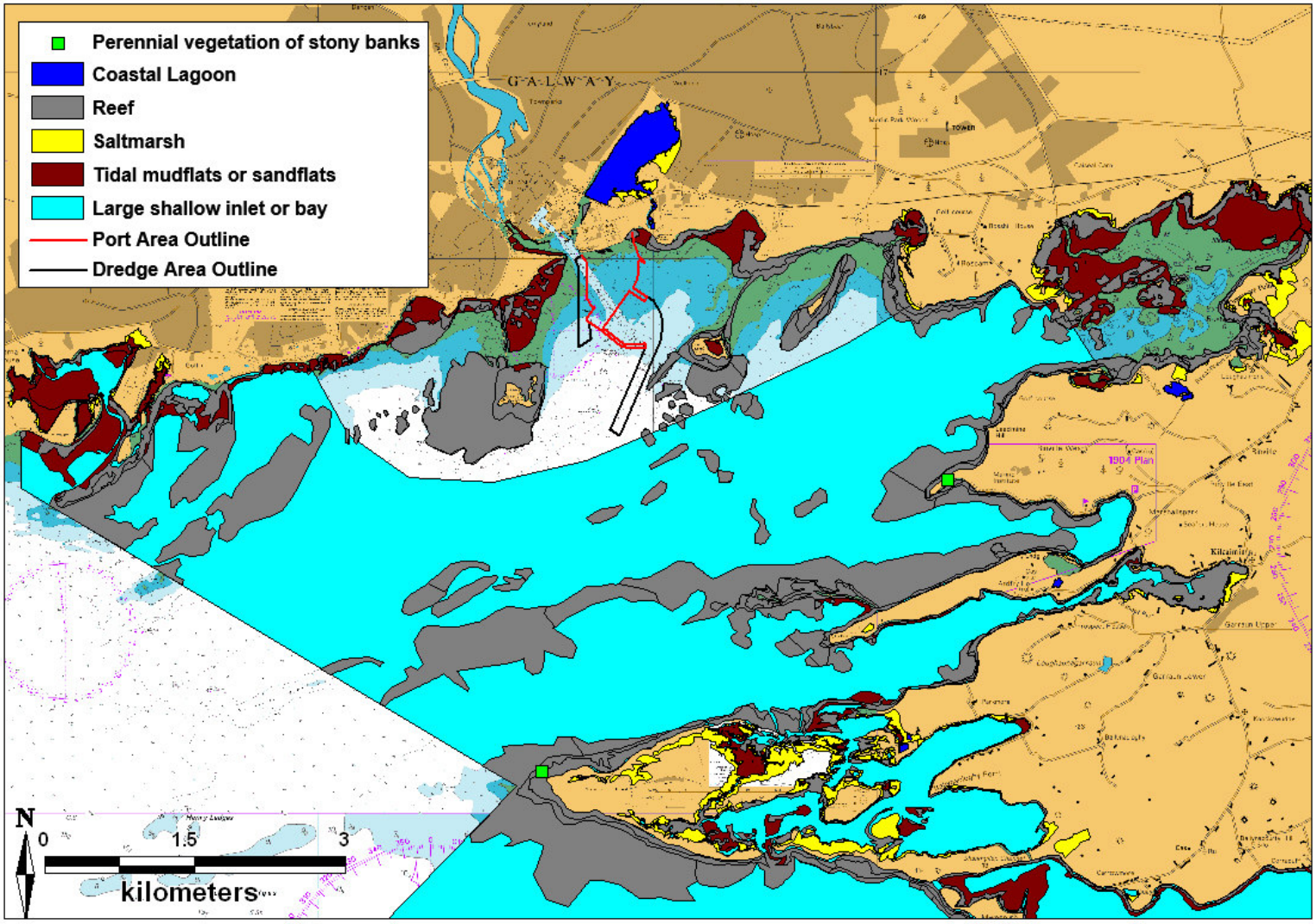


Figure 1.18 - Galway Bay cSAC (000268) QI habitats in the vicinity of the proposed development site

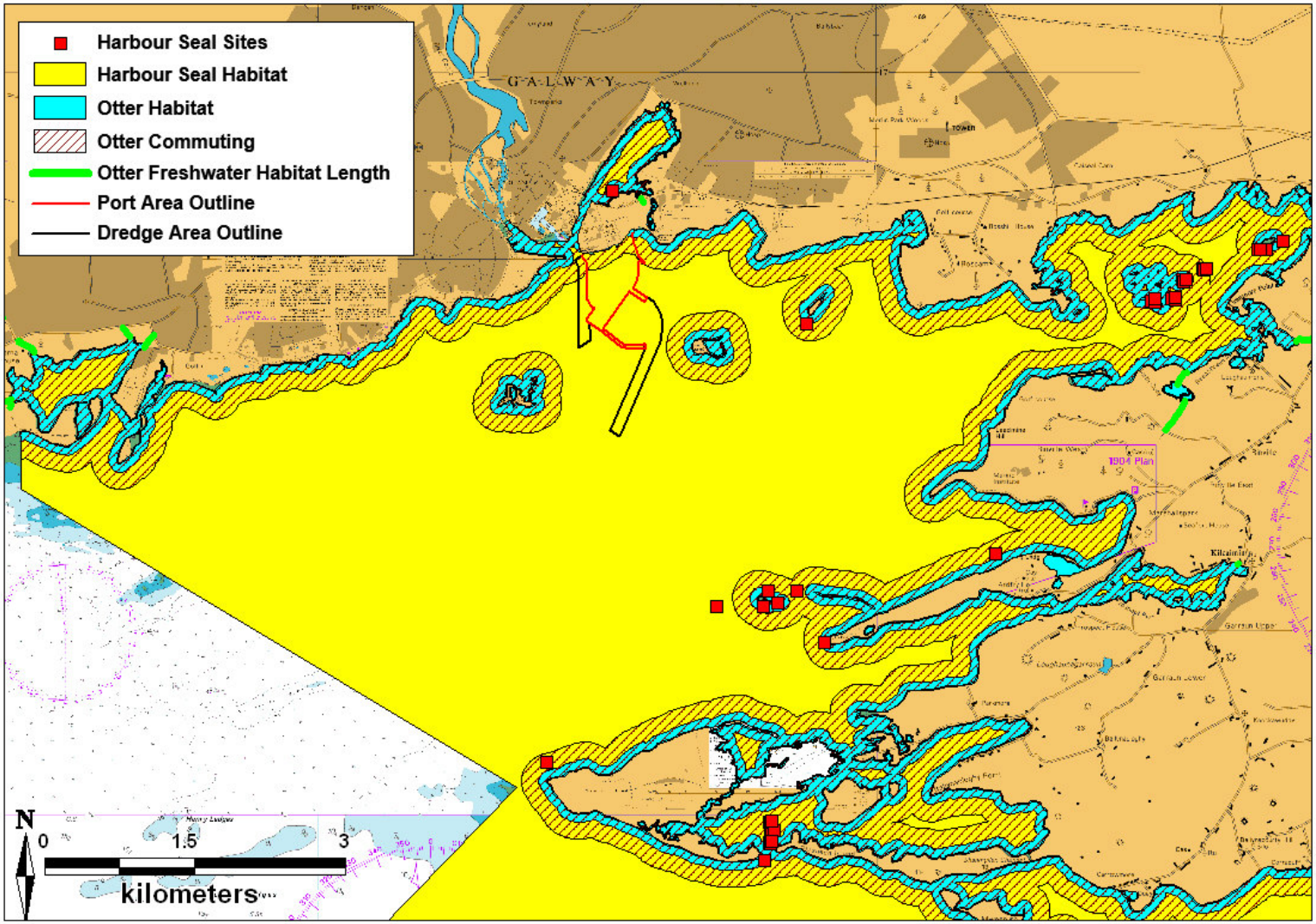


Figure 1.19 - Galway Bay cSAC (000268) QI species in the vicinity of the proposed development site

The Special Conservation Interests taken from the conservation objectives of the Galway Bay SPA (Source: NPWS, 2013c) are:

- [A003] Great Northern Diver *Gavia immer,*
- [A017] Cormorant *Phalacrocorax carbo,*
- [A028] Grey Heron *Ardea cinerea,*
- [A046] Brent Goose *Branta bernicla hrota,*
- [A050] Wigeon *Anas penelope,*
- [A052] Teal *Anas crecca,*
- [A056] Shoveler *Anas clypeata,*
- [A069] Red-breasted Merganser *Mergus serrator,*
- [A137] Ringed Plover *Charadrius hiaticula,*
- [A140] Golden Plover *Pluvialis apricaria,*
- [A142] Lapwing *Vanellus vanellus,*
- [A149] Dunlin *Calidris alpina alpina,*
- A157] Bar-tailed Godwit *Limosa lapponica,*
- [A160] Curlew *Numenius arquata,*
- [A162] Redshank *Tringa totanus,*
- [A169] Turnstone *Arenaria interpres,*
- [A179] Black-headed Gull *Chroicocephalus ridibundus,*
- [A182] Common Gull *Larus canus,*
- [A191] Sandwich Tern *Sterna sandvicensis,*
- [A193] Common Tern *Sterna hirundo,*
- [A999] Wetlands & Waterbirds

Figure 1.20 shows the distribution of the Wetlands and Waterbirds QI in relation to the proposed development site.

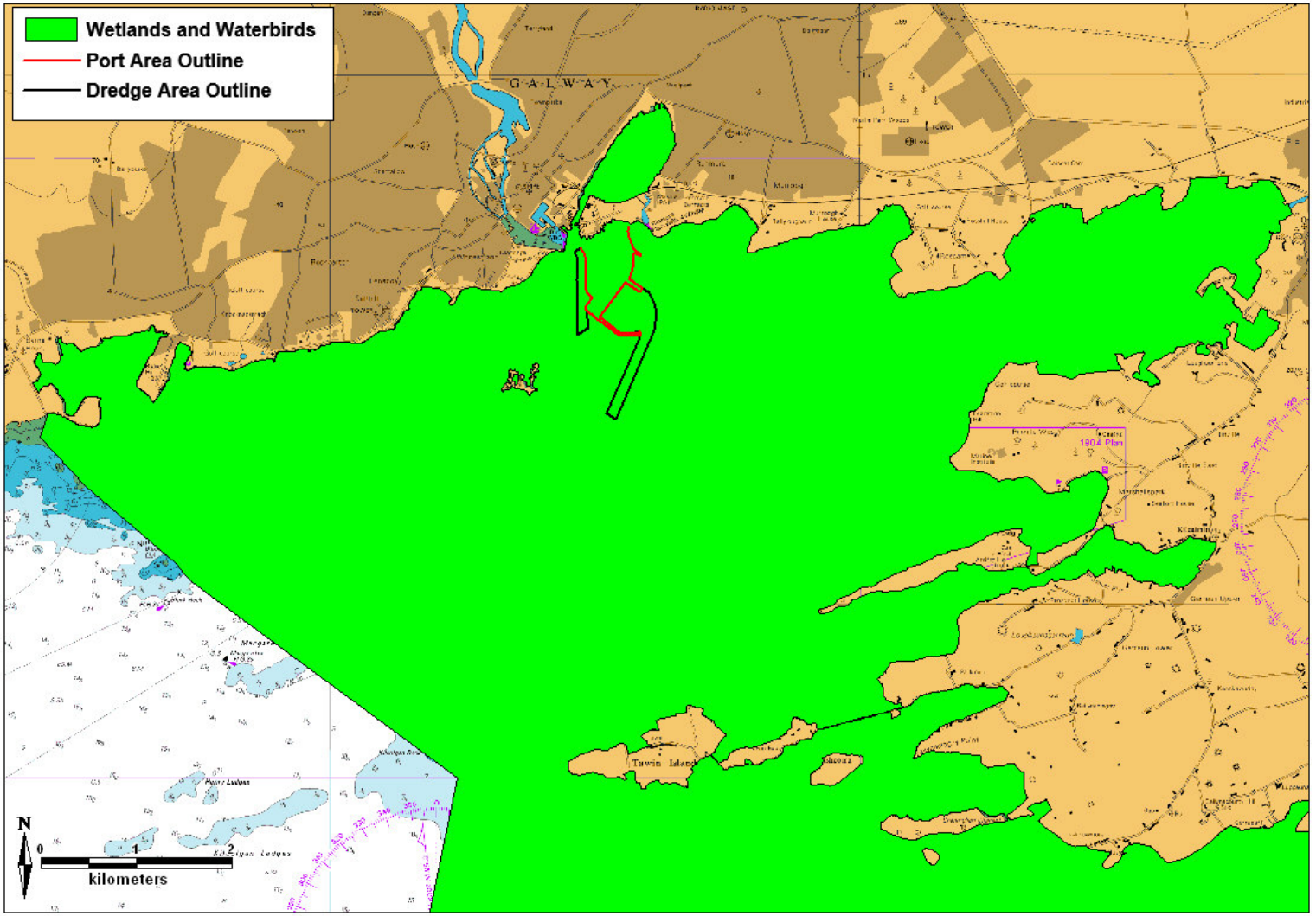


Figure 1.20 - Galway Bay SPA (004031) QIs in the vicinity of the proposed development site

2. SCREENING FOR APPROPRIATE ASSESSMENT

2.1. DESCRIPTION OF THE PROJECT

2.1.1. Project Overview

The proposed harbour extension will include:-

- 660 metres of commercial quays
- Yardage and storage areas
- Facilities for cruise liner passengers
- Port-related buildings
- Helicopter pad
- Fishing pier and yard
- Nautical centre boat yard
- 216 berth marina
- Wave protection walls
- Twin rail track to connect to Galway/Dublin rail line
- Oil and bitumen transfer pipelines
- Landscaping, amenity areas and public promenades.

The proposed development on lands to be reclaimed from foreshore and the sea is mainly in an area designated as cSAC and SPA to the south of the existing Galway Harbour Enterprise Park. It will permit the relocation of the existing harbour related activities and businesses to new quays, jetties, yards and deepwater berths.

The development area of 82.89 ha can be broken down as follows:

- Land development area 28.07ha
  - 23.89 ha land reclaimed from the sea
  - 4.18 ha redeveloped existing harbour enterprise park lands.
- Breakwater and revetments 3.04ha
- Dredged area for channel, berthing and turning ..... 46.48 ha
- Working area for dredging/marine construction ..... 5.30 ha

The harbour extension land area to be developed of 28.07 ha will provide the following land use area breakdowns in yards, quays, open space etc:

- Commercial port back up yard areas ..... 6.45 ha
- Commercial quay areas ..... 1.72 ha
- Harbour company warehouse yards ..... 1.53 ha
- Future oil and bitumen yard areas ..... 1.86 ha
- ESB, security yard & fire water storage area ..... 1.08 ha
- Marina boat yard, quay and village area ..... 1.83 ha
- Fishing pier and yard area ..... 0.55 ha
- Roads and access area ..... 3.97 ha
- Rail line and embankment area ..... 2.20 ha
- Nautical yard & slipway area ..... 0.82 ha
- Passenger terminal yard area ..... 0.34 ha
- Landscaped area ..... 5.44 ha
- Wave wall area ..... 0.28 ha

Total ..... 28.07 ha

The development will provide for bulk cargos such as the following: Coal Yard, Waste Export, Steel Import Yard, Scrap Metal Yard, Ship Chandlers, Roll on/Roll off Yard, Container Yard, Project Cargoes – Ocean Energy Development & Servicing, Biomass Storage & Handling. It will also allow for parklands, Renmore promenade, and marina promenade.

Figure 2.1 shows the principal elements of the proposed harbour extension layout and their location for identification purposes.

Access to the proposed Galway Harbour extension will be through the existing Galway Harbour Enterprise Park (GHEP). The GHEP is accessible via the existing bridge, which crosses the entrance channel to Lough Atalia. It is also proposed to upgrade the road under Lough Atalia Railway Bridge which is a protected structure.

Foul sewers will flow by gravity to a new pumping station. The pumping station will pump directly into the Galway City main drainage network via a separate rising main. Storm water collection pipes will discharge via four outfall points to the sea. The outfall pipes will be constructed to incorporate oil and grit interceptors.

The proposed harbour extension development in its basic form has two main elements *i.e.* construction of new quays at the outer deep water and land reclamation as back up lands on the landward side behind the new quay wall. There will be dredging to provide the correct depths and the dredged material will be beneficially re-used.

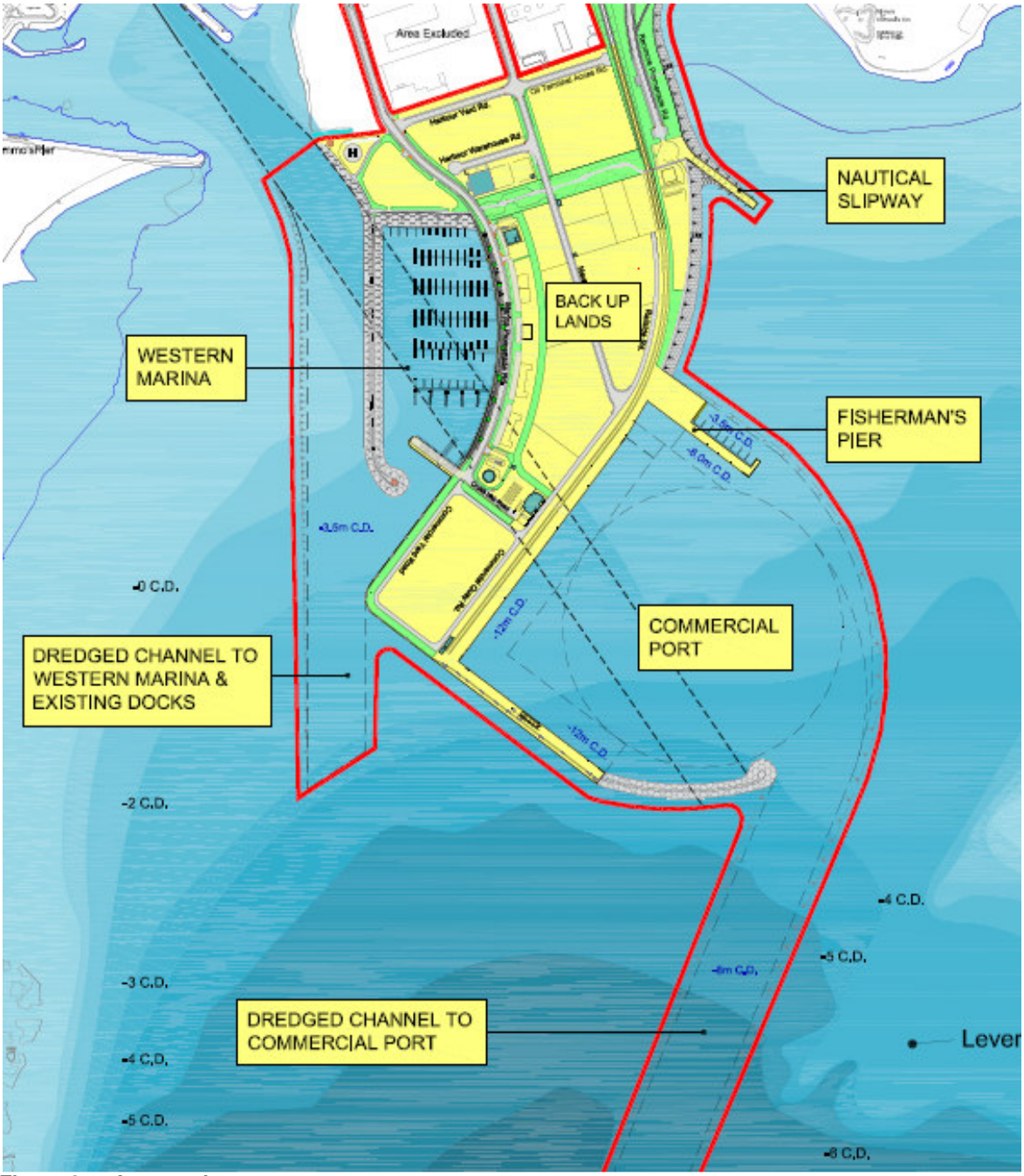


Figure 2.1 - Layout elements

2.1.2. Description of Operations

Table 2.1 details the existing tonnages handled at the existing harbour in 2012 and the proposed tonnages for the proposed harbour extension.

Existing and Proposed Tonnages						
		Existing Harbour 2012		Galway Harbour Extension		
	Vessel Types	Number of Vessels	Tonnage	Number of Vessels	Vessel Size T/dwt,000	Tonnage
Liquid	Refined Oil	105	384,132	100	5 – 25	1,200,000
	Bitumen	8	31,071	22	6 – 30	
Dry Bulk	Coal	0	0	2	3 – 12	732,000
	Steel	3	12,603	10	5 – 8	
	Scrap Steel	8	25,153	15	5 – 8	
	Project Cargoes	0	0	35	6 – 10	
	Limestone	12	47,802	25	6 – 10	
	Commercial Vessels Sub-Totals	**159**	**428,506**	**210**	**N/A**	**1,932,000**
	Passenger Liners	0	0	30	30 – 150	N/A
	Passenger Ferry	0	0	2 daily (seasonal)	0.482	N/A
	Fishing Inshore	30	1 – 3	30 daily	1 – 3	N/A
	Fishing Offshore	0	0	10 daily	10 – 25	N/A
	Leisure Craft	70	N/A	415	N/A	N/A
	Total Tonnage 2012		**428,506**			
	Total Tonnage 2035					**1,932,000**

Table 2.1. Existing and proposed tonnages.

2.1.2.1. Harbour Extension

There will be 260 m of dedicated fuel loading/discharge berth for petroleum/bitumen and 400 m of multi modal quay for loading/discharge of: scrap steel; coal; steel; project cargoes; limestone; research vessels; cruise liners; naval vessels.

Vessel movements in the commercial port will operate on a 24 hr basis and liquid bulk cargo will be conducted on a 24 hr basis as is the current practice. Dry bulk and project cargoes will generally operate from 06:00 hrs to 20:00 hrs.

Cruise liners will operate on a 24 hrs basis but generally these vessel types disembark/embark their passengers from 07:00 hrs to 20:00 hrs.

Passenger ferries will operate to a timetable to coincide with train time and coach time tables and also in response to market conditions.
Navigation to the harbour extension will be via the existing approach channels, assisted by new navigational aids.

The design of all quay walls, revetments and breakwaters will take into account recent research (*e.g.* Firth, 2013; Chapman and Brown, 2011; Martins and Thompson, 2009) which has shown that minor design changes *e.g.* the addition of pools, pits, crevasses and water retaining features, leads to a statistically significant increase in the settlement and diversity of marine flora and fauna on these artificial structures.

2.1.2.2. Operations

Ship-generated waste will be managed as per the Harbour's Waste Management Plan for both onboard waste and cargoes residues. Port security will be managed in accordance with the ISPS code and the port security plan. In the event of an oil spill, this will be managed in accordance with the Oil Spill Contingency Plan (see Appendix 4.3 of EIS). Oil booms will be deployed while ships are in port. In the event of a marine emergency, the 'Galfire Plan' will be activated. The port bye-laws are used as a tool to operate the port. Maintenance dredging will be on a 10 year cycle as is currently the practice. Dredging will be by trailer suction dredgers licenced to carry out this work in accordance with guidelines laid down by the EPA/Maritime Safety Division/Dept of Transport. Run off from the quays will be collected in the drainage system and discharged via interceptors. Ship-generated sewage will be discharged into the foul drainage system located at the quays which in turn discharges to Galway City main drainage system.

Ships taking bunkers (fuel for main & auxiliary engines) is carried out in accordance with Marine Notice 2 of 2006.

There will be a rail link from the adjacent existing Dublin to Galway rail line which will connect to the new commercial quay.

2.1.2.3. Fishing Quay

Fishing vessels will moor at the dedicated fishing quay with 30 berths. These berths will have the facility for freshwater and electrical power provided by a metered utility kiosk. Landing of fish will be carried out on a 24 hr basis. Routine maintenance will be carried out at the quayside by marine engineers as is currently the practice. A yard adjacent to the fishing quay will cater for the storage and maintenance of fishing gear and equipment.

2.1.2.4. Marina

Marine leisure craft will berth in the dedicated 216 berth western marina. These berths will have the facility for freshwater and electrical power provided by a metered utility kiosk. Allocation of berthage will be under the control of the harbour office/marina office. Waste management and on-water speed restrictions will be governed by the marina rules. At present, all craft are limited to a maximum speed of 3 knots within the docks and up to 5 knots between the Dock Gates and Leveret's Lighthouse. A dedicated fuel berth and foul station are included which will facilitate the disposal of waste to Galway City Main Drainage and the refuelling of marine leisure craft. This berth will have oil absorbent boom facilities.

2.1.2.5. Harbour Extension Buildings

A number of buildings will be provided as part of the development:

- Harbour Comapny Offices
- Marina Mangement Building
- Cruise Terminal Building
- Harbour Management Building
- Ancillary buildings *e.g.* pump house, security and ESB sub-stations.
-

Any further future buildings will be subject to separate planning procedures.

Ancillary Buildings will include pump house for fire fighting purposes, security building at the main port access gate and an ESB sub-station.
It is expected that all buildings will require pile foundations. Removal of material for foundations will be nominal and if required will be transported to a licensed facility.

2.1.2.6. New Harbour Yards

New areas for marina yard, harbour company yard, future oil yard, limestone yard, security area, fire water retention bund, ESB station, scrap/recyclables yard, steel/construction yard, projected project cargo yards, additional yardage for expansion, nautical centre yard & slipway, will be created.

A management company will be put in place for the new development lands. All of these yards will be served by HGV for the movement of cargoes to/from the quayside. These sites will be individually managed by the operators and will be required to conform to the management company procedures.

The nautical centre and slipway will be operated and managed by the local sea sport interests. The centre will be for amenity use and the harbour company will control the operation of vessel movements for reasons of the safety of navigation.

Open areas, landscaped areas and walkways which will be accessible to the public will be under the control of the management company including for maintenance.

The entire new development land and quays will be serviced with all utilities *i.e.* water main, sewer, broadband, telecom, electricity supply, gas main by connecting to existing services. These will be maintained by the harbour company in conjunction with the service providers.

The new quays will be connected to the existing fuel and bitumen terminals via new pipelines. These will be maintained by the Harbour Company in conjunction with the operator.

2.1.3. Proposed Construction Elements and Sequencing

The construction phase has two main elements *i.e.* construction of new quays at the outer deep water and land reclamation as back up lands on the landward side behind the new quay wall. There will be dredging to provide the correct depths and the dredged material will be beneficially re-used.

2.1.3.1. Main Construction Elements

The following is a summary of the main elements to be constructed (see Figure 2.2): -

- Lagoon walls to contain marine dredged materials and provide access roads to construction areas
- Lagoon walls protected with breakwater revetment on sides exposed to sea climate
- New approach channels dredged to provide safe easy access to all berths
- Dredged materials filled into confined lagoons
- Reclamation of land comprised by lagoon Areas
- Creation of defined open areas within reclaimed land
- Outer port protection breakwater
- Quay walls for deepwater berths for liners, oil and bitumen tankers and cargo vessels
- Fishing pier
- Nautical centre slipway
- Marina protection breakwater
- Marina berths
- Dedicated utilities and services to oil, bitumen, and marina berths
- General utilities and services to all areas

- Rail transport link to outer quays
- Individual site developments

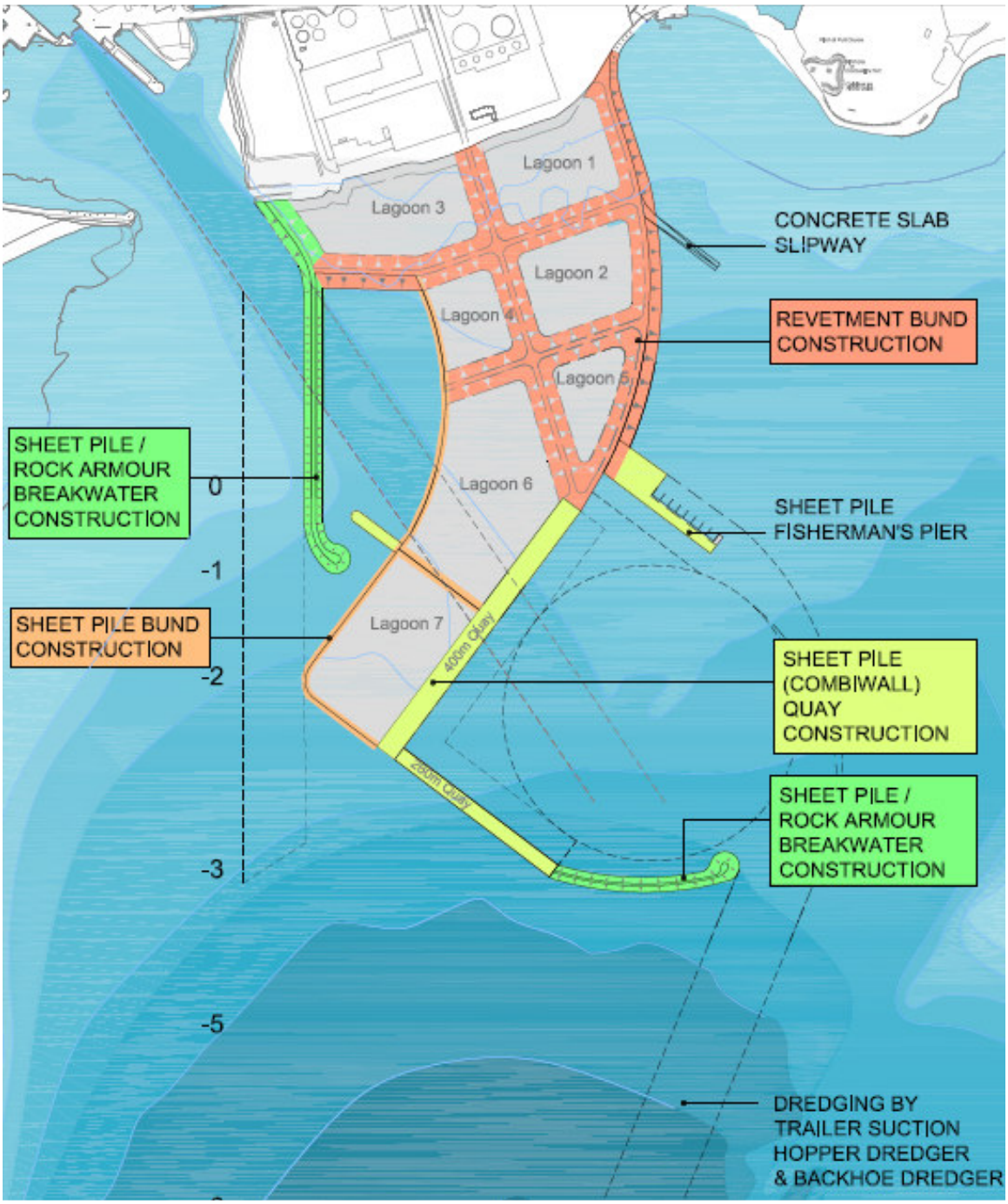


Figure 2.2. Construction elements.

2.1.3.2. Construction Methodology Summary

A full and detailed description of the construction methods is provided in Chapter 3 of the EIS. The following is a brief description of the influences and concepts behind the construction methodology:

- The geotechnical investigation reports on silts above gravels and sands over bedrock
- Dredging (using a trailer suction hopper dredge) of these soils is required to provide access channels, berths and structure foundations

- Re-use of dredged materials is a fundamental economic and sustainability principle underpinning the design
- The dredged materials will be filled into controlled lagoons to provide for land reclamation
- The materials will be contained by lagoon bund walls lined with geo-fabrics to contain the silts
- Over time, these soft materials will consolidate, accelerated by the installation of vertical drains and surcharging with dredged materials, and provide the areas for land based facilities
- Quay walls will be provided by using sheet piling systems driven through the overburden and keyed into pre-blasted trenches in the bedrock
- Rock-armoured breakwaters will be constructed to protect the outer harbour berths and the marina.
- Where these breakwaters are located adjacent to navigable channels, sheet piling will be installed below mean tide levels to provide an unobstructed channel and protect the breakwater from scouring action. Channel markers will be positioned on top of the piling to define the channel at high tide.
- A wave wall will be constructed on top of exposed the quays to prevent wave overtopping.

2.1.3.3. Construction Elements Sequence Summary

The detailed construction methodology to deliver the elements summarised above and the sequence of the construction operations are described in detail in Chapter 4 of the EIS.

- **Stage 1: Berths for Cruise Liners, Oil and Bitumen Tankers, and Cargo Vessels, complete after 43 months construction duration**

    - Pre construction site surveys *e.g.* topography, bathymetry, bore holes
    - Provision of enhanced road access from Lough Atalia Bridge and Harbour Hotel
    - Dredging of inner port and outer port access channels,
    - Dredging for outer port turning circle and berths
    - Reclamation of 19.86ha of land in lagoons 1 to 6
    - Construction of 600m of quays for oil and bitumen tankers
    - Construction of quays for cruise liners and cargo vessels
    - Installation of oil and bitumen utilities and facilities

- **Stage 2: Outer Port breakwater, rail embankment, lagoon bund and additional quays, complete after 12 months construction duration**

    - Rail embankment
    - Seaward bund wall for lagoon 7
    - Construction of 60m of quays (0.12 ha)
    - Construction of outer port protection breakwater

- **Stage 3: Marina Protection Breakwater, Fishing Pier, Slipway and Rail Access, complete after 26 months construction duration**

    - Dredging of fishing pier and marina areas
    - Construction of marina protection breakwater
    - Reclamation of 3.09ha of land in lagoon 7
    - Construction of fishing pier and nautical centre slipway (0.7ha)
    - Construction of Rail Lines

- **Stage 4: Marina Berths and Quay and Reclaimed Lands complete after 15 months construction duration**

    - Construction of service quay for marina (0.12 ha)
    - **C**onstruction of marina berths
    - Consolidation of reclaimed lands

2.1.4. Other Projects/Plans (In Combination Effects)

As part of the Appropriate Assessment Screening process, it is necessary to assess the possible in combination effects which may arise as a result of the proposed development in addition to other plans (local, regional, national), Directives and projects (current activities and proposals within the planning process).

The assessment of in combination effects considered the impacts which may arise as a result of proposed regional/national projects within the planning process *e.g.* National and Regional Strategy Plans, Local Area Plans, Conservation and Management Plans, road schemes, wastewater treatment plants and EU Directives (see Section 7.8.10.1 of Chapter 7 of EIS). Except for possible interactions between outfall plumes from Mutton Island and a proposed new outfall west of Oranmore Bay, the potential interaction effects were assessed qualitatively. Where relevant, these projects may be subject to their own NIS. Only two were considered to have potential to have in combination effects with the proposed development and these are two road schemes, 1) the N59 Moycullen Bypass that crosses the Lough Kip River and passes close to Ballyquirke Lough, both of which are designated as part of Lough Corrib cSAC and 2) the Galway City Outer Bypass that crosses the River Corrib towards the southern part of the Lough Corrib cSAC. The project was subject to a court ruling by the Court of Justice in the European Union and is being reconsidered.

In addition to such plans or projects, there are a number of existing planned activities for the Galway Harbour area that have the potential to have in combination effects. They are discussed below.

2.1.4.1. Aquaculture

Several parts of Inner Galway Bay including areas within the Galway Bay Complex cSAC and Inner Galway Bay SPA have been designated by the Government as aquaculture sites. The following production areas and species that are grown in each are listed below:

- Mweeloon Bay - mussels and oysters.
- Carraghduff - oysters.
- Killeenaran - mussels and oysters.
- Clarinbridge - mussels and oysters
- Kinvarra Bay - mussels and oysters
- Doorus Point - oysters.
- Aughinish - oysters.
- Poulnaclough - mussels and oysters

- Ballyvaughan - oysters and clams.

The cultured oyster in Inner Galway Bay is *Crassostrea gigas* also know as the Pacific Oyster. The cultivation method is based on the species being placed in bags and put on steel trestles at low water. The trestles are made of 16 mm steel tubing and are usually approximately 300 mm high and are 2.5-3.0 m long by 1 m wide. Each trestle can hold 5-6 oyster bags, which are held on by rubber bands and/or hooks. The bags vary in mesh size depending on the size of oyster being held. The bags and trestles are re-usable and remain on the shore all year round. These bags are checked on a regular basis *i.e.* low water Spring tides and sorted into different sizes depending on the individuals' growth rates. Bags are also cleaned of any algal growth. The sites are accessed by farmers at low tide using a tractor and trailer. The growing sites are positioned between Mean Low Water Spring and Mean Low Water Neap, allowing 2.5-3.5 hrs exposure per day, depending on weather and tidal conditions.

In Inner Galway Bay, mussels are cultivated by suspended mussel culture systems which involves the collection and wrapping of seed mussels on ropes or similar material, which are hung from rafts or floats. The mussels are typically collected *in situ* by settlement from the plankton and grown on the collecting ropes. As the mussels develop, they are stripped from the ropes, graded for size, tubed (mesh) and re-suspended in the water column. Harvesting usually occurs 18-30 months from settlement.

Clams (*Spisula* sp.) are not cultured in Inner Galway Bay but are fished in the southern part of the bay.

2.1.4.2. Harbour Flights

Planning permission has been given by Galway City Council for sea planes to take off and land in an area to the southwest of Hare Island to take people to and from the Aran Islands and other destinations.

2.1.4.3. Changed Galway Coastline

For a variety of reasons *e.g.* coastal protection works, enhancement projects, the construction of the Mutton Island causeway, the infilling of the area seaward of the Galway Enterprise Park *etc.,* the coastline in the vicinity of Galway City has changed over many decades.

Figure 2.3 is a part of the 1843 British Admiralty chart showing the coastline from Black Rock to the west, east to Renmore Point including the channel into Lough Atalia. Nimmo's Pier (completed in 1827) can be seen to the west of Renmore Point and the eastern bank of the entrance into Lough Atalia and the southern side of Renmore Point are drawn as uneven shorelines. The area between Fair Hill and Black Rock is also drawn as an uneven shore line. The area at White Strand was subject to flooding at High Spring tides.

Figure 2.3 - Section of Admiralty Chart number 1984 showing the area from Renmore Point to Black Rock *ca* 1843

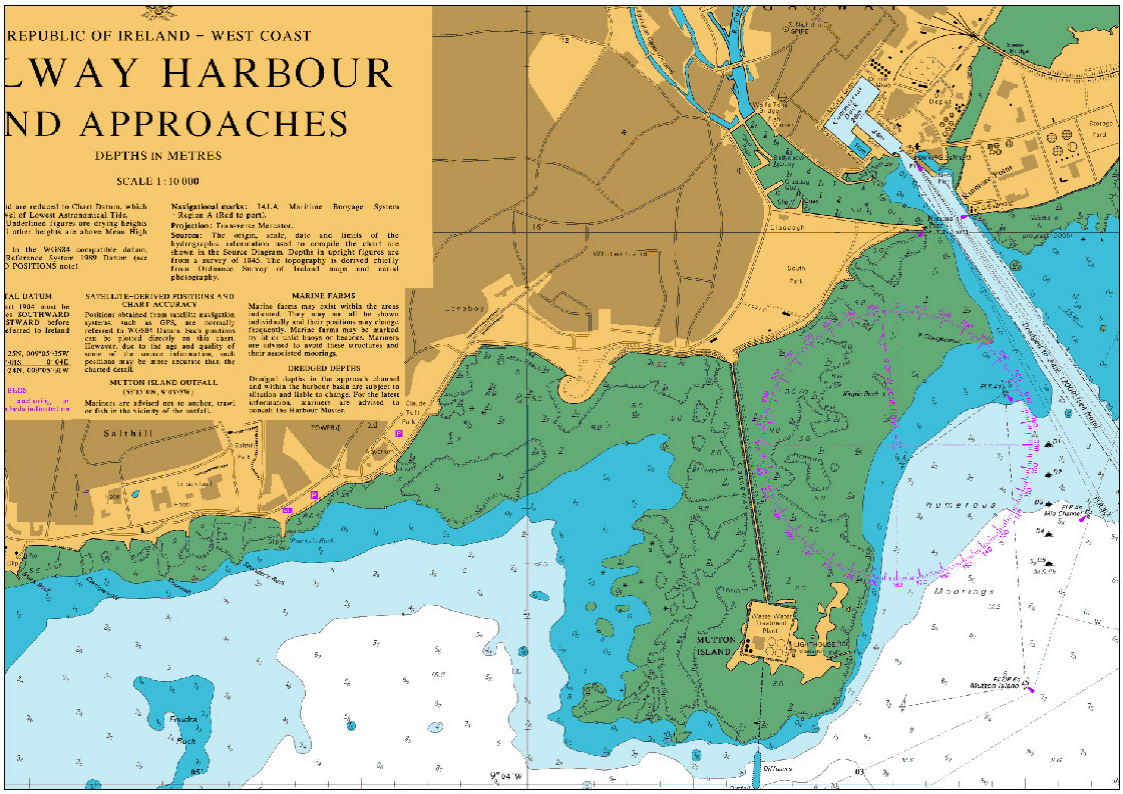


Figure 2.4 - Section of Admiralty Chart number 1904 showing approximately the same area in *ca* 2012

Figure 2.4 is section of Admiralty Chart number 1904 of the same general area. The shore line in the area of the entrance to Lough Atalia and the Galway Enterprise Park can be seen as straight lines. A number of groynes are present to the east of the causeway (not all shown in Figure 2.4) and along the coastline at Salt Hill Road upper and the diving board at Black Rock. The coastline between Fair Hill and the Salt Hill Promenade is now straightened and sea access to the area at White Strand has been blocked. The Grattan Park amenity area has been contoured into a regular shape.

The most significant change to the coastline in the vicinity of Galway City was the construction of the Mutton Island Causeway in the early 2000's. This blocked the passage between Mutton Island and the mainland forcing both ebbing and flooding tides around the island. It also diverted the long shore drift (a current that is generated by prevailing winds which in the case of Galway Bay is from the west/southwest) southwards around Mutton Island. It should be noted that as the natural level of suspended solids in Galway Bay is typically low, rates of accretion due to the long shore drift are therefore also low.

The causeway has also reduced wave action/inshore swell conditions in the same area to the east of the causeway as the structure protects it from the prevailing wind direction *i.e.* south west. It was designed to be overtopped by extremely high tides and thereby reduce shelter-induced accretion which is also somewhat curtailed by south easterly storm waves and storm events.

2.1.4.4. Ocean Energy Test Site

The Ocean Energy Test Site for ¼ scale prototypes of Wave Energy Converters (WECs) was established in Galway Bay in 2006 by the Marine Institute in association with Sustainable Energy Authority of Ireland (SEAI). The test site is located 1.3km off the north shore approximately 2.4km east south east of Spiddal Pier.

As currently configured, the ¼ scale wave energy test site facility is utilised by Ocean Energy companies, technology developers and national / international researchers. Two Irish wave energy companies (Wavebob and Ocean Energy Ltd) have assessed the performance of WECs over the last few years under various sea states, wave heights and oceanographic conditions. Technology developers have also used the site for acoustic monitoring of cetaceans and communications and telemetry research (McKeown, 2010). To date wave energy devices have not been connected to the shore for electricity or data exchange. In order to test the devices for operational configuration, the Galway Bay Cable Project is in the process of establishing the facility as a cabled connection for developers.

2.1.4.5. Tarrea pontoon

A local marine engineering firm is planning to construct a small floating structure as a new pier close to Tarrea Pier, Kinvara Bay.

2.1.4.6. Legacy Issues

In addition to the in combination effects of current plans or projects, it is also prudent to assess the in combination effects of previous developments on and within the vicinity of the proposed development site. The historic development of the site and surrounding area is considered to have had an effect on the Galway Bay Complex cSAC and Inner Galway Bay SPA resulting in the loss of 8.15 ha of fucoid dominated intertidal reef complex and 7.69 ha of salt marsh. There are areas of the site which were developed prior to designation and detailed baseline information is not available as to the condition or quality of the habitat which was lost; however, on the basis of the precautionary principal, these effects are considered to be indeterminate in terms of loss of Annex I habitat including intertidal habitats, Atlantic Salt and Mediterranean Salt Meadows and loss of feeding habitat for Otter, Harbour seal and some bird species. These works (referred to as ***legacy*** issues) when taken in combination with the proposed development pose the risk of significant impact to these habitats and species and therefore are considered further within the Appropriate Assessment process (refer to Drg 2139-2118 for Legacy Habitat Mapping).

2.2. ECOLOGICAL DESCRIPTION OF THE RECEIVING ENVIRONMENT

Extensive field surveys were carried out in order to describe the receiving environment and to allow an assessment for screening purposes of the pre-construction, construction and operational impacts on the Qualifying Interests (QIs) and species of Special Conservation Interests (SCIs). These included:

- Terrestrial habitat mapping to document the habitats on lands within and around the periphery of the proposed development site in order to be able to determine if any listed or sensitive habitats were present.
- Botanical surveys to record plant species that were present within the habitats recorded above to be able to determine if any rare or sensitive species were present
- Benthic surveys including intertidal and subtidal surveys in the area within and in the vicinity of the proposed development site to record habitat types present and their associated plant and animal taxa to be able to comment on any rare or sensitive habitats or taxa
- Sedimentological surveys to provide data on sediment type and sediment chemistry in the area where the construction (and approach channel/turning circle) is to occur.
- Sediment profile imagery to provide data on subtidal habitat quality
- Salmon smolt surveys and salmon smolt predation surveys were requested by Inland Fisheries Ireland to provide data on smolt migration routes through the construction area and the possibility of increased predation
- Bird surveys to document numbers of species, numbers of individuals, seasonality, breeding sites and feeding locations.
- Mammal surveys – cetacean, otter, seal and bat surveys to document numbers of species, numbers of individuals, seasonality, breeding sites and feeding locations.

Details of these surveys and models can be found in Appendices 7.3 – 7.16 of the EIS and in Chapter 7 of the EIS, and a summary of this information is presented below.

2.2.1. Physical, Chemical and Oceanographic Characteristics of the Area

Galway Bay is a large, west facing bay and is bounded by County Galway to the north and by County Clare to the south. At its widest, it measures *ca* 60 km and extends westwards over *ca* 70 km. The bay is divided into 3 subsets as defined by O'Connor *et al.* (1993) (see Figure 2.5)

- Inner Galway Bay, describing all waters to the east of a line between Black Head on the south and Spiddal to the north,
- Mid Galway Bay defined by this line to the east and comprising waters to the south as far as a line drawn between Inisheer and the Clare coast and to the west by a line drawn from Inishmore to Golam Head on the north (Rossaveal and Greatman's Bay are considered discrete water masses) and
- Outer Galway Bay defined by waters inside of a line drawn from Loop Head to Slyne Head.

The proposed development site lies in the north eastern part of Inner Galway Bay.

In geological terms, the north shore of Galway Bay is comprised of granite while east of Galway City and along the southern part including the Aran Islands, Visean limestone is the rock type.

There are three small islands in the inner bay area and these are Mutton (now joined to the mainland by a causeway), Hare Island and Rabbit Island (see Figure 2.6) the latter two of which are drumlins. Water depths in this inner part of Galway Bay range down to 10 m south of Mutton Island and sea bed sediments are characterised by muddy sands. At low water, the intertidal substrates are a complex of algal-and mussel-covered rocks and muddy sands. This habitat is shown in green in Figure 2.6. Lough Atalia and its small offshoot, Renmore Lough, are separated from the open sea by a land mass on which the railway embankment was built in the 1850s.The

River Corrib flows into Galway Bay through Galway City and when in flood (*ca* 300m^3/sec) plays a significant role in water structure in Inner Galway Bay. There are other small rivers at the eastern end of the bay but their flows are far less significant than the Corrib.

As part of the Water Framework Directive, the EPA has defined the marine environment where the development is to take place as Transitional *i.e.* with variable salinity or estuarine, in character and Figure 2.7 shows the extent of this water body type in the vicinity of the proposed development site. The proposed Galway Harbour extension will alter the classification of that part of Galway Bay from Transitional to Modified.

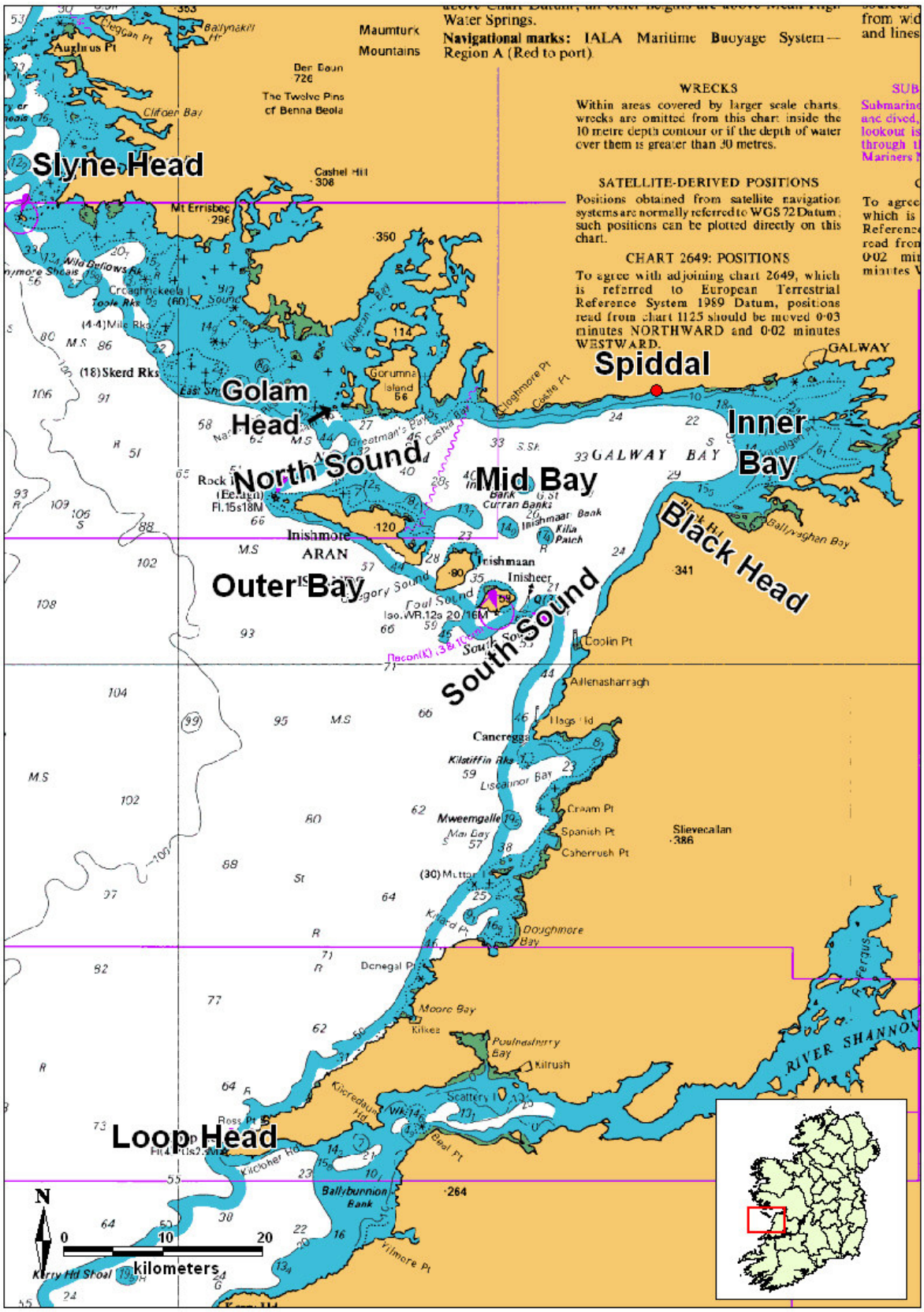


Figure 2.5 - Galway Bay Area

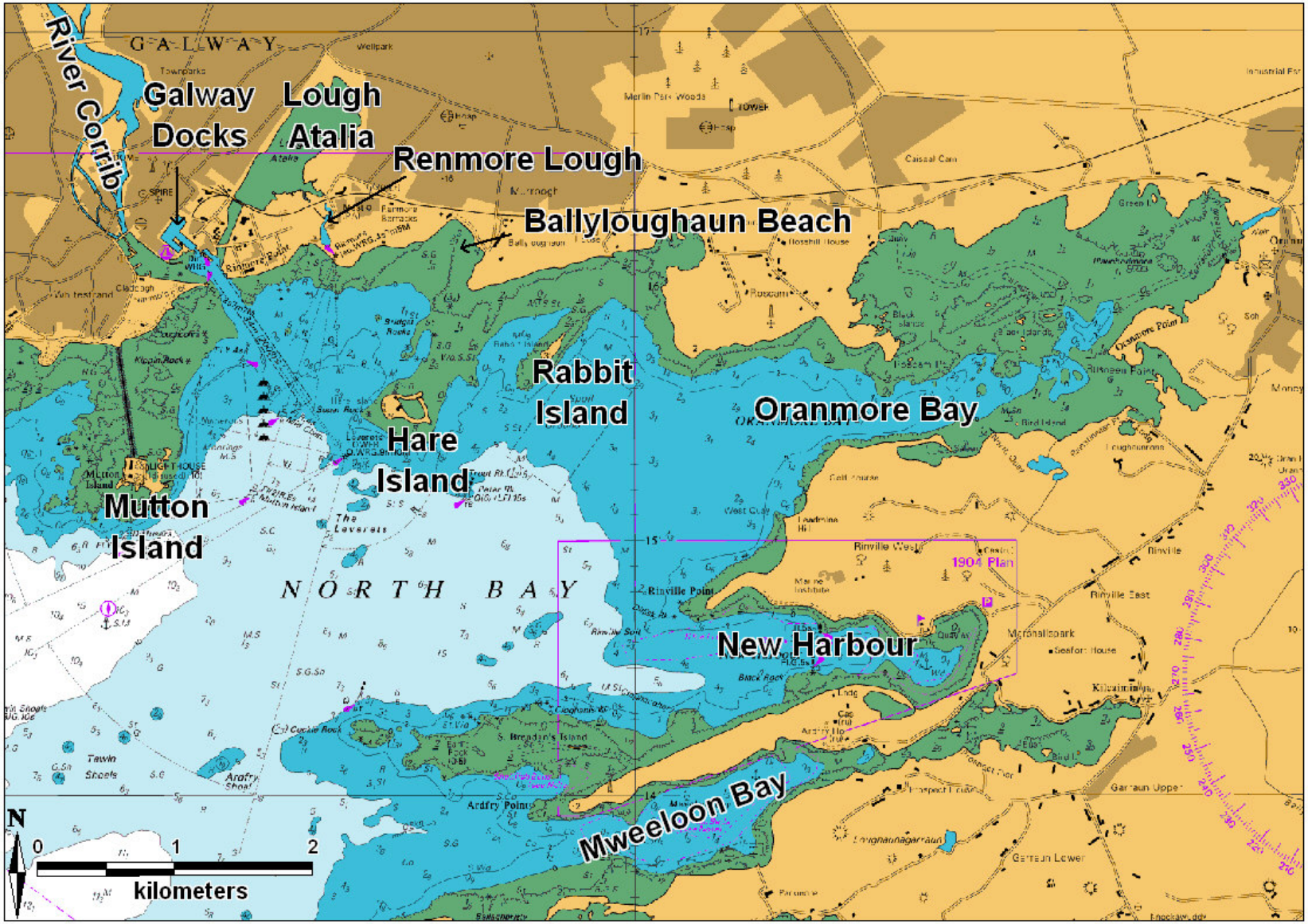


Figure 2.6 - Inner Galway Bay Area

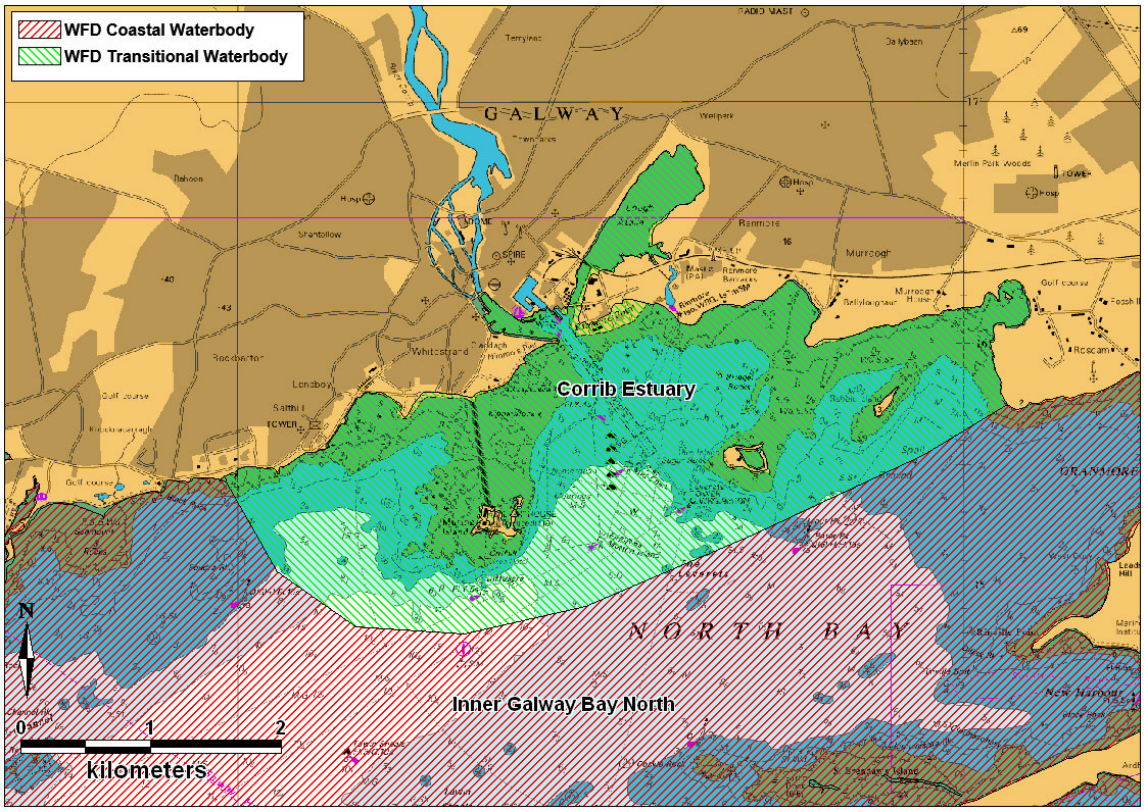


Figure 2.7 - Water bodies in the northeastern part of Inner Galway Bay (EPA)

Current flow on the west coast of Ireland has been studied by Tulloch & Tait (1959) and, in Galway Bay, by Booth (1974). Both studies show that the tidal pulse along the west coast is from the south to the north on the flooding tide. Maximum tidal differences between low water and high water Spring tides is *ca* 5.6 m. Water enters the bay from the south, primarily through the South Sound with the Foul (between Inisheer and Inishmaan) and Gregory (between Inishmaan and Inishmore) Sounds being less important in this respect. Circulation is anticlockwise with water leaving the bay chiefly through the North Sound (Booth, 1974) (see Figure 2.5). This overall south to north net flow agrees with Monahan's (1977) findings and directs fresh (largely Corrib) water outflow along the North Shore with suspended materials being deposited over this area. The deflection of the Corrib water westwards along the north shore of Galway Bay is driven largely by the Coriolis effect. While predominantly neritic *i.e.* inshore and "estuarine" (Booth 1974) in nature, the bay is subject to periodic intrusions of oceanic water masses (O'Brien 1976, 1977; Fives & O'Brien 1976). Both Lusitanian and North Atlantic Drift indicator species have been taken in the plankton of the Mid Bay (Fives & O'Brien 1976).

Transport of nutrients and bacteria in inner Galway Bay depends on a number of variables including current speed and direction, wind speed and direction, river flow and tidal conditions. Water movement in Galway Bay is complex and variable and is strongly influenced by wind. Current directions are mainly between northeast and east during flood tide and between southwest and northwest during the ebb tide. For Spring tides, the ebb pattern is dominated by tidal currents while the flood pattern is diverse with direction influenced to a large extent by wind directions (An Foras Forbartha, 1988).There is also a strong tidal influence under some ebb tides with calm to moderate breezes during Neap tides. The presence of a gyre in the inner portion of the bay has been suggested by Booth (1974) and Harte *et al.* (1982). O'Connor *et al.* (1986) comment on this feature in the light of the distribution of *Amphiura filiformis*.

There is some stratification on different stages of the tidal cycle and other wind conditions. The vertical mixing of the water column in terms of salinity and temperature is weaker during Neap tides than during Spring tides.

The River Corrib is by far the largest input of freshwater to Galway Bay. The river has a very strong effect in structuring the water column in the northeastern section of the inner bay, especially during spate periods. Although this freshwater may follow the anticlockwise flow of the Atlantic seawater within the bay, it can be influenced by the wind velocity and direction (Smith *et al.* 1998). In calm conditions, the river water flows in a westerly direction along the north shore but, when westerly gales are blowing, this water can be backed up into Oranmore Bay and New Harbour (An Foras Forbartha, 1986).

The flow of the River Corrib affects surface salinities in the area, *i.e.* northeast of Mutton and Hare Islands. From there, the freshwater tends to flow seawards in a west/southwest direction. Low salinity at the surface also extends to Oranmore Bay, New Harbour and Mweeloon Bay (An Foras Forbartha, 1988).

On the turn of the tide after low water, the water fills from the southwest as it makes its way eastwards towards Oranmore Bay. Due to the presence of the Mutton Island causeway, the flooding tide is directed around the island and enters the mouth of the River Corrib and also spills into Lough Atalia. The movement of the ebbing tide water is essentially the reverse of this.

Winds coming from the west to the southwest sector are the strongest winds in inner Galway Bay. These winds can modify surface water current speeds causing water to be forced either to the north during southerly wind flows or easterly if the wind comes from the west. These prevailing wind conditions generate an easterly moving long shore drift in inner Galway Bay. The Mutton Island causeway intercepts any sediment mobilised by this long shore drift and thereby has reduced the extent of material being carried onto Ballyloughaun Beach and into the area of the proposed Galway Harbour extension.

In terms of river flow, there is a strong seasonality regarding to volume between Winter and Spring months with Winter having the largest flows. Open water tidal velocities in the area are low and do not exceed 30 cm/sec. However, when the Corrib River is in spate, ebb tide velocities can reach *ca* 60 cm/sec. In the access channel into Lough Atalia, velocities can exceed 1.5 m sec.

Water Framework Directive monitoring results from 1994 to 2011 collected by the EPA were reviewed, In the Corrib Estuary transitional waters, annual median ammonia (NH_3) values ranged from 0.01 to 0.3 mg/l, annual median total organic Nitrogen (TON) values ranged from 0.01 to 0.92 mg/l (not all years were sampled and there are variations in the sampling effort each year). In the Inner Galway Bay North coastal water body, annual median NH_3 values ranged from 0.01 to 0.3 mg/l, annual median TON values ranged from 0.01 to 0.3 mg/l and annual median PO_4 values ranged from 4.99 to 24 µg/l from 1994 to 2011.

Heavy metal levels measured over the past (An Foras Forbartha, CAAS and AQUAFACT reports) in water samples taken in inner Galway Bay were always very low and results from surveys carried out during the preparation of the NIS showed that all levels were still low.

Water quality in inner Galway Bay has improved greatly since the waste water treatment plant located in Mutton Island became operative in September 2003. The microbiological analyses carried out by AQUAFACT over the 2003 and 2004 period revealed that coliform levels had dropped and that bathing areas such as Salthill and Silver Strand complied with the EU Directive on Bathing Waters. In more recent years, Grattan Beach and Ballyloughaun Beach have complied with the EU Directive on Bathing Waters. This Directive was also used as a guideline to compare values obtained from areas not designated as bathing areas such as Lough Atalia and Oranmore. These areas, especially Lough Atalia (Moloney *et al.*, 1990), have traditionally been regarded as polluted. Samples obtained by AQUAFACT showed that coliform levels were below the EU regulations on most of the occasions since September 2003 (AQUAFACT, 2004).

O'Connor *et al.*(1993) describe the benthic assemblages and sea bed characteristics of a section of Greater Galway Bay, all of Outer Galway Bay and a large part of Inner Galway Bay while Shin

et al. (1982) describe the benthic habitat of North Bay, some of which falls within the proposed development site.

2.2.2. Terrestrial Habitats

A detailed assessment of terrestrial habitats was carried out and this can be seen in Chapter 7 of the EIS. The areas to the east and west of the existing and proposed harbour lands are primarily made up of amenity grasslands (GA2) and built environment (BL3). There are also sections of sea walls and jetties to the west of the proposed development area at South Park, Claddagh Quay and Mutton Island Causeway (see Figure 2.8 following).

The area along the east and southeastern shore of Lough Atalia was classified as Lower and Upper Saltmarsh (CM1/CM2). The area contained Sea Aster (*Aster tripolium*), Sea Plantain (*Plantago maritima*), Common Scurvy grass (*Cochleria officinalis*), Creeping Bent (*Agrostis stolonifera*), Red Fescue (*Festuca rubra*), Sea Rush (*Juncus maritimus*), Sea Club-rush (*Bolboschoenus maritimus*) and Saltmarsh Rush (*Juncus gerardi*). There were also some small patches or beds of Reed (*Phragmites australis*), although these were not considered large enough to classify separately as Reed and large sedge swamps (FS1). This area of salt marsh occupies the fringe of the eastern side of Lough Atalia and its south-eastern corner. The area is considered a mosaic of lower and upper salt marsh that is equivalent to both the EU Habitats Directive Annex I habitats 'Atlantic salt meadows (Natura 2000 Code 1330)' and 'Mediterranean salt meadows (Natura 2000 Code 1410)'.

A small area of heavily vegetated shingle and gravel bank habitat (CB1) (Perennial vegetation of stony banks [1220]) is present along the southern end of Renmore Lough between it and the sea shore. Due to its overgrown character, it is difficult to define its extent but it is *ca* 2 m wide and 30 m long and runs in an east - west direction. This smae habitat type is present as a narrow strip along South Park and on Mutton Island.

Grassland habitats comprise much of the remaining terrestrial habitat surrounding Lough Atalia, including Amenity grassland (GA2), Dry meadows and grassy verges (GS2) and Improved agricultural grassland areas. Mown and managed Amenity grassland lines the western fringe of Lough Atalia by the side of Lough Atalia Road and at the northern end by the Huntsman public house. There are some areas of this habitat dominated by False Oat-grass (*Arrhenatherium elatius*) and Couch-grass (*Agropyron repens*), with other herbs and punctuated with occasional patches of Bramble (*Rubus fruticosus* agg.), on the eastern side of Lough Atalia between Lakeshore Drive and the water. This area of habitat does not correspond to those protected under Annex I of the Habitats Directive or those identified as qualifying interests of the Galway Bay Complex cSAC.

A small area of improved agricultural grassland is located on higher ground on the eastern side of Lough Atalia. This area can be reached via an old farm track and where a number of large metal containers associated with a sailing club are located. This area does not appear to have been much used for grazing recently and the hedges do not seem to have recently been cut. The whole area (except where the containers are placed and where sailing club activities keep the ground open) is likely to revert to scrub unless management is undertaken to prevent this.

In addition to grassland and salt marsh, there are several areas of scrub at Lough Atalia, particularly in the south-east corner near to the railway line. Species present included Gorse (*Ulex europaeus*), Common Sallow (*Salix cinerea* ssp. *oleifolia*), Whitebeam (*Sorbus* spp.) and Hawthorn (*Crataegus monogyna*). A number of small garden plots on the western side of Lough Atalia between Lough Atalia Road and the water. These gardens belong to the houses almost opposite them on the other side of Lough Atalia Road and are considered Flower bed and border habitat (BC4). Dry stone walls act as boundary markers and stock barriers for old fields on the eastern side of Lough Atalia between Lakeshore Drive and the water. This habitat is classified as Stonewalls and other stonework (BL1) in accordance with Fossitt (2000). Stone sea walling at the northern end of Lough Atalia in the vicinity of the Huntsman public house is considered Sea wall, pier and jetties (CC1) habitat. None of the above habitats correspond to those protected

under Annex I of the Habitats Directive or those identified as qualifying interests of the Galway Bay Complex cSAC.

Habitats at Mutton Island include salt marsh (CM1/2), dry meadows (GS2), sea wall (CC1), spoil and bare ground (ED2) and shingle and gravel banks (CB1).

A map of the terrestrial habitats in the vicinity of the proposed harbour extension is provided in Figure 2.8 following.

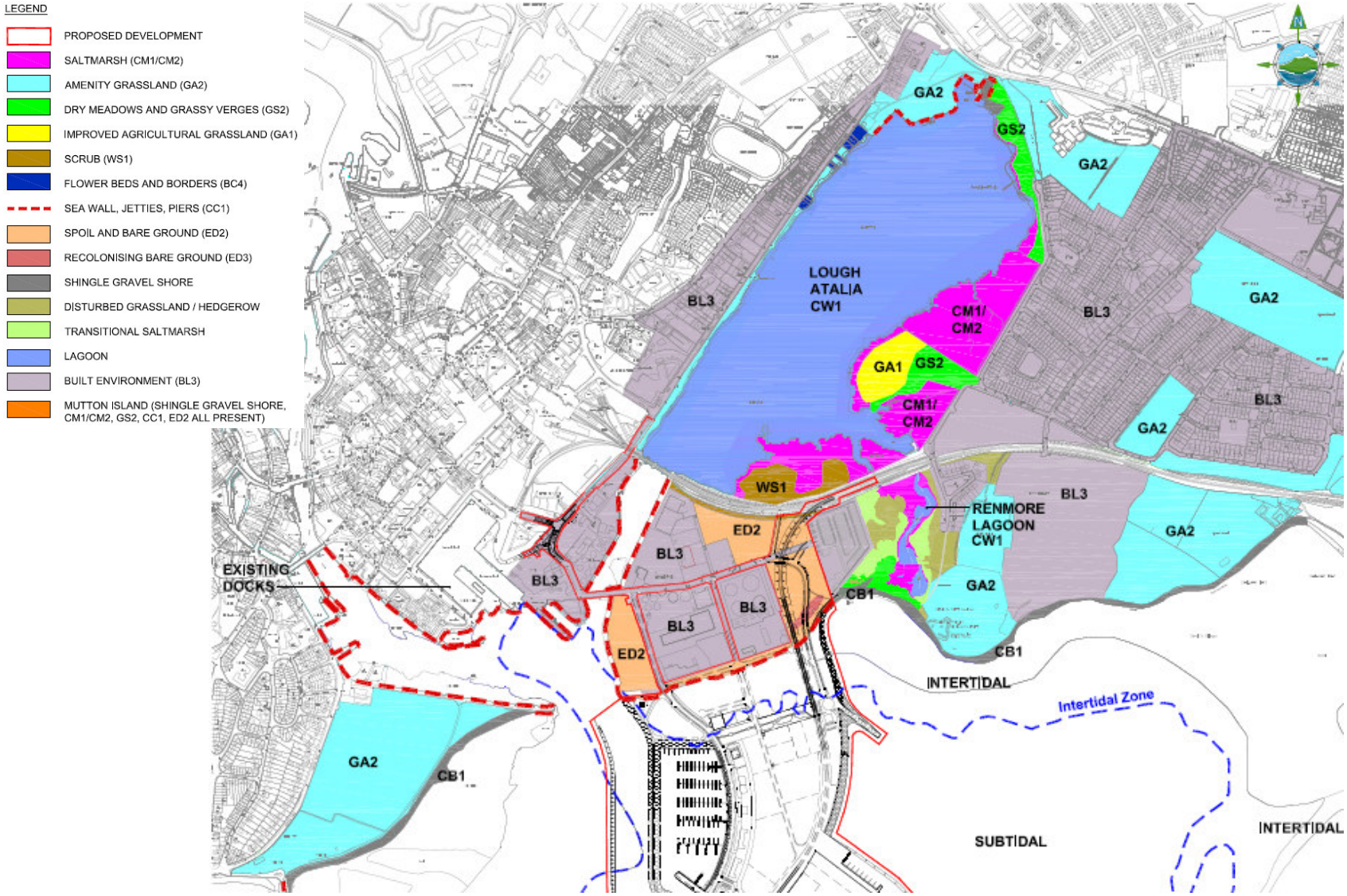


Figure 2.8 - Terrestrial habitats present in the vicinity of the proposed harbour extension

Lough Atalia and Renmore Lough comprise a water body that is approximately 40 ha in extent. To the south of the railway bridge, there is a narrow (50-75 m wide) rocky shore channel linking to the sea. The aquatic habitat of Lough Atalia is discussed in more detail in Section 2.2.3 below.

The terrestrial habitats adjacent to the proposed development and surrounding Lough Atalia are as follows:

- Lower & Upper Saltmarsh (CM1/CM2) 9.4 ha
- Stony banks and gravels (CB1) 0.1 ha
- Amenity grassland (GA2) 3.5 ha
- Dry meadows and grassy verges (GS2) 2.4 ha
- Improved agricultural grassland (GA1) 1.6 ha
- Scrub (WS1) 1.6 ha
- Flower beds and borders (BC4) 0.3 ha
- Stone walls and other stonework (BL1) 490 m
- Sea walls, piers and jetties (CC1) 570 m

The majority of the terrestrial habitats within the site of the proposed development comprise those associated with human disturbance and development, including spoil and bare ground, recolonising bare ground and buildings and artificial surfaces. The terrestrial habitats present, as classified according to the scheme detailed in Fossitt (2000) are outlined below:

- Spoil and bare ground (ED2) 4.34 ha
- Buildings and artificial surfaces (BL3) 3.76 ha
- Recolonising bare ground (ED3) 0.26 ha
- Dry meadows and grassy verges (GS2) 0.25 ha
- Amenity Grassland (GA2) 0.07 ha
- Scrub (WS1) 0.11 ha
- Sea walls, piers and jetties (CC1) 570 m

The diversity of terrestrial habitats within the development footprint was considered to be poor and much of the area has been or is still subject to human disturbance. None of the plants that are found in this area of particular conservation significance, some of them being introduced or escaped alien species.

A map of the terrestrial habitats within the development footprint is provided in Figure 2.9 below.

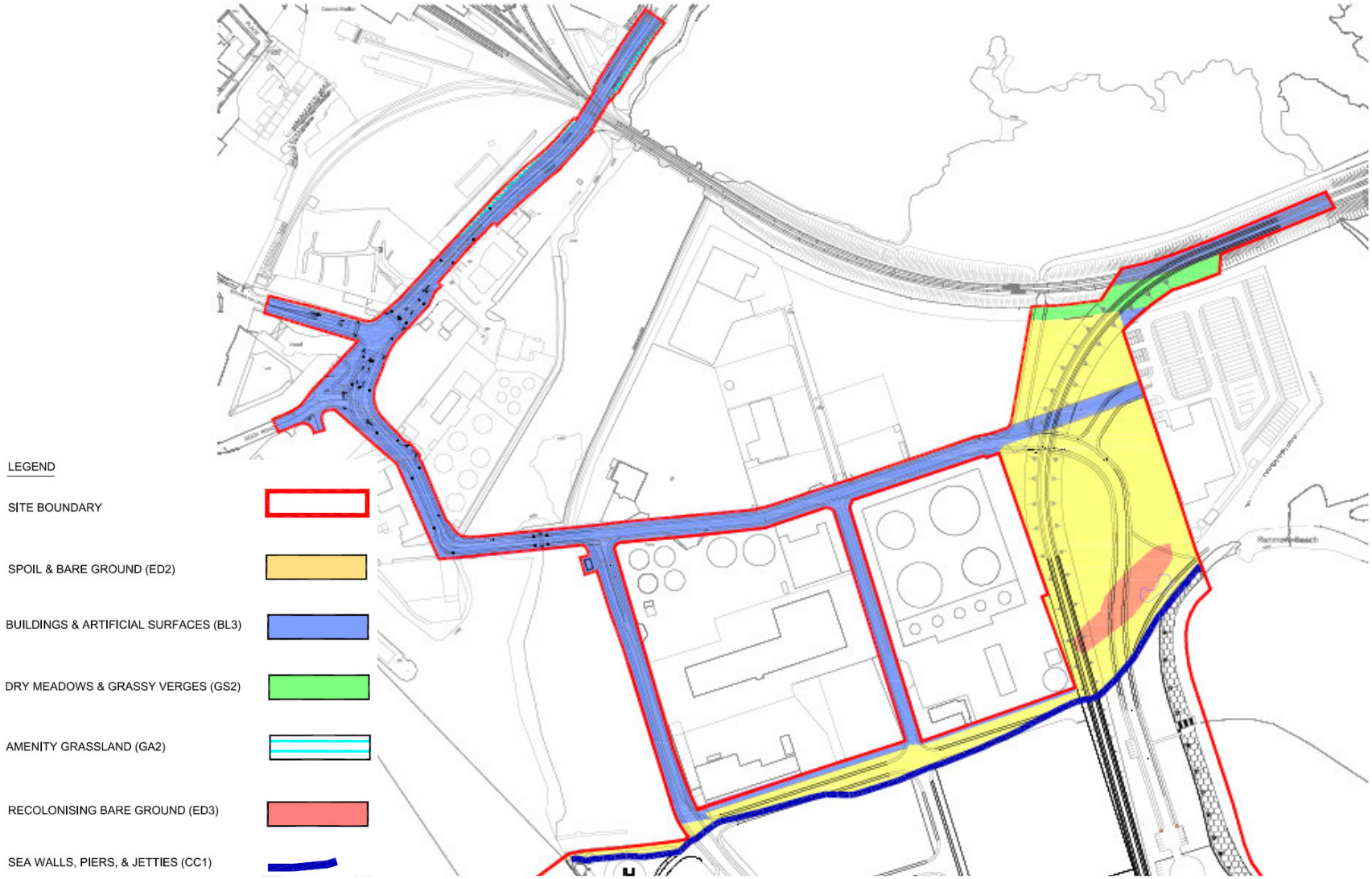


Figure 2.9 – Terrestrial Habitats in Development Footprint

The terrestrial habitats occurring within the development footprint are not listed amongst those that are protected under Annex I of the Habitats Directive or those identified as qualifying interests of the Galway Bay Complex cSAC.

The loss of habitats of this nature would not be considered significant, given their lack of wildlife value and biodiversity potential. Their potential as terrestrial habitats is limited by their location within an urban city environment, with significant levels of human disturbance. The area is isolated from other terrestrial areas of higher wildlife potential within the city, although the area has links to marine and intertidal habitat areas.

2.2.3. Lagoonal Habitat

A detailed assessment of Lough Atalia was carried out and this can be found in Chapter 7 of the EIS. Lough Atalia and its small off-shoot, Renmore Lough comprises an area of ca 40 ha of Inner Galway Bay (see Figure 2.10). Given the presence of at least 3 lagoonal specialists in the Lough Atalia/Renmore Lough water body, the wide variability in salinities and the fact that it only partially empties over the tidal cycle, this habitat falls within the definition of a lagoon. Lagoons are listed in Annex I of the Habitats Directive as a priority habitat, 'Coastal Lagoons' (Natura 2000 Code 1150).

Figure 2.10 - Lough Atalia and Renmore Lough

Lough Atalia has a narrow channel to the south-west connecting it with Inner Galway Bay (see Figure 2.10). There is a shallow sill at the entrance to the lagoon which restricts full tidal flow into and out of it. This corresponds to the characterisation by Healy (2003) of lagoons being at least partially separated from, while still having exchange of water, with the sea. The presence of the sill in Lough Atalia leads to an asymmetrical tide of *ca* nine hours ebb and three hours flood. The sill also acts to retain water at low tide with approximately 80% of the lough remaining inundated at low tide (Oliver, 2007. The intertidal, muddy area in the northern part of Lough Atalia is relatively small in comparison to the large area of water retained.

Renmore Lough (Figure 2.10) is connected to the south-east of Lough Atalia via a cut channel under the railway. It was historically connected to Lough Atalia by a natural channel but this was closed up when the railway line was built and a new channel was opened ca 100m to the west of

the original access point. This goes under the railway line to join the main body of Lough Atalia (Figure 2.10). The water level in Renmore Lough is ca 1 m higher than the top of the culvert under the railway line (marked on Figure 2.10 as “Present Connection”). Sea water can only access Renmore Lough from Lough Atalia at high water on the bigger Spring tides.

Water depths in Lough Atalia are mostly shallow (less that 1 m) but there is a deeper area towards the south-western section of the mouth with depths of up to ca 4m and which can reach >5.5m at high water. Depths of Renmore Lough range between 0.15-0.85m.

Current velocities around the mouth vary from 0.15 - 3m/s with lower velocities in the rest of the lough; often at the minimum of 0m/s but sometimes rising to 0.05m/s in the centre. Weak water currents compared to those of estuaries are a characteristic of lagoons (Healy, 2003).

Salinities within Lough Atalia range from 0.4 to 29.4 psu (practical salinity unit). Over the course of Spring-Neap tidal cycles, surface salinities range from 0.4 to 28.8 psu and bottom salinities range from 10 to 29.4 psu. Salinity in Renmore Lough ranges from 2.2 to 23.9 psu with the extreme values at its northern end. The extensive range of salinities recorded both in Lough Atalia and Renmore Lough classifies them as poikilohaline systems (poikilohaline = high variability in salinities). Millar *et al*. (1990) note that mean salinity values range from 0 – 35 psu and comment that lagoonal species are usually quite tolerant of a wide salinity range.

Of the 50 species known to occur in Lough Atalia and Renmore Lough (from Oliver, 2007; Sotillo *et al*., 2011; AQUAFACT, 2010 - 2013), 3 (*Chaetomorpha linum, Jaera nordmanni* and *Palaemonetes varians*) are considered to be lagoonal specialist species (Healy, 2003; Oliver, 2007).

A review of species and where they occur in Lough Atalia clearly showed that the bed of the lough is very species poor (see Chapter 7 of the EIS). The more biologically diverse area is the intertidal zone. However, as noted in Oliver (2007), Lough Atalia is of no conservation value.

2.2.4. Intertidal Habitats

A detailed assessment of intertidal habitats was carried out and this can be seen in Chapter 7 of the EIS. The intertidal area (dark blue shaded area on Figure 2.11) can be described as a sheltered shore with much of the eulittoral zone being covered by brown and green algae. Small patches of lichen (*Caloplaca, Verrucaria*) and *Pelvetia canaliculata* are present on rocks above high water and in the upper shore respectively. *Fucus spiralis* is present close to the top of the shore while *Fucus vesiculosus* and *Fucus ceranoides* are present from the top of the shore to the mid shore. *Ascophyllum nodosum* covers the bulk of the mid-eulittoral along with *Polysiphonia lanosa*. Patches of *Chondrus crispus* are present throughout the mid shore and *Ulva* sp. (formerly *Enteromorpha*) is present on the boulders of the revetment wall and down the shore. *Ulva lactuca* is present on the lower shore. *Fucus serratus* is present low down on the shore nearest the water’s edge. The substrate along the western boundary consisted predominantly of gravels and pebbles with boulders scattered throughout. The shore extended to 120 m along this boundary (Figure 2.11)

The intertidal area consists of a mosaic of typical intertidal macroalgae and macrofauna, mussel reefs and exposed muddy shores. The intertidal area is classified by Fossitt as a ‘mixed substrata shore’ (LR4). Further to this, NPWS describe the intertidal habitat as a ‘fucoid dominated intertidal reef complex’ and this represents a combination of both ‘mudflats and sandflats not covered by seawater at low tide’ and ‘reefs’ (1140 and 1170 respectively) as described in the EU Habitats Directive. Both are Annex I Habitats under this Directive (see Section 2.2.9.1, Section 3.6 and Table 3.32 below for further discussion on Annex I Habitats). Figure 2.11 shows this Annexed habitat.

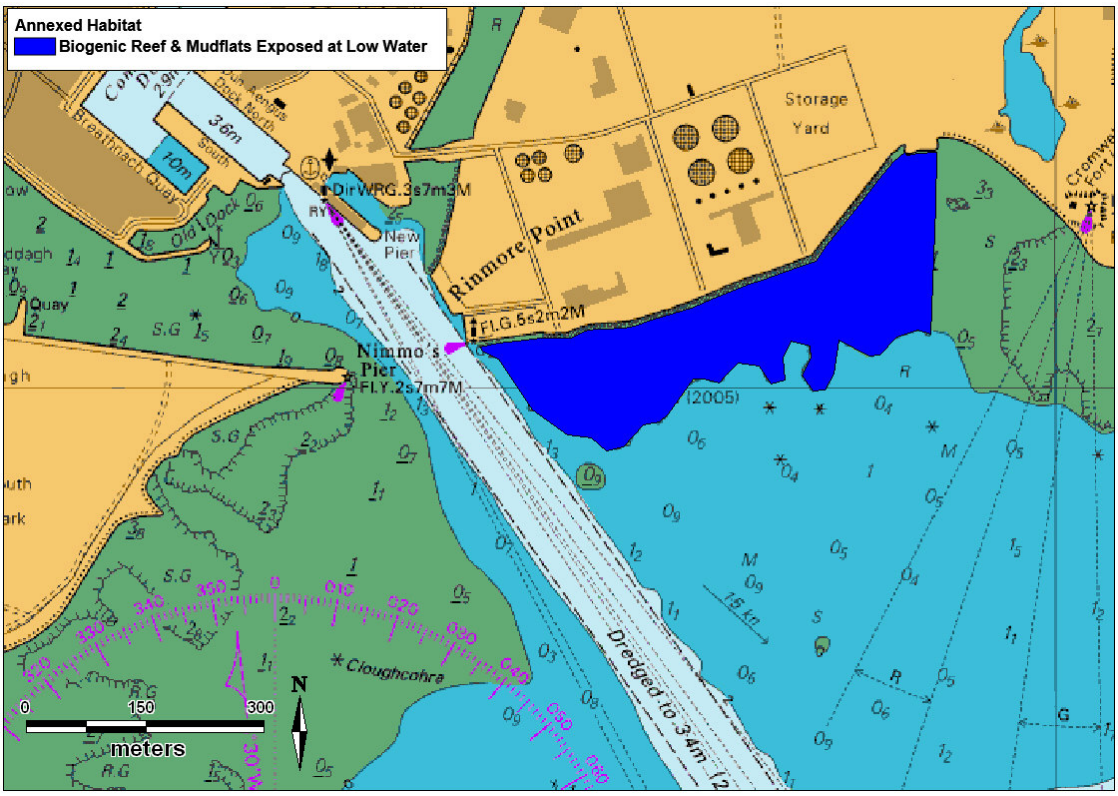


Figure 2.11 - Habitat map of annexed marine habitats in and around the proposed development

2.2.5. Marine Habitats

A detailed assessment of marine habitats was carried out and this can be seen in Chapter 7 of the EIS. Sediments in the proposed development area are predominately fine sands and silt-clay. The sea floor in the general area is relatively poorly oxygenated with successional stage values (from SPI analysis) indicating that the area of Galway Bay where it is proposed to build the Galway Harbour extension is of low to medium quality. Organic carbon content (between 2 – 5.2%) in this region is not considered to be excessively high or uncommon for this area. Although heavy metal concentrations in the area are elevated for the most part, they are below the lower guidance level of Cronin *et al.* (2006). Hydrocarbon and PAH levels are also below the lower guidance level of Cronin *et al.* (2006).

The dominating macrofaunal subtidal species are the bivalve *Kurtiella bidentata,* the tube-dwelling polychaete *Melinna palmata,* the amphipod *Ampelisca brevicornis* and the bivalve mollusc *Thracia phaseolina*. Other dominants include the polychaete *Phyllochaetopterus anglicus*, the amphipod *Crassicorophium crassicorne*, the polychaetes *Nephtys* spp. and *Euclymene oerstedii*, the bivalves *Angulus fabula, Venus casina* and *Thyasira flexuosa*, the gastropod *Turitella communis* and the ophiuroid *Amphiura filiformis*. These species are quite common for this area and are typical of species that inhabit muddy sand areas. Their characteristics identify them with previously recorded communities in the area: the *Melinna palmata* association reported by Keegan *et al.* (1976), Groups A and C recorded by Shin *et al.* (1982) and is an equivalent to the *Telinna fabula* sub-community described by Spärck (1935). Full faunal listings including sediment chemistry and granulometry are presented in Appendices 7.5 and 7.6 to the EIS.

Overall, the faunal assemblage of the area is homogenous. *Kurtiella bidentata* is a common species in this area and *Melinna palmata* is tolerant to organic enrichment. These species are typical of the study area, which is a shallow, moderately exposed site and the species inhabiting it are adapted to on-going natural stresses and disturbances (*i.e.* fluctuations in salinity, strong

waves, tides and storms, periodic high turbidity). No unusual species were observed during the present study.

The habitat within the foot print of the proposed construction/dredge area is comprised of "Transitional water" or "Estuary" which is not a qualifying interest within the cSAC.

Adult mussels form feeding resources for invertebrate species such as carnivorous gastropods and star fish and bird species such as Oystercatcher and Hooded Crow while post larvae and juveniles are a food resource for a wide range of benthic invertebrates.

Figure 2.12 shows the marine communities in the Inner Galway Bay area (NPWS, 2013a).

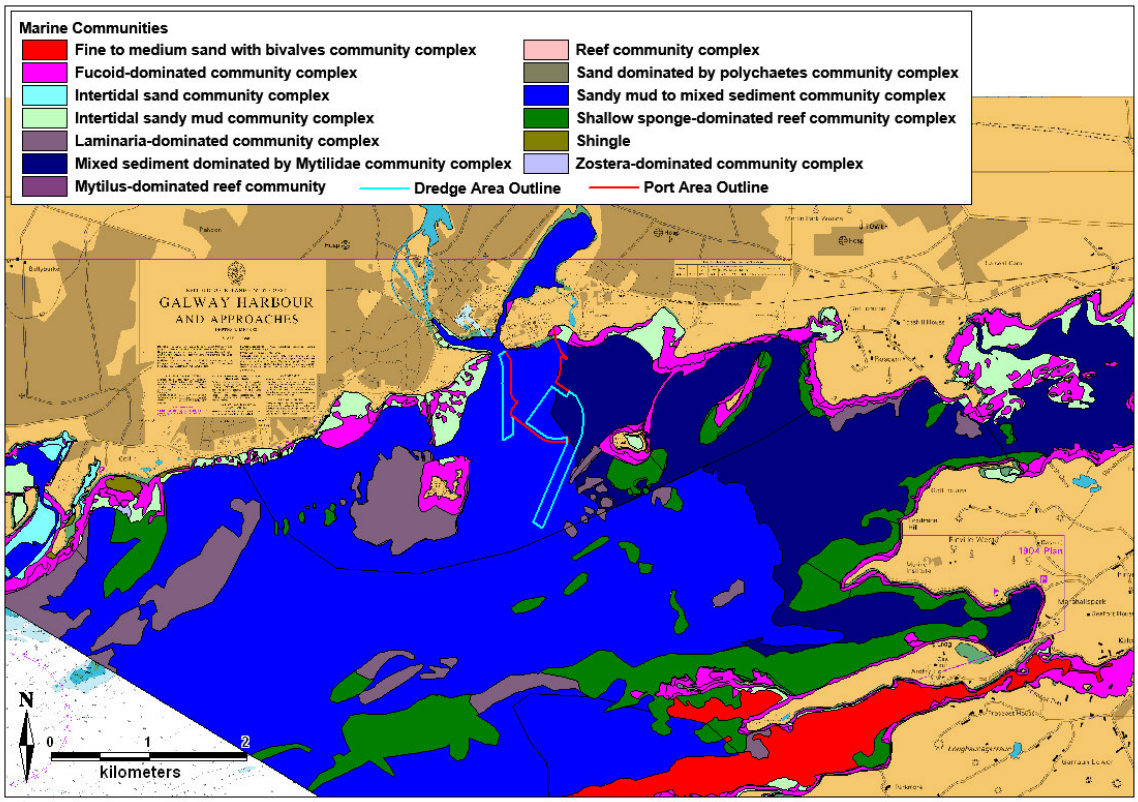


Figure 2.12 - Marine communities in the Inner Galway Bay area (Source: NPWS, 2013a)

2.2.6. Fish Species

The whole of the proposed development site lies within the Galway Fishery, administered by Inland Fisheries Ireland (IFI) from their Galway office. The Galway Fishery District includes the Clare River, the Clarin River and the whole Lough Corrib and Lough Mask catchments, the River Corrib, parts of north coastal Co. Clare and the sea area including Galway Bay and the Aran Islands. The two species of relevance to the proposed development are Atlantic Salmon (*Salmo salar*) which is listed in Annexes II (when in fresh water) and V of the EU Habitats Directive and Sea Lamprey (*Petromyzon marinus*) which is also listed in Annex II of the EU Habitats Directive.

2.2.6.1. Salmon (*Salmo salar*)

The city of Galway is famed around the world as a centre for Salmon angling, both in the River Corrib and in Lough Corrib further to the north. Fewer fish have been recorded in recent years than was the case in the past, a trend that is reflected throughout the range of salmon in Europe and eastern North America.

Salmon are anadromous fish *i.e.* they hatch in freshwater, migrate to the sea, where they mature before returning to their natal areas to breed. They are from 2 to 4 years old when the fully-

silvered juveniles, known as smolts, migrate to the sea. Adult Salmon that have spent a winter at sea are known as grilse. Grilse are the most numerous types of Salmon that are found migrating back into rivers from the sea. Some individuals spend more than one winter at sea before breeding and are referred to as Multi-Sea- Winter (MSW) fish. MSW fish are usually larger than grilse and are known as 'Spring' fish when they migrate back into rivers during the Spring. During the period from 1989 to 2003, the proportion of Spring fish in the total annual angling catch from the Galway Fishery ranged between 3.7% and 41.3% (data courtesy of Mr. Tom McDermott, Marine Institute). Adult Salmon lose 40% of their body weight during migration and spawning and mortality is high. Some adults, known as kelts, survive the spawning season and live to run back downriver and return to sea. A few (3 – 6%) kelts survive to return to their natal rivers again as previous spawners (Hendry and Cragg-Hine, 2003).

Salmon are present in the River Corrib in Galway from January to October: Spring fish come into the river from January to May, whilst returning grilse run upriver from May to August. There is also a smaller Autumn grilse run in September and October. Smolts migrate downriver to the sea from March to May. Recreational angling for Salmon in the area is licensed as part of either the Galway Fishery or that known locally as the 'High Bank Fishery'. Anglers require both a state Salmon License and permit from IFI to use these fisheries. Commercial Salmon trapping ceased after the 1998 season. The Irish Government ordered that drift netting for Salmon off Irish coasts should cease indefinitely from the 1st of January 2007.

There has been much academic interest in the possible impact of mammal and bird predation on salmon populations. Based on observations from the River Dee in Scotland, Carter *et al.* (2001) suggested that migrating adult Atlantic Salmon tend to move into rivers at night and during the ebb tide during Summer and when water levels are low, while at other times of year and during higher river flows Salmon migrate into rivers during the day. The same authors reported that predation by seals on salmonids was observed most often during the day and further suggested that seals may find salmonids easier to catch during daylight. Fish-eating birds such as Gannet (*Morus bassanus*), Cormorant (*Phalacrocorax carbo*), Shag (*Phalacrocorax aristotelis*), Red-breasted Merganser (*Mergus serrator*) and gull species are known to predate on Salmon and, with the exception of Gannet, all of these birds are common in the Inner Galway Bay area. It is likely that divers (also found in small numbers in the area from Autumn to Spring) will prey on Salmon too. The species mentioned generally search for food by sight and so feed during the day. Greenstreet *et al.* (1993) postulated that Salmon smolts migrate at night in order to avoid such predators. Adult Salmon may often be seen during the day, in Spring and early Summer, below the Salmon Weir in Galway City. These fish are lying up before attempting the weir, but it may be that the majority of them would have passed through the area at night had there been no weir to delay their progress. Returning adult salmon do not hold up in the area of the proposed development. Salmon smolts running down the River Corrib do not show any preference for night migration (Tom McDermott, Marine Institute, pers comm.), but migrate during either day or night in groups of perhaps 50, 70 or 90. Their migration down the Corrib seems to be more dependent on river conditions than time of day. It may be that predation pressure from diurnal predators is not a significant factor for the Corrib catchment Salmon population.

A study was undertaken to determine the length of time it takes migrating salmon smolts to move from freshwater to the sea and also to examine the preferred routes taken (see Chapter 7 of the EIS). This was achieved by surgically placing radio transmitters in 100 salmon smolts and by placing listening devices in the mouth of the Corrib, Lough Atalia and at a number of sites in an arc between Ballyloughan and Mutton Island.

In Galway Bay, most fish pass Mutton Island within 24 hours of entering the estuary and the preferred route is between the Leveret's Lighthouse and Mutton Island. As the velocities are predicted to increase with the construction of the harbour extension, transit times will decrease.

Studies on cormorants and seals in the proposed development area indicate that neither species are significant predators of salmon smolts (see Appendix 7.13 & 7.14 of the EIS).

2.2.6.2. Sea Lamprey (*Petromyzon marinus*)

Sea Lamprey is listed in Annex II of the EU Habitats Directive. Adults enter the River Corrib in May and early June to spawn. It was thought that these fish cannot get further upriver than the Salmon Weir; however, video footage collected by a camera located in the fish pass at the Salmon Weir bridge clearly show lamprey moving up through it. The years 2003 and 2004 appear to have been good spawning years for Sea Lamprey and their spawning areas (or redds) were clearly visible just upstream of the Salmon Weir Bridge in 2004 (Dr. Greg Forde, pers comm.). Prior to the year 2003 Sea Lamprey had not been detected travelling upstream in significant numbers into Galway for some years (Seamus Hartigan, IFI, pers comm.). The NPWS has records of this species for Lough Corrib and it is thought that the lake may hold a non-migratory population (pers. comm. Dr. Ferdia Marnell, NPWS).

2.2.7. Mammals

2.2.7.1. Otter (*Lutra lutra*)

Otter is a qualifying interest for both the Lough Corrib and Galway Bay Complex cSACs. Survey work at the site of the proposed development (parts of which lie within the Galway Bay complex cSAC) have demonstrated that Otter is present in the marine area close to the shoreline and that individuals forage both in this area and in adjacent areas (*i.e.* at Mutton Island and in the Renmore Lough area) and that they therefore commute between these foraging sites through the marine area that it is proposed to infill as part of the proposed development (refer to Chapter 7 of the EIS for details of this survey work). Other observations have shown that Otter is present in Lough Atalia. No holt sites were recorded within the site of the proposed development and it is considered unlikely that any part of the site will be used for that purpose by Otter. Figure 2.13 shows the otter habitat, commuting zone and freshwater habitat within the Galway Bay cSAC (NPWS, 2013a).

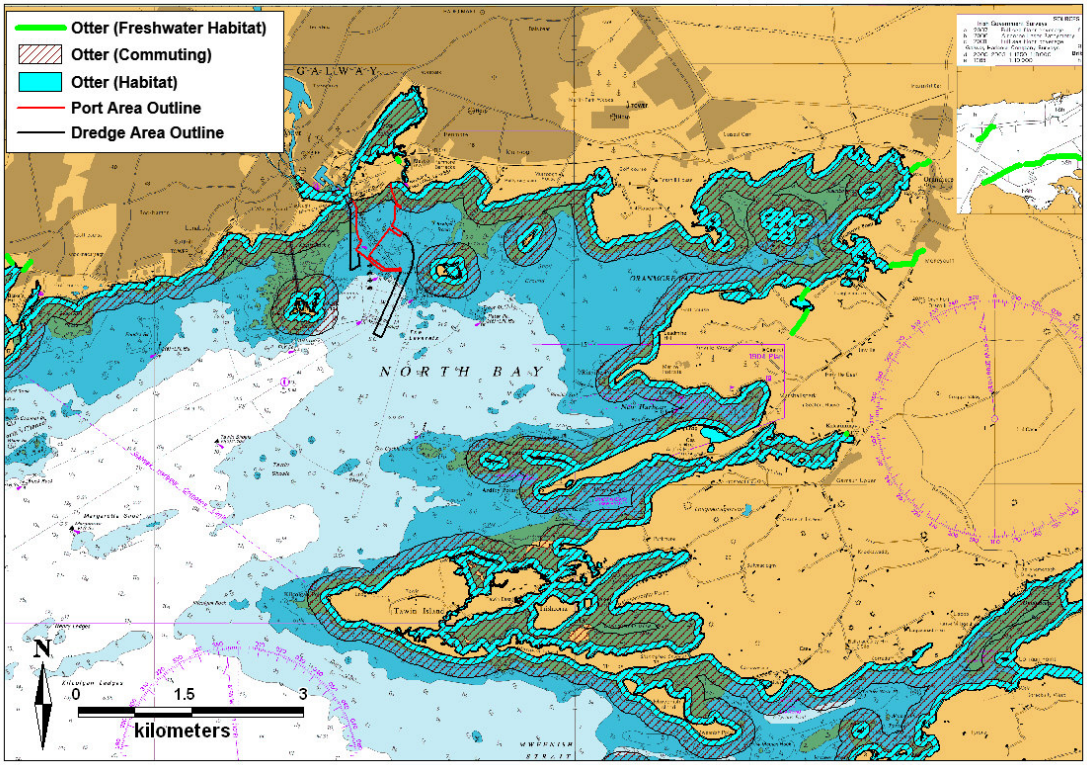


Figure 2.13 - Otter habitat (NPWS, 2013a)

2.2.7.2. Harbour Seal (*Phoca vitulina*)

Harbour seal is a qualifying interest for the Galway Bay Complex cSAC. Survey work at the site of the proposed development (parts of which lie within the Galway Bay complex cSAC) have demonstrated that Harbour seal are present in the marine area close to the shoreline and that individuals forage both in this area and in adjacent areas (refer to Chapter 7 and Appendix 7.14 of the EIS for details of this survey work). Seals also commute between foraging sites through the marine area that it is proposed to infill as part of the proposed development. Figure 2.14 shows the harbour seal sites in the vicinity of the proposed development (NPWS, 2013a).

Baseline data for the various seal haul-out sites in the wider area around the site of the proposed development were gathered over the course of one year. The nearest regularly-used resting haul out site (Rabbit Island) lies approximately 1.5 km from the development footprint, although there is one site that is occasionally used as a resting site by small numbers of seals (a maximum of two were recorded) that lies 175 m east of the development footprint. Observations have shown that common Seal use Lough Atalia on a regular basis (there is a small single-rock resting haul-out site near to the railway bridge); although the maximum number of individuals recorded was only two. The nearest important haul-out site is at Oranmore Bay (approximately 5 km east of the development site).

Although haul-out surveys do not account for migration into or from large areas of habitat like Galway Bay, the data from the haul-out surveys and continuing NPWS survey seem to indicate that the numbers of seals in the area are at least stable and may be increasing.

2.2.7.3. Other marine mammal species

Three other species occur in Inner Galway Bay and these are Bottle nosed Dolphin, Grey Seal and Harbour Porpoise, the latter being present on almost a daily basis. These three species are capable of undertaking long (100's of kilometers) distance journeys.

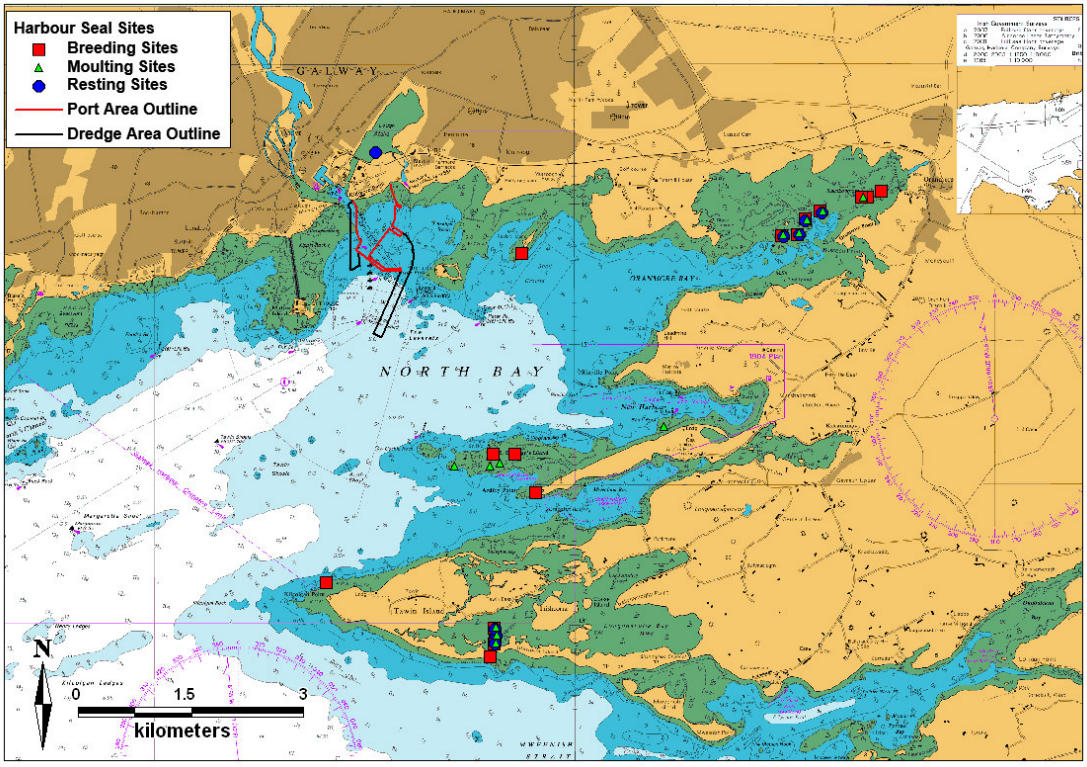


Figure 2.14 - Harbour seal sites in the vicinity of the proposed development site (NPWS, 2013a)

2.2.7.4. Bats

Two species of bat Common Pipistrelle (*Pipistrellus pipistrellus*) and Soprano Pipistrelle (*P. pygmaeus*), were recorded during a dedicated bat survey (Refer to Chapter 7 of the EIS for details of this survey work). The species recorded are the two most numerous and frequently recorded in Ireland, commonly foraging at street lights which most other Irish bat species will avoid. They also feed along the tidelines of beaches in still conditions (presumably on winged insects associated with washed-up seaweed). However, bats will avoid exposed coastal areas on occasions when the winds are anything more than moderate. Further, both species will roost in buildings that have enough insulation to ensure a relatively stable temperature, including older buildings and modern houses.

The numbers of bat passes recorded during the survey were few, only six in a period of six hours and forty-five minutes. A registration rate of less than one pass per hour is less than would be expected during good night weather conditions in any town park or suburban garden.

Lesser Horseshoe Bat, a qualifying interest of the Lough Corrib cSAC, was not identified as part of the bat survey and there are no records of any roost site in the immediate area. Roosts are usually situated in old buildings, structures such as ice houses or souterrains and in caves or tunnels.

Given the small number of registrations of bats made (*i.e.* only six passes recorded in six hours and forty-five minutes), the behaviour observed and the species involved, indications are that the site is not of significance for bats, only for small-scale foraging during calm weather. The failure to record any bats until more than 40 minutes after sunset and for more than four hours before sunrise is suggestive that there are no roost sites in the near vicinity to the area surveyed.

2.2.8. Birds

Of the 20 special conservation interest species for which the Inner Galway Bay SPA was designated, thirteen were recorded foraging or resting/roosting within the development site study area during thirteen months of survey work (refer to Chapter 7 and Appendix 7.15 of the EIS for details of this survey work). These thirteen species were: Great Northern Diver, Cormorant, Grey Heron, Light-bellied Brent Goose, Red-breasted Merganser, Turnstone, Sandwich Tern, Common Tern, Wigeon, Curlew, Redshank, Black-headed Gull and Common Gull. Of these thirteen species, eight are from a total of ten Special Conservation Interest (SCI) selection species for the SPA, while five are additional SCI species.

2.2.8.1. Birds using the site shoreline and intertidal area

Table 2.2 shows the maximum recorded numbers of the bird species that were observed using the shoreline and intertidal area within the site of the proposed development during the watches that were held during the March 2011 to March 2012 period. The birds included are those that are listed as Special Conservation Interests of the Inner Galway Bay SPA. The maximum number of each species recorded using the site is shown alongside the maximum number for that species recorded during I-W*e*BS counts in the area corresponding to the Inner Galway Bay SPA over the winter of 2011 – 2012 and the percentage of the I-W*e*BS maxima represented by the site counts is also shown.

Species	Max. count at site	I-WeBS max 2011-2012	% SPA total (from I-WeBS)
Black-headed Gull	4	2115	0.2
Brent Goose	16	1936	0.8
Common Gull	2	1717	0.1
Cormorant	2	194	1.0
Curlew	2	672	0.3
Grey Heron	2	136	1.5
Redshank	1	902	0.1
Turnstone	19	393	4.8
Wigeon	2	3564	<0.1

Table 2.2. Birds recorded using the site shoreline and intertidal, 2011 – 2012, compared with I-WeBS counts 2011-2012.

Table 2.3 shows the same species and site maxima alongside the figure for one percent of the international population of the species (also known as the threshold for international significance, *i.e.* a site is of international importance for a species if 1% of the international population is present) after Wetlands International (2006).

Species	Max. count at site	1% International Population	% International Threshold
Black-headed Gull	4	20,000	<0.1
Brent Goose	16	260	6
Common Gull	2	16,000	<0.1
Cormorant	2	1,200	0.2
Curlew	2	8,500	<0.1
Grey Heron	2	2,700	<0.1
Redshank	1	3,900	<0.1
Turnstone	19	1,500	1.3
Wigeon	2	15,000	<0.1

Table 2.3. Birds recorded using the site shoreline and intertidal, 2011 – 2012, compared with international thresholds.

Inspection of the results of the survey work for the shoreline and intertidal area at the site reveal that it is used by small numbers of waterfowl and waders. None of the species' maximum count numbers constitutes as much as 5% of the maximum recorded number for the 2011 – 2012 winter season I-WeBS counts for the Inner Galway Bay SPA as a whole and none is more than a few percent of the relevant 1% international population threshold.

2.2.8.2. Birds using the site marine area

The maximum numbers of SCI bird species that were observed using the site marine area are shown in Table 2.4.

Species	Max. count at site	I-WeBS max 2011-2012	% SPA total (from I-WeBS)
Black-headed Gull	69	2115	3.3
Brent Goose	5	1936	0.3
Common Gull	7	1717	0.4
Common Tern	4		
Cormorant	6	194	3.1
Great Northern Diver	8	146	5.5
Red-breasted Merganser	3	248	1.2
Sandwich Tern	13		
Wigeon	12	3564	0.3

Table 2.4. Birds recorded using the site marine area, 2011 – 2012, compared with I-WeBS counts 2011-2012.

Table 2.5 shows the same species and site maxima alongside the figure for the 1% international threshold.

Species	Max. count at site	1% International Population	% International Threshold
Black-headed Gull	69	20,000	0.3
Brent Goose	5	260	1.9
Common Gull	7	16,000	<0.1
Common Tern	4	1,900	0.2
Cormorant	6	1,200	0.5
Great Northern Diver	8	50	16
Red-breasted Merganser	3	1,700	0.2
Sandwich Tern	13	1,700	0.8
Wigeon	12	15,000	<0.1

Table 2.5. Birds recorded using the site marine area, 2011 – 2012, compared with international thresholds.

The figures for the maximum numbers of birds recorded in the marine area at the site reveal that most species are not present at the site in numbers that are significant in terms of the SPA as a whole. The maximum recorded numbers Great Northern Diver do equal a greater proportion of 2011 – 2012 SPA I-WeBS maxima (5.5%), although there is a possibility that this has been skewed to some extent by the differing degrees of observer effort when the site survey is compared with the I-WeBS counts. No recent figures are available for the summering populations of Common Tern and Sandwich Tern in inner Galway Bay. However, if 50 – 100 pairs of Common Tern are present at the Rabbit Island colony and perhaps 100 pairs of Sandwich Tern at the colony in Corranroo Bay, then minimum populations must be 100 – 200 Common and 200 Sandwich Tern.

2.2.8.3. Divers at the site and at the comparison site

Table 2.6 shows the 2011 – 2012 I-WeBS count maxima Great Northern Diver, along with the maximum counts at the site of the proposed development and at the comparison site at Traught, with these figures also expressed (in parentheses) as percentages of the I-WeBS count maxima for the Inner Galway Bay SPA in the 2011 – 2012 winter season.

Species	I-W*e*BS max 2011-2012	Max. count at site	Max. count at Traught
Great Northern Diver	146	8 (5.5%)	25 (17.1%)

Table 2.6. Great Northern Divers recorded using the site marine area and the comparison site at Traught, 2011 – 2012, compared with I-W*e*BS maxima for the 2011 – 2012 winter season.

As can be seen from Table 2.6, the maximum diver counts recorded at Traught were much higher than those recorded at the site marine area. This is in agreement with I-WeBS data from both the 2011 – 2012 I-W*e*BS season and from earlier winters, where the numbers of divers recorded on the southern side of Galway Bay have always been larger than those recorded on the northern side of the bay. No particular pattern or variation in the numbers of divers present at either site *i.e.* with respect to state of the tide or time of day was noted.

The intertidal zone within the site of the proposed development is mainly rocky fucoid-covered reef and Mussel (*Mytilus edulis*) reef, with small areas of shelly mud exposed at low tide. The proposed development will entail the loss of 5.93 hectares of this intertidal habitat and 26.93 hectares of subtidal marine habitat. The supratidal habitat within the site of the proposed development is not suitable for wintering waterfowl. Seven of the Inner Galway Bay SPA SCI species were not recorded using the study area during the thirteen months of survey work. Table 2.7 shows the seven SCI species that were not recorded at the site, along with their habitat preferences and the potential for them to utilise the site of the proposed development.

Species	Feeding guild & favoured habitat	Potential at development site
Ringed Plover	Intertidal walker, out of water Intertidal sand and muddy sand	Unlikely due to type of intertidal habitat and known high fidelity for non-breeding sites
Golden Plover	Intertidal walker, out of water Tidal mud and sand flats, freshwater and agricultural land	Unlikely due to type of intertidal habitat
Lapwing	Intertidal walker, out of water open areas of mud or sand flats, or salt marsh	Possible for roosting in small numbers; site habitats not the most ideal for feeding
Dunlin	Intertidal walker, out of water Mainly sand and muddy sand flats	Possible, but site habitat not ideal
Bar-tailed Godwit	Intertidal walker, out of water Sandy costal wetland sites	Unlikely due to type of intertidal habitat
Shoveler	Surface swimmer, dabbler Shallow water, fresh and intertidal	Possible for small numbers feeding and roosting
Teal	Surface swimmer, dabbler Shallow water, fresh and intertidal, grazes on grasses in supratidal zone	Possible for small numbers feeding and roosting

Table 2.7 - Potential for unrecorded SCI species at site.

The numbers of conservation interest birds (and the numbers of other bird species) that use the intertidal zone within the development site are few. Given the low numbers of both species and individuals that use this area and the fact that this type of intertidal habitat is common and widely distributed within the SPA, the intertidal zone is not of high importance for birds. The subtidal zone of the development site is of more importance for birds and the maximum number of Great Northern Diver recorded in this area was 5.5% of the maximum I-W*e*BS count for the SPA during the 2011-2012 season.

2.2.9. Summary of Findings

2.2.9.1. Annex I Habitats Present

The intertidal area consists of a mosaic of typical intertidal macroalgae and macrofauna, mussel reefs and exposed muddy shores. The intertidal area is classified by Fossitt as a 'mixed substrata shore' (LR4). Further to this, NPWS describe the intertidal habitat as a 'fucoid dominated intertidal reef complex' and this represents a combination of both 'mudflats and sandflats not covered by seawater at low tide' and 'reefs' (1140 and 1170 respectively) as described in the EU Habitats Directive. Both are Annex I Habitats under this Directive (see Section 3.6 and Tables 3.1-3.13 below for further discussion on Annex I Habitats).

Saltmarsh occurs outside the development site and is found around Renmore Lough and along the fringe of the eastern side of Lough Atalia and its south-eastern corner. The area is considered a mosaic of lower and upper saltmarsh that correspond to both the EU Habitats Directive Annex I habitats 'Atlantic salt meadows (Natura 2000 Code 1330)' and 'Mediterranean salt meadows (Natura 2000 Code 1410)'.

A small area of shingle and gravel bank habitat occurs east of the proposed development site. It is *ca* 2 m wide by 30 m long.

Lough Atalia and Renmore Lough, which are outside the development site, fall under the EU Habitats Directive definition of "lagoon" and are defined as a priority habitat *i.e.* habitats that require protection.

2.2.9.2. Annex II Species Present

Otter is a qualifying interest for both the Lough Corrib and Galway Bay Complex SACs and is listed in Annexes II and V of the EU Habitats Directive. No holt sites were identified within the site of the proposed development but Otter was recorded as using the marine area close to the shoreline for foraging and commuting.

Harbour seal is a qualifying interest for the Galway Bay Complex cSAC and is included on Annex II and V of the EU Habitats Directive. Survey work at the site of the proposed development has identified that Harbour Seal are present in the marine area close to the shoreline and that individuals forage both in this area and in adjacent areas. The area is used for commuting and foraging by seals. No haul out sites were identified within the site of the proposed development. The nearest regularly used haul out is at Rabbit Island (1.5km) although there are occasionally used sites (by small numbers of seals) at Lough Atalia and at a site 175m east of the proposed development site.

Lough Corrib cSAC includes Atlantic Salmon (*Salmo salar*) among its conservation interests. Atlantic Salmon is listed in Annexes II (when in fresh water) and V of the EU Habitats Directive. This species passes through the site of the proposed development as part of its migration to and from the River Corrib.

Sea Lamprey (*Petromyzon marinus*) is listed in Annex II of the EU Habitats Directive and is a qualifying interest of the Lough Corrib cSAC. Adults enter the River Corrib in May and early June to spawn. This species use the site of the proposed development as part of its migratory route to and from the River Corrib.

The Grey seal *Halichoerus grypus,* Bottlenose dolphin *Tursiops truncatus* and the Harbour porpoise *Phocoena phoconea* are all listed on Annex II of the Habitats Directive and while the Galway Bay cSAC is not designated for their protection, the Bottlenose dolphin and Harbour porpoise are also listed on Annex IV of the Habitats Directive which means they are protected wherever they occur. There is the potential for these species to occur in Galway Bay. While the grey seal is not listed on Annex IV of the Habitats Directive, its potential presence in Galway Bay must also be assessed.

2.2.9.3. Special Conservation Interest Bird Species Present

Of the 20 special conservation interest species for which the Inner Galway Bay SPA was designated, thirteen were recorded foraging or resting/roosting within the development site study area during thirteen months of survey work. These thirteen species were: Great Northern Diver, Cormorant, Grey Heron, Light-bellied Brent Goose, Red-breasted Merganser, Turnstone, Sandwich Tern, Common Tern, Wigeon, Curlew, Redshank, Black-headed Gull and Common Gull. Of these thirteen species, eight are from a total of ten special conservation interest (SCI) selection species for the SPA, while five are additional SCI species.

The results of the survey work for the shoreline and intertidal area at the site reveal that it is used by small numbers of waterfowl and waders (see Chapter 7 and Appendix 7.15 of the EIS). None of the species' maximum count numbers constitutes as much as 5% of the maximum recorded number for the 2011 – 2012 winter season I-W*e*BS counts for the Inner Galway Bay SPA as a whole and none is more than a few percent of the relevant 1% international population threshold.

The figures for the maximum numbers of birds recorded in the marine area at the site reveal that most species are not present at the site in numbers that are significant in terms of the SPA as a whole. The maximum recorded numbers of Great Northern Diver equals a greater proportion of 2011 – 2012 SPA I-W*e*BS maxima *i.e.* 5.5%.

The maximum Great Northern Diver counts recorded at the site of the proposed development were lower than those recorded at the comparison site on the southern side of the inner bay. This agrees with I-WeBS data from both the 2011 – 2012 I-W*e*BS season and from earlier

winters, where the numbers of divers recorded on the southern side of Galway Bay have always been larger than those recorded on the northern side of the bay. No particular pattern or variation in the numbers of divers present at either site *i.e.* with respect to state of the tide or time of day was noted

The intertidal zone within the site of the proposed development is mainly rocky fucoid-covered reef and Mussel (*Mytilus edulis*) reef, with small areas of shelly mud exposed at low tide. The proposed development will entail the loss of 5.93 hectares of this intertidal habitat and 26.93 hectares of subtidal marine habitat. The supratidal habitat within the site of the proposed development is not suitable for wintering waterfowl. Seven of the Inner Galway Bay SPA SCI species were not recorded using the study area during the thirteen months of survey work. It is considered possible that four of these species (Teal, Shoveler, Lapwing and Dunlin) have minor potential to use the site in small numbers, while it is considered unlikely that three (Ringed Plover, Golden Plover and Bar-tailed Godwit) would use the site due to the nature of the habitats that are present.

Of the species of birds observed during site surveys, four were identified as those which are special conservation interests of the Lough Corrib SPA, namely, Common Scoter, Common Gull, Common Tern and Black-headed Gull. The specific links between usage of the Inner Galway Bay SPA and Lough Corrib SPA by these species are not known i.e. it is not possible to say that the individuals identified would use both Natura 2000 sites or whether completely separate populations exist.

2.3. NATURA 2000 SITE IDENTIFICATION

In accordance with the European Commission Methodological Guidance (EC2001), a list of Natura 2000 sites that can be potentially affected by the proposed development has been compiled. Adopting the precautionary principle in identifying these sites, it has been decided to include all Natura 2000 sites within a 15km radius (Scott Wilson *et al.,* 2006) of the development site (see Figures 2.15 and 2.16). This range has been extended for a number of mobile species that have the potential to travel to the proposed development site to feed *i.e.* 50km radius for Harbour seals (Hayden & Harrington, 2000), 170km for Grey seals 160km for Harbour porpoises and 100km for Bottlenose dolphin even though it is considered that in terms of the total population number, the number of individuals that may travel to the proposed site will be low.

The seasonal migration of Bottlenose dolphins out of the Shannon Estuary during the winter indicates that the Shannon cSAC does not cover the entire range of this population and there is a paucity of data on their movements outside the Estuary (Ingram *et al.,* 2001). Applying the precautionary principal, the possibility that some percentage of the Shannon dolphins may enter Inner Galway Bay cannot be excluded and therefore the Lower River Shannon cSAC must be included for assessment. Similarly the West Connacht Coast cSAC population must be included for assessment.

Otters have a range of 15km and therefore fall within the initial radius of 15km identified (Bailey & Rochford, 2006). In addition, a number of species migrate through the proposed development site area moving to and from freshwater spawning grounds *e.g.* Lamprey (*Petromyzon* marinus) and Atlantic salmon (*Salmo salar*). One site has been identified outside the 15km zone for Atlantic salmon.

Many bird species have the potential to fly for much greater distances than 15 km *e.g.* wetland wildfowl and sea birds. However, as the proposed construction site has not been shown to be an important site for many species in comparison to other areas of the SPA, it is considered unlikely that birds would therefore seek specifically to fly from great distances to it. It is also considered that if any do migrate into the site, individual numbers are likely to be low in terms of the overall population size. The scope of this screening exercise has not been extended to include such bird species. Therefore, the only birds assessed are those that are SCIs for SPAs within 15 km of the proposed development.

The QIs and SCIs for each of the identified Natura 2000 sites are given in this section, with any sites brought forward to Stage 2 of the process, Natura Impact Statement, discussed in full detail at that stage.

2.3.1. candidate Special Areas of Conservation (cSAC)

All of the cSACs identified within the ranges set out above can be seen in Table 2.8 along with their qualifying interests (QIs) and their distance and direction from the proposed development site. Figure 2.15 shows the locations of these cSACs in relation to the proposed development site.

cSACs in the Wider Area around the Proposed Development Site		
Designated Site	**Qualifying Interests**	**Distance/Direction from Development Site**
Moneen Mountain 000054	[1065] Marsh fritillary *Euphydryas* (*Eurodryas, Hypodryas*) *aurinia,* [1303] Lesser horseshoe bat *Rhinolophus hipposideros,* [3180] * Turloughs, [4060] Alpine and Boreal heaths, [5130] *Juniperus communis* formations on heaths or calcareous grasslands, [6130] Calaminarian grasslands of the *Violetalia calaminariae,* [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia*)(* important orchid sites), [7220] * Petrifying springs with tufa formation (*Cratoneurion*), [8240] * Limestone pavements	13.4km SSW
Slieve Tooey / Tormore Island / Loughros Beg Bay 000190	[1014] Narrow-mouthed whorl snail *Vertigo angustior,* [1230] Vegetated sea cliffs of the Atlantic and Baltic coasts, [1355] Otter *Lutra lutra,* [1364] Grey seal *Halichoerus grypus,* [2110] Embryonic shifting dunes, [2120] Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes"), [2140] * Decalcified fixed dunes with *Empetrum nigrum,* [2150] * Atlantic decalcified fixed dunes (*Calluno-Ulicetea*), [4060] Alpine and Boreal heaths, [7130] Blanket bogs (* if active only)	161km N
Castletaylor Complex 000242	[3180] * Turloughs, [4060] Alpine and Boreal heaths, [5130] *Juniperus communis* formations on heaths or calcareous grasslands, [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia*)(* important orchid sites), [8240] * Limestone pavements	14.3km SE
Galway Bay Complex 000268	[1140] Mudflats and sandflats not covered by seawater at low tide, [1150] * Coastal lagoons, [1160] Large shallow inlets and bays. [1170] Reefs, [1220] Perennial vegetation of stony banks, [1310] *Salicornia* and other annuals colonising mud and sand, [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), [1355] Otter *Lutra lutra*, [1365] Harbour seal *Phoca vitulina*, [1410] Mediterranean salt meadows (*Juncetalia maritimi*), [3180] * Turloughs, [5130] *Juniperus communis* formations on heaths or calcareous grasslands, [6210] Semi-natural dry grasslands and scrubland facies on	Within cSAC

cSACs in the Wider Area around the Proposed Development Site		
Designated Site	**Qualifying Interests**	**Distance/Direction from Development Site**
	calcareous substrates (*Festuco Brometalia*)(*important orchid sites), [7210] Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae*, [7230] Alkaline fen	
Inishbofin and Inishshark 000278	[1150] * Coastal lagoons, [1364] Grey seal *Halichoerus grypus*, [3110] Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflora*e), [4010] Northern Atlantic wet heaths with *Erica tetralix*, [4030] European dry heaths	80.9km NW
Lough Corrib 000297	[1029] Freshwater pearl mussel *Margaritifera margaritifera,* [1092] White-clawed crayfish *Austropotamobius pallipes,* [1095] Sea lamprey *Petromyzon marinus,* [1096] Brook lamprey *Lampetra planeri,* [1106] Atlantic salmon *Salmo salar* (only in fresh water), [1303] Lesser horseshoe bat *Rhinolophus hipposideros,* [1355] Otter *Lutra lutra,* [1393] Shining sickle moss *Drepanocladus* (*Hamatocaulis*) *vernicosus,* [1833] Slender naiad *Najas flexilis,* [3110] Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflora*e), [3140] Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp., [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia*)(*important orchid sites), [6410] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), [7110] * Active raised bogs, [7120] Degraded raised bogs still capable of natural regeneration, [7150] Depressions on peat substrates of the *Rhynchosporion*, [7210] * Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*, [7220] * Petrifying springs with tufa formation (*Cratoneurion*), [7230] Alkaline fens, [8240] * Limestone pavements, [91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles, [91D0] * Bog woodland	0.6km NW
Slyne Head Islands 000328	[1170] Reefs, [1364] Grey Seal *Halichoerus grypus*	77.1km NW
Davillaun Islands 000495	[1364] Grey seal *Halichoerus grypus*	116km NW
Inishkea Islands 000507	[1364] Grey seal *Halichoerus grypus,* [1395] Petalwort *Petalophyllum ralfsii,* [21A0] Machairs (* in Ireland)	121km NW

cSACs in the Wider Area around the Proposed Development Site		
Designated Site	**Qualifying Interests**	**Distance/Direction from Development Site**
Lough Fingall Complex 000606	[1303] Lesser horseshoe bat *Rhinolophus hipposideros,* [3180] * Turloughs, [4060] Alpine and Boreal heaths, [5130] *Juniperus communis* formations on heaths or calcareous grasslands, [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia*)(*important orchid sites), [7210] * Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*, [8240] * Limestone pavements	11.3km SE
Kiltiernan Turlough 001285	[3180] * Turloughs	14.3km SE
Ross Lake and Woods 001312	[1303] Lesser horseshoe bat *Rhinolophus hipposideros,* [3140] Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.	14.6km NW
East Burren Complex 001926	[1065] Marsh fritillary *Euphydryas* (*Eurodryas, Hypodryas*) *aurinia,* [1303] Lesser horseshoe bat *Rhinolophus hipposideros,* [1355] Otter *Lutra lutra,* [3140] Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp., [3180] * Turloughs, [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* Vegetation, [4060] Alpine and Boreal heaths, [5130] *Juniperus communis* formations on heaths or calcareous grasslands, [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia*)(*important orchid sites), [6510] Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*), [7210] * Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae,* [7220] * Petrifying springs with tufa formation (*Cratoneurion*), [7230] Alkaline fens, [8240] * Limestone pavements, [8310] Caves not open to the public, [91E0] * Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)	13.3km S
Maumturk Mountains 002008	[1106] Atlantic salmon *Salmo salar* (only in fresh water), [1833] Slender naiad *Najas flexilis*, [3110] Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflora*e), [4010] Northern Atlantic wet heaths with *Erica tetralix*, [4060] Alpine and Boreal heaths, [7130] Blanket bogs (* if active only), [7150] Depressions on peat substrates of the *Rhynchosporion*, [8220] Siliceous rocky slopes with chasmophytic vegetation	38.6km NW

cSACs in the Wider Area around the Proposed Development Site		
Designated Site	**Qualifying Interests**	**Distance/Direction from Development Site**
Connemara Bog Complex 002034	[1065] Marsh fritillary *Euphydryas* (*Eurodryas, Hypodryas*) *aurinia,* [1106] Atlantic salmon *Salmo salar* (only in fresh water), [1150] * Coastal lagoons, [1170] Reefs, [1355] Otter *Lutra lutra,* [1833] Slender naiad *Najas flexilis,* [3110] Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflora*e), [3160] Natural dystrophic lakes and ponds, [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, [4010] Northern Atlantic wet heaths with *Erica tetralix,* [4030] European dry heaths, [6410] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), [7130] Blanket bogs (* if active only), [7140] Transition mires and quaking bogs, [7150] Depressions on peat substrates of the *Rhynchosporion,* [7230] Alkaline fens, [91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	13.3km WNW
Kilkieran Bay and Islands 002111	[1140] Mudflats and sandflats not covered by seawater at low tide, [1150] * Coastal lagoons, [1160] Large shallow inlets and bays, [1170] Reefs, [1330] Atlantic salt meadows (*Glauco-Puccinellietalia* maritimae), [1355] Otter *Lutra lutra*, [1365] Harbour seal *Phoca vitulina*, [1410] Mediterranean salt meadows (*Juncetalia maritimi*), [1833] Slender naiad *Najas flexilis*, [21A0] Machairs (* in Ireland), [6510] Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)	36.6km W
Lower River Shannon 002165	[1029] Freshwater Pearl Mussel *Margaritifera margaritifera,* [1095] Sea Lamprey *Petromyzon marinus,* [1096] Brook Lamprey *Lampetra planeri,* [1099] River Lamprey *Lampetra fluviatilis,* [1106] Atlantic Salmon *Salmo salar* (only in fresh water), [1110] Sandbanks which are slightly covered by sea water all the time, [1130] Estuaries, [1140] Mudflats and sandflats not covered by seawater at low tide, [1150] * Coastal lagoons, [1160] Large shallow inlets and bays, [1170] Reefs, [1220] Perennial vegetation of stony banks, [1230] Vegetated sea cliffs of the Atlantic and Baltic coasts, [1310] *Salicornia* and other annuals colonizing mud and sand, [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), [1349] Bottlenose Dolphin *Tursiops truncatus,* [1355] Otter *Lutra lutra,* [1410] Mediterranean salt meadows (*Juncetalia maritimi*), [3260] Water	53 – 100km S / SW

cSACs in the Wider Area around the Proposed Development Site		
Designated Site	**Qualifying Interests**	**Distance/Direction from Development Site**
	courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* Vegetation, [6410] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), [91E0] *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)	
Blasket Islands 002172	[1170] Reefs, [1230] Vegetated sea cliffs of the Atlantic and Baltic coasts, [1351] Harbour porpoise *Phocoena phocoena*, [1364] Grey seal *Halichoerus grypus*, [4030] European dry heaths, [8330] Submerged or partly submerged sea caves	156km SW
West Connacht Coast 002998	[1349] Bottlenose Dolphin *Tursiops truncatus*	75km NW

Table 2.8. cSACs identified as having the potential to be impacted by the proposed development.

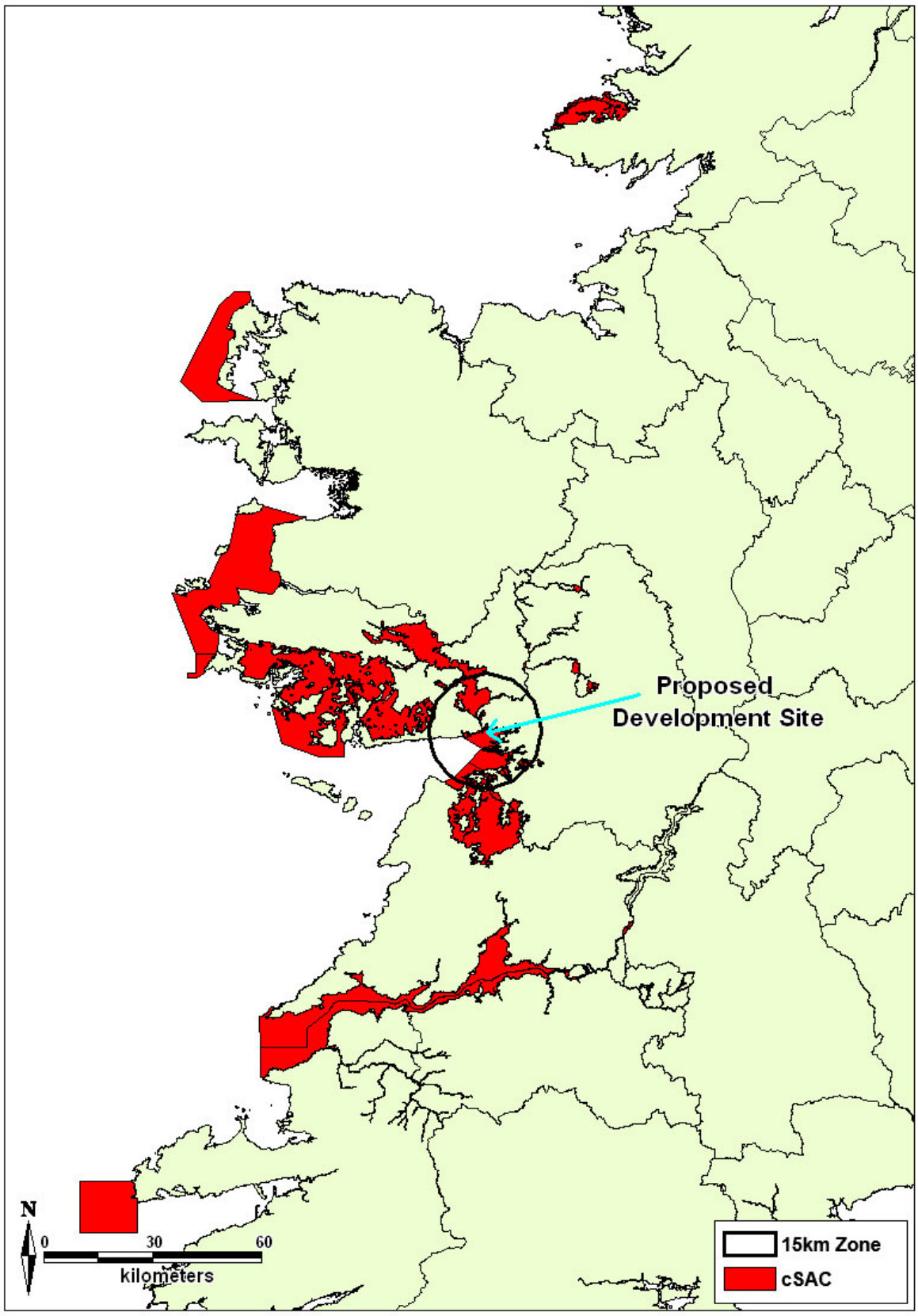


Figure 2.15 - Location of all relevant cSACs in the vicinity of the proposed development site

2.3.2. Special Protection Areas (SPA)

All of the SPAs identified within 15km of the proposed development can be seen in Table 2.9 along with their species of special conservation interests (SCIs) and their distance and direction from the proposed development site.

SPAs in the Wider Area around the Proposed Development Site		
Designated Site	**Special Conservation Interests**	**Distance/Direction from Development Site**
Inner Galway Bay 004031	[A003] Great Northern Diver *Gavia immer,* [A017] Cormorant *Phalacrocorax carbo,* [A028] Grey Heron *Ardea cinerea,* [A046] Brent Goose *Branta bernicla hrota,* [A050] Wigeon *Anas penelope,* [A052] Teal *Anas crecca,* [A056] Shoveler *Anas clypeata,* [A069] Red-breasted Merganser *Mergus serrator,* [A137] Ringed Plover *Charadrius hiaticula,* [A140] Golden Plover *Pluvialis apricaria,* [A142] Lapwing *Vanellus vanellus,* [A149] Dunlin *Calidris alpina alpina,* [A157] Bar-tailed Godwit *Limosa lapponica,* [A160] Curlew *Numenius arquata,* [A162] Redshank *Tringa totanus,* [A169] Turnstone *Arenaria interpres,* [A179] Black-headed Gull *Chroicocephalus ridibundus,* [A182] Common Gull *Larus canus,* [A191] Sandwich Tern *Sterna sandvicensis,* [A193] Common Tern *Sterna hirundo,* [A999] Wetlands	Within SPA
Lough Corrib 004042	[A051] Gadwall *Anas strepera,* [A056] Shoveler *Anas clypeata,* [A059] Pochard *Aythya ferina,* [A061] Tufted Duck *Aythya fuligula,* [A065] Common Scoter *Melanitta nigra,* [A082] Hen Harrier *Circus cyaneus,* [A125] Coot *Fulica atra,* [A140] Golden Plover *Pluvialis apricaria,* [A179] Black-headed Gull *Chroicocephalus ridibundus,* [A182] Common Gull *Larus canus,* [A193] Common Tern *Sterna hirundo,* [A194] Arctic Tern *Sterna paradisaea,* [A395] Greenland White-fronted Goose *Anser albifrons flavirostris,* [A999] Wetlands	4.5km NNW
Creganna Marsh 004142	[A395] Greenland White-fronted Goose *Anser albifrons flavirostris*	6.4km ESE

Table 2.9. SPAs identified as having the potential to be impacted by the proposed development.

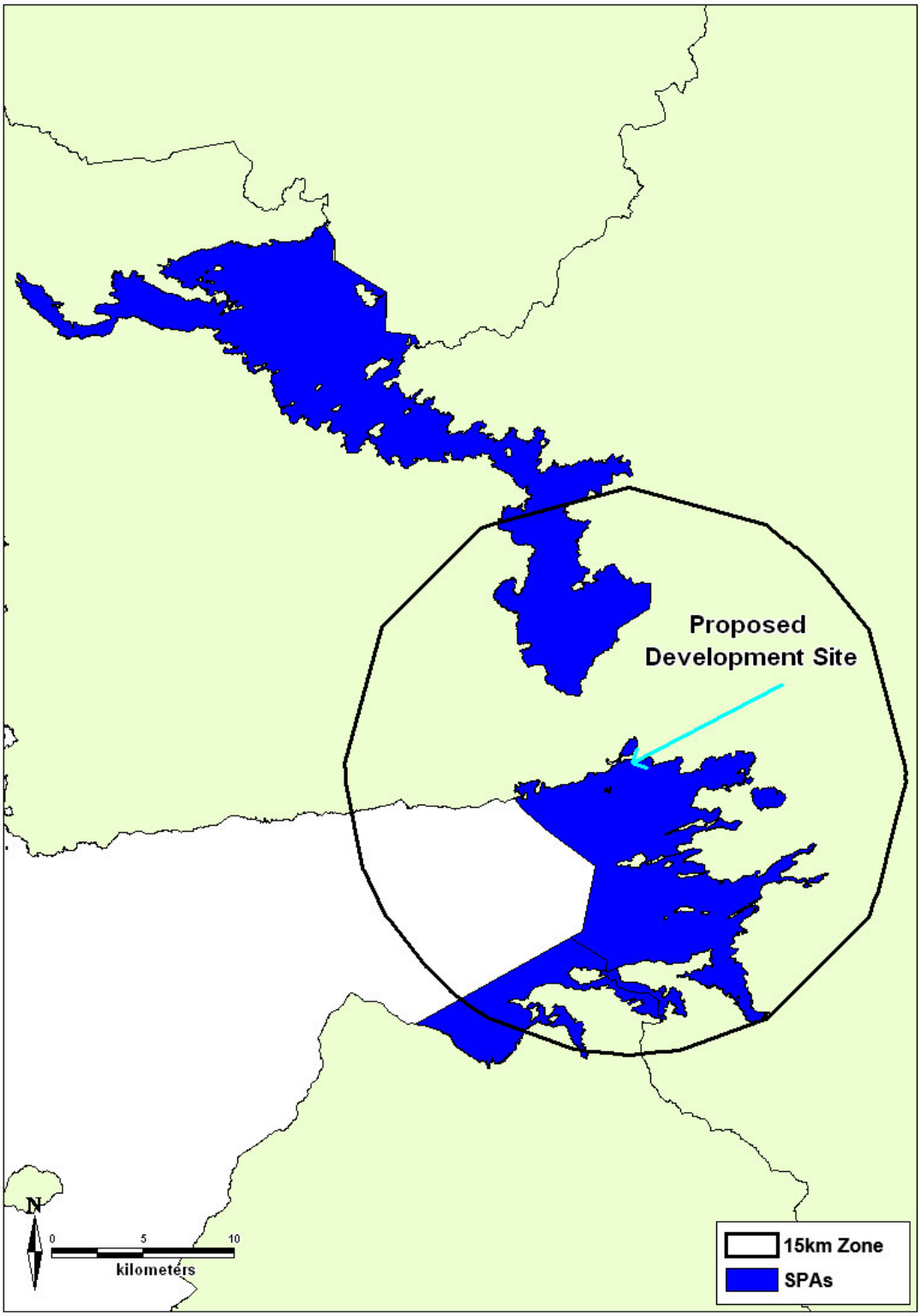


Figure 2.16 - Location of all relevant SPAs in the vicinity of the proposed development site

2.4. IDENTIFICATION AND ASSESSMENT OF POTENTIAL IMPACTS

2.4.1. Potential Pre-Construction and Construction Impacts

Table 2.10 lists the potential impacts of the pre-construction and construction phases of the project, the duration of each and the QIs/SCIs that have the potential to be impacted. These include a variety of types of disturbance relating to the presence of people and vessels, increased suspended sediments caused by dredging and other sea floor activities, potentially reduced oxygen levels arising from dredging of deeply buried sediments, changes in pH due to the use of concrete and noise.

Noise will be generated by any machinery used either on land or in the water during the construction period. The most significant source however, will be from explosions required to break up bed rock and also from percussive pile driving. Less significant noise sources include drilling, rock dredging and shipping.

Other impacts include habitat destruction caused by the construction of the structure including an area around the foot print and the dredging of the new approach channel and turning circle, habitat degradation caused by the settlement of suspended sediments at a distance from the working area and increased background noise levels in the same area, the risk of collision of mobile, marine biota such as mammals with vessels and habitat creation arising from the construction of new quay walls and break waters. All vessel types offer the opportunity to non-native algae and invertebrate species to colonise ports: mature specimens growing on the vessels' hulls can reproduce and their larvae can settle on the sea bed or quay walls in the vicinity of the port. This is another source of impact.

Accidents of several types may also occur during these initial phases and include spillages of fuel, waste water or sewage from vessels or on-board/on-shore machinery, collisions between construction vessels themselves or with other vessels and the ensuing potential pollution risks, collapse of lagoon bund walls caused either by poor construction, extreme weather or impact from construction vessels and land-based machinery falling into the sea.

Another type of impact is the possibility that some marine mammals, specifically seals, may be killed by being drawn into ducted propellers with which some vessels are equipped. Examination of seal corpses found in the U.K. (eastern Scotland, north Norfolk and Strangford Lough) has led researchers (Thompson *et al*., 2010) to believe that they had been killed by being drawn through ducted or cowled ship propellers. Indications are that these accidents are unlikely to have happened as a result of casual collisions. The number of seals recorded by Thompson *et al.* (2010) for a) off the Scottish Coast over the period 2008 – 2010 were low in terms of the total population size and ranged from 2 in 2008, 5 in 2009 and 7 in 2010, b) for off the Norfolk coast from 11 in 2009 to 26 for 2010 and for Strangford Lough from "several" between 2008 to 2010. This type of propeller is common in tugs, construction vessels and construction barges and is used when such vessels are either manoeuvring slowly or trying to maintain position. This situation could occur during the construction phase.

Potential Impacts Construction Stage					
Phase	**Activity**	**Type of Impact**	**Description of Impact**	**Impact**	**Impact on**
Pre-Construction	**Topographical survey**	Disturbance	Presence of survey personnel on shore	Short-term and temporary (1-2 weeks)	Intertidal birds, otters and seals within 50m of personnel
	Bore holes **(Site exploration)**	Disturbance	Noise from drilling rig	Short-term and temporary (2 months)	Mammals and birds within 1m minimum of rig
		Disturbance	Presence of drill rig/support vessels	Short-term and temporary (2 months)	Mammals and birds within 50m of vessels/rig
		Loss of habitat	Destruction of habitat due to drilling	Permanent	Subtidal and intertidal habitat and species in footprint of drill holes
		Loss of habitat	Destruction of habitat due to presence of jack-up	Short-term and temporary (2 months)	Subtidal and intertidal habitat and species in footprint of jack-up legs
		Direct physical impact	Physical damage due to collision with vessels/plant	Short-term and temporary (2 months)	Subtidal and intertidal species in footprint of jack-up legs
	Bathymetric survey	Disturbance	Presence of survey vessel	Short-term and temporary (2 weeks)	Seals, otters and salmon smolts within 10m; birds, within 100m of vessel
		Disturbance	Sub-bottom profiling	Short-term and temporary (2 weeks)	Seals, otters and salmon smolts within 10m; birds, within 100m of vessel
		Direct physical impact	Physical damage due to collision with vessels/plant or by being drawn into ducted propellers.	Short-term and temporary (2 weeks)	Subtidal and intertidal species, including seals, where vessel is working
Construction	**Sediment Dredging**	Disturbance	Noise	Short-term and temporary (6.5 months)	Mammals and birds within 350m of survey site
		Disturbance	Presence of jack up rig/support vessels. N/A for Trailer Suction Hopper Dredger	Short-term and temporary (6.5 months)	Mammals and birds within 50m of rig/vessel.
		Disturbance	Presence of survey vessel	Short-term and temporary (6.5 months)	Salmon smolts within 10m; seals, otters and birds, within 100 m

Potential Impacts Construction Stage					
Phase	**Activity**	**Type of Impact**	**Description of Impact**	**Impact**	**Impact on**
Construction	**Sediment Dredging (cont'd)**	Disturbance	Increased suspended solids	Short-term and temporary (6.5 months)	Otter, seal, salmon and lamprey in the footprint, all birds using area as feeding/roosting site, marine habitats in the footprint
		Disturbance	Reduced oxygen levels in the water column due to increased suspended solids	Short-term and temporary (6.5 months)	Otter, seal, salmon and lamprey in the footprint, all birds using area as feeding/roosting site, marine habitats in the footprint
		Disturbance	Increased pH due to use of concrete	Short-term and temporary	Otter, seal, salmon and lamprey in the footprint, all birds using area as feeding/roosting site, marine habitats in the footprint
		Loss of habitat	Destruction of habitat due to removal of sediment	Temporary in approach channel and turning circle	Marine habitats and biota in the footprint.
		Loss of habitat	Destruction of habitat due to infilling	Permanent	Marine and wetland habitats and biota in the footprint.
		Habitat degradation/alteration	Settlement of fine suspended sediments	Long term	Benthic species.
		Collision	Potential physical damage due to collision with vessels/plant or by being drawn into ducted propellers.	(6.5 months)	Subtidal and intertidal species, including seals, where vessel is working
	Boreholes (as a requirement for blasting)	Disturbance	Noise from drilling rig	Short-term and temporary (5 months)	Mammals, birds, otters and seals within 1m minimum of vessel
		Disturbance	Presence of drill rig/support vessels	Short-term and temporary (5 months)	Mammals, birds, otters and seals within 50m of rig/vessel

Potential Impacts Construction Stage					
Phase	**Activity**	**Type of Impact**	**Description of Impact**	**Impact**	**Impact on**
		Loss of habitat	Destruction of habitat due to drilling	Short-term and temporary (5 months)	Subtidal and intertidal habitat and species in footprint of drill holes
		Loss of habitat	Destruction of habitat due to presence of jack-up	Short-term and temporary (5 months)	Subtidal and intertidal habitat and species in footprint of jack-up legs
		Direct physical impact	Physical damage due to collision with vessels/plant or by being drawn into ducted propellers.	Short-term and temporary (5 months)	Subtidal and intertidal species in footprint of jack-up legs
	Blasting and Impulsive pile driving.	Direct physical impact	Explosions	Short term and temporary (5 months)	Salmon, lamprey, eel:18 m. Otter and seal : 500m Diving birds; no data available. Estimated at high likelihood within 100m and a medium likelihood within 1 km outside which the likelihood is low.
		Disturbance	Explosions	Short-term and temporary (5 months)	Otter, seal, salmon, lamprey, eel, diving birds and marine invertebrates: medium likelihood of disturbance up to 1 km.
		Disturbance	Increased suspended solids	Short-term and temporary (5 months)	Otter, seal, salmon and lamprey in the footprint, all birds using area as feeding/roosting site, marine habitats in the footprint.
		Direct physical impact	Physical damage due to collision with vessels/plant or by being drawn into ducted propellers.	Short-term and temporary (5 months)	Subtidal and intertidal species where vessel is working.
	Rock Dredging	Disturbance	Noise	Short-term and temporary (16 days)	Mammals and birds within 1m of machinery/vessel.
		Disturbance	Presence of jack up rig/support vessels.	Short-term and temporary (16 days)	Mammals and birds within 50m of rig/vessel.

Potential Impacts Construction Stage					
Phase	**Activity**	**Type of Impact**	**Description of Impact**	**Impact**	**Impact on**
		Disturbance	Increased suspended solids	Short-term and temporary (16 days)	Otter, seal, salmon and lamprey in the footprint, all birds using area as feeding site, marine habitats in the footprint.
		Disturbance	Increased pH due to use of concrete	Short-term and temporary	Otter, seal, salmon and lamprey in the footprint, all birds using area as feeding site, marine habitats in the footprint.
		Loss of habitat	Destruction of habitat due to removal of sediment	Permanent in infilled area	Marine habitats in the footprint, otter, seal, salmon and lamprey.
		Loss of habitat	Destruction of habitat due to removal of sediment	Temporary in approach channel and turning circle	Marine habitats in the footprint, otter, seal, salmon and lamprey.
		Habitat degradation/alteration	Disturbance of sedimentary characteristics in the area immediately beside where the dredger is operating.	Long term	Benthic species including fish.
		Direct physical impact	Physical damage due to collision with vessels/plant or by being drawn into ducted propellers.	(16 days)	Subtidal and intertidal species, including seals where vessel is working
	Construction of quay walls and breakwater	Direct physical impact	Noise	Longer-term and temporary (39 months)	Otter, seals, salmon and lamprey in the footprint. All diving birds using the area. Marine invertebrates and habitats in the footprint

Potential Impacts Construction Stage					
Phase	**Activity**	**Type of Impact**	**Description of Impact**	**Impact**	**Impact on**
		Disturbance	Noise	Longer-term and temporary (39 months)	Otter, seal, salmon and lamprey in the footprint, all birds using area as feeding/roosting site, marine habitats in the footprint
		Disturbance	Increased suspended solids	Longer-term and temporary (39 months)	Otter, seals, salmon and lamprey in the footprint, all birds using area as feeding/roosting site, marine habitats in the footprint
Construction		Disturbance	Presence of jack up rig/support vessels.	Longer-term and temporary (39 months)	Otter, seal, salmon and lamprey in the footprint, all birds using area as feeding/roosting site, marine habitats in the footprint
		Direct physical impact	Physical damage due to collision with vessels/plant or by being drawn into ducted propellers.	Longer-term and temporary (39 months)	Subtidal and intertidal species, including seals where vessel is working
	Construction of lagoons. (filling of lagoons runs concurrently with dredging)	Loss of habitat	Building operation and infilling of lagoons	Permanent	Marine, wetland and terrestrial habitats within foot print including feeding, growing, and sheltering for marine biota, fish, birds and mammals.
		Habitat creation	Settlement of plant and animal species. Potential seal haul out	Permanent	Epiphytic and epifaunal species and mobile invertebrate/vertebrate species. Breakwater area is a potential seal haul out area.
		Habitat alteration		Permanent	
		Impact on life cycle	Disruption of a critical period	Permanent	Atlantic Salmon, Lamprey, Otter, Common Seal and SCI bird species.

Potential Impacts Construction Stage					
Phase	**Activity**	**Type of Impact**	**Description of Impact**	**Impact**	**Impact on**
		Secondary impact	Localised disruption of normal ecological activity	Permanent	Atlantic Salmon, Lamprey, Otter, Common Seal and SCI bird species.
		Alterations to local physical oceanography	Changes in current velocities and directions	Permanent	Atlantic Salmon, Lamprey, Otter, Common Seal and SCI bird species.
		Alterations to local physical oceanography	Changes to subtidal sedimentation patterns due changes in current velocities and directions	Permanent	Large shallow bays and inlets
Construction		Alterations to local physical oceanography	Changes to wave climate	Permanent	All marine QI species and habitats in the area
		Alterations to local physical oceanography	Changes to flooding regime in the area between Mutton Island Causeway and the new structure	Permanent	All marine QI species and habitats in the area
		Alterations to local chemical oceanography	Changes to salinity regimes	Permanent	All marine QI species and habitats in the area
		Habitat loss/impairment of water quality	Loss of suspended sediments from lagoons and reclamation bunds	Short-term and temporary (lagoon rock wall construction 7.5 months; filling of lagoons 6.5 months)	Marine QI habitats, Atlantic Salmon, Lamprey, Otter, Common Seal and SCI bird species.
	Overall construction period	Introduction of non-native invasive species	Non-native species that could out-compete native species	Permanent	Benthic floral and faunal marine species.
		Impact on water quality	Deterioration of habitat quality due to water quality degradation	Short-term and temporary	Marine QI habitats, Atlantic Salmon, Lamprey, Otter, Common Seal and SCI bird species.
		Disturbance	Impact on life cycle due to dust arising from construction activities	Short-term and temporary	Otter, Common Seal, Salmon, Lamprey

Potential Impacts Construction Stage					
Phase	**Activity**	**Type of Impact**	**Description of Impact**	**Impact**	**Impact on**
		Disturbance	Impact of habitat quality due to dust arising from construction activities	Short-term and temporary	Otter, Common Seal, Salmon, Lamprey
		Disturbance	Impact of habitat quality due to deterioration in air quality due to construction activities	Short-term and temporary	Otter, Common Seal, Salmon, Lamprey

Table 2.10. Potential impacts of the pre-construction and construction phases.

2.4.2 Potential Operational Impacts

Table 2.11 lists the potential impacts of the operational phase of the project and the QIs/SCIs that have the potential to be impacted and the duration of each of the potential impacts.

Operational impacts include a variety of types of disturbance relating to the presence of people and vessels, increased suspended sediments caused by ships' propellers or anchors, noise and additional lighting on the harbour extension.

Noise will be generated by any operational machinery used either on land or in the water and from shipping.

Other impacts include the risks of spillages causing impacts on water quality, the importation of non-native, invasive species on ships' hulls or in ballast water and future requirement for maintenance dredging. With regard to maintenance dredging, as there will be at most only the same amount of sediment coming in from the river/sea, the rate will be at most the same as it is at present. In fact with the Mutton Island causeway in place, the expected increase in current velocities anticipated due to the new structure and the decommissioning of the sewerage pipes in the Corrib River and off South Park, the sediment loadings will be somewhat less than in previous years. This in turn suggests a slower build-up of material within the proposed development area over time than is the case at present.

Information from the Harbour Master indicates that maintenance dredging occurs *ca* every 10 years *i.e.* when the channel has filled in to *ca* +50 cm over the last dredging episode. As suspended sediment loadings will be lower and current velocities will be lower, it is predicted that maintenance dredging will only be required every *ca* 10 years.

Noise will be generated by any machinery and vessels used either on land or in the water during port operation. Other vessels including commercial, pilot boats, tugs, marine research and rescue and pleasure craft will also be a source of noise.

Other impacts include habitat destruction caused by the construction of the structure including an area around the foot print and the dredging of the new approach channel and turning circle, habitat degradation caused by the settlement of suspended sediments at a distance from the working area and increased background noise levels in the same area, the risk of collision of mobile, marine biota such as mammals with vessels and habitat creation arising from the construction of new quay walls and break waters. All vessels types offer the opportunity to non-native algae and invertebrate species to colonise ports: mature specimens growing on the vessels' hulls can reproduce and their larvae can settle on the sea bed or quay walls in the vicinity of the port. This is another source of impact.

Accidents of several types may also occur during the operational phase and include spillages of fuel, waste water or sewage from vessels or on-board/on-shore machinery, collisions between vessels of various types and the ensuing potential pollution risks, collapse of lagoon bund walls caused either by poor construction and land-based machinery falling into the sea.

Another type of impact is the possibility that some marine mammals, specifically seals, may be killed by being drawn into ducted propellers with which some vessels are equipped. This has already been described in the Construction section above.

Light from the harbour extension may also impact marine biota.

A helicopter pad forms part of the design for the new Galway Harbour Extension. This will be used to support offshore developments such as renewable energy projects and oil and gas exploration. Noise generated during takeoff and landing will add to the level of aerial noise generated by the proposed development.

As the proposed harbour is *ca* 1 km long and *ca* 500 wide, the structure itself, when fully operational, may also impact biota *e.g.* Lamprey,salmon,waterfowl and marine mammals.

Dust arising from port activities such as off or unloading of materials from another source of operational impact and could affect water quality.

Potential Impacts of Operation Phase					
Phase	**Activity**	**Type of Impact**	**Description of Impact**	**Impact**	**Impact on**
Operation	**Shipping**	Disturbance	Noise of vessels entering and leaving the port	Permanent and localised	Birds, otters and seals in close proximity to vessel
			Sediments suspended by propellers	Permanent and localised	Birds, otters and seals in close proximity to vessel
			Introduction of non-native species	Potentially permanent; low risk	Marine biota
			Accidental spillages	Short term; low risk; exceptional event	QI habitats and species;SCI species
			Ship collisions	Short term and localised; low risk; exceptional event	QI habitats and species;SCI species
		Collision	Potential physical damage due to collision with vessels or by being drawn into ducted propellers.	Permanent but localised	Mammals especially seals
		Water quality	Discharge of cooling water	Short term, temporary, localised. Possibly positive	Aquatic organisms.
	Light	Disturbance	Light spillage from port area	Permanent but localised	Birds and otter
	Dust	Disturbance	Air quality	Temporary and localised	Birds
	Odour	Disturbance	Air quality	Temporary and localised	Birds
	Maintenance dredging	Disturbance	Noise	Short-term, temporary and localised (2 months every *ca* 10 years)	Mammals and birds within 350m of dredge and disposal site
		Disturbance	Presence of dredger	Short-term, temporary and localised (2 months every *ca* 10 years)	Salmon smolts within 10m; seals, otters and birds, within 100m

Potential Impacts of Operation Phase					
Phase	**Activity**	**Type of Impact**	**Description of Impact**	**Impact**	**Impact on**
		Disturbance	Increased suspended solids	Short-term, temporary and localised (2 months every *ca* 10 years)	Otter, seal, salmon and lamprey in the footprint, all birds using dredge and disposal areas
		Disturbance	Reduced oxygen levels in the water column due to increased suspended solids	Short-term, temporary and localised (2 months every *ca* 10 years)	Otter, seal, salmon and lamprey in the footprint, all birds using dredge and disposal areas
		Loss of habitat	Destruction of habitat due to removal/disposal of sediment	Short-term, temporary and localised (2 months every *ca* 10 years)	Marine habitats and their biota
	Helicopter take off and landing	Disturbance	Noise	Permanent, localised and short term	Birds

Table 2.11. Potential impacts of the operational phase.

2.4.3 Assessment of Significance

2.4.3.1 QI Habitats

The only QI habitats that can be impacted by the proposed development are those within or in the immediate vicinity of the proposed development site. The proposed development site is only located within the Galway Bay cSAC (000268); therefore, it is only the QI habitats that are located within or in the immediate vicinity of the proposed development site that have the potential to be impacted and are therefore **screened in**. Those QI habitats in the area and the type of impact, where known, that will affect them are listed below:

- [1140] Mudflats and sandflats not covered by seawater at low tide. Impacts include permanent habitat loss due to infilling within foot print of the harbour extension and variations in suspended solids and salinity
- [1150] * Coastal lagoons. Impacts include variations in suspended solids and salinity
- [1160] Large shallow inlet and bays. Impacts include variations in suspended solids and salinity
- [1170] Reefs. Impacts include permanent habitat loss and variations in suspended solids and salinity
- [1220] Perennial vegetation of stony banks. Impacts indeterminate
- [1330] Atlantic salt meadows. Impacts indeterminate
- [1410] Mediterranean salt meadows. Impacts indeterminate

All of the remaining QI habitats in the Galway Bay cSAC can be **screened out** as they are not present within or connected to the development site. Those habitats are: [1310] *Salicornia* and other annuals colonising mud and sand, [3180] * Turloughs, [5130] *Juniperus communis* formations on heaths or calcareous grasslands, [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia*)(*important orchid sites), [7210] Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae* and [7230] Alkaline fen.

All of the other cSACs listed in Table 2.8 above have QI habitats that can also be **screened out** as these habitats are not located within or connected to the development site. These are: Moneen Mountain (000054), Slieve Toory / Tormore Island / Loughros Beg Bay* (000190), Castletaylor Complex (000242), Inishbofin and Insihshark (000278), Lough Corrib* (000297), Slyne Head Islands* (000328), Davillaun Islands* (000495), Inishkea Islands* (000507), Lough Fingal Complex (000606), Kiltiernan Turlough (001285), Ross Lake and Woods (0001312), East Burren Complex (001926), Maumturk Mountains* (002008), Connemara Bog Complex* (002034), Kilkieran Bay and Islands* (002111), Lower River Shannon* (002165), Blasket Islands* (002172) and West Connacht Coast* (002998).

* These sites while screened out due to absence of QI habitats, they are screened in later due to presence of QI Species (see Section 2.4.3.2).

2.4.3.2 QI Species

With regards to the species that are qualifying interests of the cSACs listed in Table 2.8, only those that

- are permanently present in the proposed development site and the immediate surrounding area,
- those that migrate through the development site and
- those that have the potential to occasionally occur there even though in terms of the overall population, numbers are low

have the potential to be directly or indirectly impacted by the proposed development and these are therefore **screened in**. Those QI species (and their associated cSAC site codes) and the sources of impact which may affect them are:

- [1095] Sea lamprey *Petromyzon marinus* (Site Code: 000297 [migratory]). Increase in suspended sediment loadings arising from preconstruction dredging of sediment to expose bed rock. Noise arising from shipping, drilling, blasting, pile driving, rock dredging and construction of quay wall and breakwater.
- [1106] Atlantic salmon *Salmo salar* (only in freshwater) (Site Code: 000297, 002008 [migratory]). Increase in suspended sediment loadings arising from preconstruction dredging of sediment to expose bed rock. Noise arising from shipping, bore hole drilling, blasting, pile driving, rock dredging and construction of quay wall and breakwater.
- [1349] Bottlenose dolphin *Tursiops truncatus* (Site Code: 002165, 002998 [feeding]). Increase in suspended sediment loadings arising from preconstruction dredging of sediment to expose bed rock. Noise arising from shipping, bore hole drilling, blasting, pile driving, rock dredging and construction of quay wall and breakwater.
- [1351] Harbour porpoise *Phocoena phocoena* (Site Code: 2172 [feeding]). Increase in suspended sediment loadings arising from preconstruction dredging of sediment to expose bed rock. Noise arising from shipping, bore hole drilling, blasting, pile driving, rock dredging and construction of quay wall and breakwater.
- [1355] Otter *lutra lutra* (Site Code: 000268 [resident], 000297, 002034 [feeding]). Increase in suspended sediment loadings arising from preconstruction dredging of sediment to expose bed rock. Noise arising from shipping, bore hole drilling, blasing, pile driving, rock dredging and construction of quay wall and breakwater.
- [1364] Grey seal *Halichoerus grypus* (Site Code: 000190, 00278, 000328, 000495, 000507, 002172 [feeding]) Increase in suspended sediment loadings arising from preconstruction dredging of sediment to expose bed rock. Noise arising from shipping, bore hole drilling, blasting, pile driving, rock dredging and construction of quay wall and breakwater.
- [1365] Harbour seal *Phoca vitulina* (Site Code: 000268 [resident], 002111 [feeding]) Increase in suspended sediment loadings arising from preconstruction dredging of sediment to expose bed rock. Noise arising from shipping, bore hole drilling, blasting, pile driving, rock dredging and construction of quay wall and breakwater.

All other QI species listed in Table 2.8 above can be **screened out**.

2.4.3.3SCI Birds

The bird species that have the potential to be impacted by the proposed development are those that are resident within and in the vicinity of the proposed development site, those that feed within and in the vicinity of the proposed development site and those that make passage over the proposed development site from other SPAs within 15km of it. As the proposed development site is located within the Galway Bay SPA (004031), all of the SCIs for this site have the potential to be impacted by the proposed development and are therefore **screened in**:

- [A003] Great Northern Diver *Gavia immer*
- [A017] Cormorant *Phalacrocorax carbo*
- [A028] Grey Heron *Ardea cinerea*
- [A046] Brent Goose *Branta bernicla hrota*
- [A050] Wigeon *Anas penelope*
- [A052] Teal *Anas crecca*
- [A056] Shoveler *Anas clypeata*
- [A069] Red-breasted Merganser *Mergus serrator*
- [A137] Ringed Plover *Charadrius hiaticula*
- [A140] Golden Plover *Pluvialis apricaria*
- [A142] Lapwing *Vanellus vanellus*
- [A149] Dunlin *Calidris alpina alpina*

- [A157] Bar-tailed Godwit *Limosa lapponica*
- [A160] Curlew *Numenius arquata*
- [A162] Redshank *Tringa totanus*
- [A169] Turnstone *Arenaria interpres*
- [A179] Black-headed Gull *Chroicocephalus ridibundus*
- [A182] Common Gull *Larus canus*
- [A191] Sandwich Tern *Sterna sandvicensis*
- [A193] Common Tern *Sterna hirundo*
- [A999] Wetlands

The Lough Corrib SPA (004042) has SCIs that have the potential to feed and/or pass through the proposed development site and are therefore **screened in**. Those SCIs of relevance are:

- [A065] Common Scoter *Melanitta nigra*
- [A179] Black-headed Gull *Chroicocephalus ridibundus*
- [A182] Common Gull *Larus canus*
- [A193] Common Tern *Sterna hirundo*
- [A194] Arctic Tern *Sterna paradisaea*

All of the remaining SCIs from the Lough Corrib SPA listed in Table 2.9 above can be **screened out** as they will not occur within the proposed development area. Those SCIs are: [A051] Gadwall *Anas strepera,* [A056] Shoveler *Anas clypeata,* [A059] Pochard *Aythya ferina,* [A061] Tufted Duck *Aythya fuligula,* [A082] Hen Harrier *Circus cyaneus,* [A125] Coot *Fulica atra,* [A140] Golden Plover *Pluvialis apricaria* and [A179] Greenland White-fronted Goose *Anser albifrons flavirostris.* The Greenland white-fronted goose [A395] from the Creganna Marsh (004142) can also be **screened out** as it will not move into the area of the proposed development.

2.4.4 Screening Result

The screening process results in a screening matrix, showing those cSACs and their relevant qualifying interests that are screened in (see Table 2.12). Figure 2.17 shows the locations of the screened in cSACs in relation to the development site.

Similarly, the screened in SPAs and their relevant special conservation interests can be seen in Table 2.13. Figure 2.18 shows the locations of the screened in cSACs in relation to the development site.

Screened in cSACs			
Designated Site	**Qualifying Interests**	**Distance/Direction from Development Site**	**Potential Impact**
Slieve Tooey / Tormore Island / Loughros Beg Bay 000190	[1364] Grey seal *Halichoerus grypus*	161km N	Noise arising from shipping, bore hole drilling, blasting, pile driving, rock dredging and construction of quay wall and breakwater. Increase in suspended sediment loadings arising from preconstruction dredging of sediment to expose bed rock. Physical damage/death due to collision with vessels or their propellers
Galway Bay Complex 000268	[1140] Mudflats and sandflats not covered by seawater at low tide, [1150] * Coastal lagoons, [1160] Large shallow inlets and bays. [1170] Reefs, [1220] Perennial vegetation of stony banks, [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), [1355] Otter *Lutra lutra*, [1365] Harbour seal *Phoca vitulina*, [1410] Mediterranean salt meadows (*Juncetalia maritimi*)	Within cSAC	Impacts include permanent habitat loss due to historic and planned infilling within the area of the harbour extension, variations in suspended solids and salinity, noise from construction and operational activities
Inishbofin and Inishshark 000278	[1364] Grey seal *Halichoerus grypus*	80.9km NW	Noise arising from shipping, bore hole drilling, blasting, pile driving, rock dredging and construction of quay wall and breakwater. Increase in suspended sediment loadings arising from preconstruction dredging of

Screened in cSACs			
Designated Site	**Qualifying Interests**	**Distance/Direction from Development Site**	**Potential Impact**
			sediment to expose bed rock. Physical damage/death due to collision with vessels or their propellers
Lough Corrib 000297	[1095] Sea lamprey *Petromyzon marinus,* [1106] Atlantic salmon *Salmo salar* (only in fresh water), [1355] Otter *Lutra lutra*	0.6km NW	
Slyne Head Islands 000328	[1364] Grey seal *Halichoerus grypus*	77.1km NW	Noise arising from shipping, bore hole drilling, blasting, pile driving, rock dredging and construction of quay wall and breakwater. Increase in suspended sediment loadings arising from preconstruction dredging of sediment to expose bed rock. Physical damage/death due to collision with vessels or their propellers
Davillaun Islands 000495	[1364] Grey seal *Halichoerus grypus*	116km NW	Noise arising from shipping, bore hole drilling, blasting, pile driving, rock dredging and construction of quay wall and breakwater. Increase in suspended sediment loadings arising from preconstruction dredging of sediment to expose bed rock. Physical damage/death due to collision with

Screened in cSACs			
Designated Site	**Qualifying Interests**	**Distance/Direction from Development Site**	**Potential Impact**
			vessels or their propellers
Inishkea Islands 000507	[1364] Grey seal *Halichoerus grypus*	121km NW	Noise arising from shipping, bore hole drilling, blasting, pile driving, rock dredging and construction of quay wall and breakwater. Increase in suspended sediment loadings arising from preconstruction dredging of sediment to expose bed rock. Physical damage/death due to collision with vessels or their propellers
Maumturk Mountains 002008	[1106] Atlantic salmon *Salmo salar* (only in fresh water)	38.6km NW	
Connemara Bog Complex 002034	[1355] Otter *Lutra lutra,*	13.3km WNW	Noise arising from shipping, bore hole drilling, blasting, pile driving, rock dredging and construction of quay wall and breakwater. Increase in suspended sediment loadings arising from preconstruction dredging of sediment to expose bed rock.
Kilkieran Bay and Islands 002111	[1365] Harbour seal *Phoca vitulina*,	36.6km W	Noise arising from shipping, bore hole drilling, blasting, pile driving, rock dredging and construction of quay wall and breakwater. Increase in suspended

Screened in cSACs			
Designated Site	**Qualifying Interests**	**Distance/Direction from Development Site**	**Potential Impact**
			sediment loadings arising from preconstruction dredging of sediment to expose bed rock. Physical damage/death due to collision with vessels or their propellers
Lower River Shannon 002165	[1349] Bottlenose Dolphin *Tursiops truncatus*	53 – 100km S / SW	Noise arising from shipping, bore hole drilling, blasting, pile driving, rock dredging and construction of quay wall and breakwater. Increase in suspended sediment loadings arising from preconstruction dredging of sediment to expose bed rock.
Blasket Islands 002172	[1351] Harbour porpoise *Phocoena phocoena*, [1364] Grey seal *Halichoerus grypus*,	156km SW	Noise arising from shipping, bore hole drilling, blasting, pile driving, rock dredging and construction of quay wall and breakwater. Increase in suspended sediment loadings arising from preconstruction dredging of sediment to expose bed rock. Physical damage/death due to collision with vessels or their propellers
West Connacht Coast 002998	[1349] Bottlenose Dolphin *Tursiops truncatus*	75km NW	Noise arising from shipping, bore hole drilling, blasting, pile driving, rock

Screened in cSACs			
Designated Site	Qualifying Interests	Distance/Direction from Development Site	Potential Impact
			dredging and construction of quay wall and breakwater. Increase in suspended sediment loadings arising from preconstruction dredging of sediment to expose bed rock.

Table 2.12. Screened in cSACs.

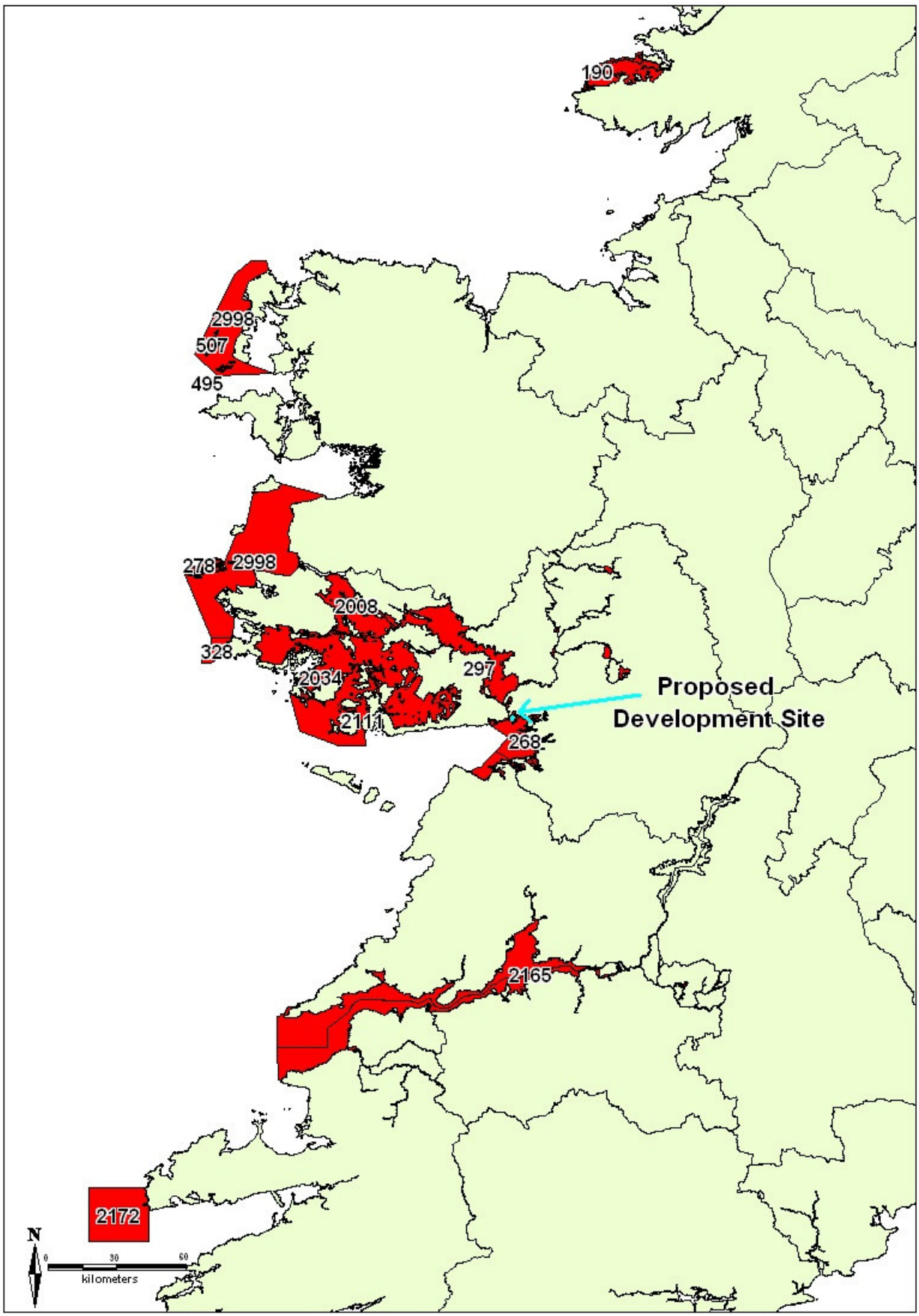


Figure 2.17 - Screened in cSACs

Screened in SPAs			
Designated Site	**Special Conservation Interests**	**Distance/Direction from Development Site**	**Potential Impact**
Inner Galway Bay 004031	[A003] Great Northern Diver *Gavia immer,* [A017] Cormorant *Phalacrocorax carbo,* [A028] Grey Heron *Ardea cinerea,* [A046] Brent Goose *Branta bernicla hrota,* [A050] Wigeon *Anas penelope,* [A052] Teal *Anas crecca,* [A056] Shoveler *Anas clypeata,* [A069] Red-breasted Merganser *Mergus serrator,* [A137] Ringed Plover *Charadrius hiaticula,* [A140] Golden Plover *Pluvialis apricaria,* [A142] Lapwing *Vanellus vanellus,* [A149] Dunlin *Calidris alpina alpina,* [A157] Bar-tailed Godwit *Limosa lapponica,* [A160] Curlew *Numenius arquata,* [A162] Redshank *Tringa totanus,* [A169] Turnstone *Arenaria interpres,* [A179] Black-headed Gull *Chroicocephalus ridibundus,* [A182] Common Gull *Larus canus,* [A191] Sandwich Tern *Sterna sandvicensis,* [A193] Common Tern *Sterna hirundo,* [A999] Wetlands	Within SPA	Disturbance arising from construction activities
Lough Corrib 004042	[A065] Common Scoter *Melanitta nigra,* [A179] Black-headed Gull *Chroicocephalus ridibundus,* [A182] Common Gull *Larus canus,* [A193] Common Tern *Sterna hirundo,* [A194] Arctic Tern *Sterna paradisaea*	4.5km NNW	

Table 2.13. Screened in SPAs.

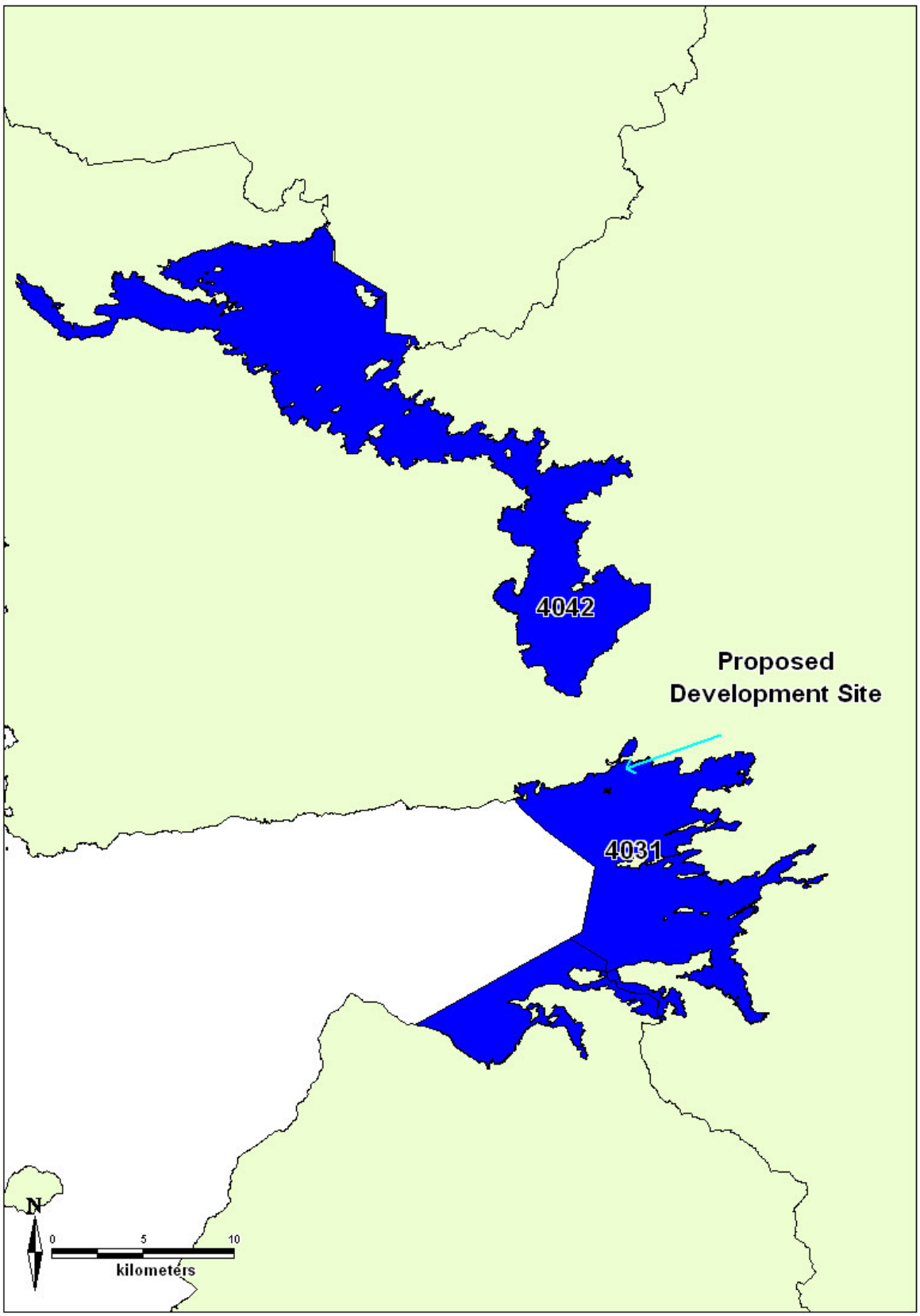


Figure 2.18 - Screened in SPAs

2.5 SCREENING CONCLUSION

In order to determine the potential impacts of the proposed Galway Harbour extension on nearby Natura 2000 sits, a screening process was undertaken. The proposed development area is within 15km of 12 Natura 2000 sites and within 170 km of a further 10 Natura 2000 sites (for migratory and highly mobile species).

It was determined during the screening process that 7 of these sites (Moneen Mountain cSAC [000054], Castletaylor Complex cSAC [000242], Lough Fingal Complex cSAC [000606], Kiltiernan Turlough cSAC [001285], Ross Lake and Woods cSAC [0001312], East Burren Complex cSAC [001926] and Creganna Marsh SPA [004142]) will not be impacted in any way by the proposed development, alone or in combination, with other projects.

However, 15 sites could potentially be impacted by the proposed development. Three of these are cSACs and 2 are SPAs located within 15km of the proposed development site (Galway Bay Complex cSAC [000268], Lough Corrib cSAC [000297] and Connemara Bog Complex cSAC [002034], Inner Galway Bay SPA [004031] and Lough Corrib SPA [004042]).

The remainder are screened in due to the presence of migratory and/or highly mobile species that have the potential to enter the proposed development site (Slieve Tooey / Tormore Island / Loughros Beg Bay cSAC [000190], Inishbofin and Inishshark cSAC [000278], Slyne Head Islands cSAC [000328], Davillaun Islands cSAC [000495], Inishkea Islands cSAC [000507], Maumturk Mountains cSAC [002008], Kilkieran Bay and Islands cSAC [002111], Lower River Shannon cSAC [002165], Blasket Islands cSAC [002172], West Connacht Coast cSAC [002998]. On this basis, the Screening Stage concluded with the recommendation to proceed to Stage 2: Appropriate Assessment for these 15 Natura 2000 sites.

3 APPROPRIATE ASSESSMENT (NATURA IMPACT STATEMENT)

3.1 INTRODUCTION

In order to determine the level of impact on the 15 Natura 2000 sites identified in the screening stage, the following modelling studies were carried out to assess the impacts from the various pre-construction, construction and operational phase activities on the QIs and SCIs for those sites. These included:

- Hydrodynamic modelling to access changes in the physical oceanography of the area due to the presence of the new structure.
- Salinity modelling to assess changes in salinity levels in Lough Atalia and other areas due to the presence of the new structure.
- Sediment transport modelling to determine the sediment plumes arising from the construction phase activities and initial operational phase.
- Wave climate modelling to assess changes in wave climate due to the presence of the new structure.
- Flood modelling to assess the risk of flooding due to the presence of the new structure.
- Noise modelling studies to assess the noise level of each activity and its impact on biota.

Chapter 8 of the EIS presents the hydrodynamic, salinity, sediment transport, wave climate and flood studies and Chapter 10 of the EIS presents the noise modelling study.

The potential impacts resulting from the proposed Harbour development (which are detailed in Section 2.4 above) are then discussed in relation to the conservation objectives of the Natura 2000 sites. Mitigation measures, some of which are an integral part of the design process, are then detailed.

3.2 CHARACTERISTICS OF THE NATURA 2000 SITES

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 and cSACs and SPAs 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 specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- The conservation status of its typical species is favourable.

Favourable conservation status of a species is achieved when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitat, 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.

The conservation objectives for the relevant QIs are set out in the sections below. As Conservation Objectives are not complete for all of the cSACs/SPAs of relevance, generic conservation objectives have been used for those that are not complete.

3.2.1 Slieve Tooey / Tormore Island / Loughros Beg Bay cSAC (000190)

This large site is of major ecological significance for its range of good quality coastal and terrestrial habitats. Grey seal, a species listed on Annex II of the European Habitats Directive, breed in sea caves in this site, with an estimated 100-120 pups born annually.

The full list of cSAC QIs can be seen above in Table 2.9 and the conservation objectives for those with the potential to be impacted by the proposed development are shown below (NPWS, 2011a).

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected:

- [1364] Grey seal *Halichoerus grypus*

3.2.2 Galway Bay cSAC (000268)

This large coastal site has a diverse range of marine, coastal and terrestrial habitats and is of immense conservation importance, with many habitats listed on Annex I of the EU Habitats Directive, four of which have priority status (lagoon, *Cladium* fen, turlough and orchid-rich calcareous grassland). The examples of shallow bays, reefs, lagoons and salt marshes are amongst the best in the country. The site supports an important Harbour seal colony and a breeding Otter population, both species that are listed on Annex II of the EU Habitats Directive, and six regular Annex I EU Birds Directive species. The site also has four Red Data Book[2] plant species (Whilde, 1993), plus a host of rare or scarce marine and lagoonal animal and plant species.

The full list of cSAC QIs can be seen above in Table 2.8 and the conservation objectives for those with the potential to be impacted by the proposed development are shown below (NPWS, 2013b).

[2] The Red Data Book is a list of plant and animal species that are under threat and are legally protected. It is based on the International Union for Conservation of Nature's (IUCN) global Red List of Threatened Species.

Conservation Objectives for : Galway Bay Complex SAC [000268]

1140 Mudflats and sandflats not covered by seawater at low tide

To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 3	Habitat area was estimated using OSi data as 744ha
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal sandy mud community complex; and Intertidal sand community complex. See map 7	Based on intertidal surveys undertaken in 2009 and 2010 (RPS, 2012). See marine supporting document for further information

Conservation Objectives for : Galway Bay Complex SAC [000268]

1150 Coastal lagoons

To restore the favourable conservation condition of Coastal lagoons in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable, subject to slight natural variation. Favourable reference area 76.7ha. See map 4	Areas calculated from spatial data derived from Oliver, 2007. Site codes IL037, IL038, IL039, IL046, IL047, IL048, IL049, IL050, IL051, IL052. NB there may be more, as yet unmapped, lagoons within this SAC. See lagoon supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 4 for mapped lagoons	Sites IL037, IL038, IL039, IL046, IL047, IL048, IL049, IL050, IL051, IL052 in Oliver, 2007. NB there may be more, as yet unmapped, lagoons within this SAC. See lagoon supporting document for further details
Salinity regime	Practical salinity units (psu)	Median annual salinity and temporal variation within natural ranges	The lagoons in the site vary from oligohaline to euhaline. See lagoon supporting document for further details
Hydrological regime	Metres	Annual water level fluctuations and minima within natural ranges	Most of the lagoons listed for this site are considered to be shallow; however, Aughinish lagoon and Lough Atalia do have deeper (at least 3m) parts. See lagoon supporting document for further details
Barrier: connectivity between lagoon and sea	Permeability	Appropriate hydrological connections between lagoons and sea, including where necessary, appropriate management	The lagoons within this site exhibit a variety of barrier types including cobble/shingle, karst and artificial embankment/causeway. Several are recorded as having sluices. See lagoon supporting document for further details
Water quality: Chlorophyll *a*	µg/L	Annual median chlorophyll *a* within natural ranges and less than 5µg/L	Target based on Roden and Oliver (2010). See lagoon supporting document for further details
Water quality: Molybdate Reactive Phosphorus (MRP)	mg/L	Annual median MRP within natural ranges 0.1mg/L	Target based on Roden and Oliver (2010). See lagoon supporting document for further details
Water quality: Dissolved Inorganic Nitrogen (DIN)	mg/L	Annual median DIN within natural ranges and less than 0.15mg/L	Target based on Roden and Oliver (2010). See lagoon supporting document for further details
Depth of macrophyte colonisation	Metres	Macrophyte colonisation to at least 2m depth	For shallow lagoons, it is expected that macrophytes should extend to their deepest points. See lagoon supporting document for further details
Typical plant species	Number and m^2	Maintain number and extent of listed lagoonal specialists, subject to natural variation	Species listed in Oliver, 2007. See lagoon supporting document for further details
Typical animal species	Number	Maintain listed lagoon specialists, subject to natural variation	Species listed in Oliver, 2007. See lagoon supporting document for further details
Negative indicator species	Number and % cover	Negative indicator species absent or under control	Low salinity, shallow water and elevated nutrient levels increase the threat of accelerated encroachment by reedbeds. See lagoon supporting document for further details

Conservation Objectives for : Galway Bay Complex SAC [000268]

1160 Large shallow inlets and bays

To maintain the favourable conservation condition of Large shallow inlets and bays in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 5	Habitat area was estimated as 10,825ha using OSi data and the Transitional Water Body area as defined under the Water Framework Directive
Community extent	Hectares	Maintain the extent of the *Zostera*-dominated community complex and the maërl-dominated community, subject to natural processes. See map 7	Based on 2006 diver observation and dropdown camera data (MERC, 2006). See marine supporting document for further details
Community structure: *Zostera* density	Shoots per m^2	Conserve the high quality of *Zostera*-dominated communities, subject to natural processes	2006 diver observation and dropdown camera data (MERC, 2006). See marine supporting document for further details
Community structure	Biological composition	Conserve the high quality of the maërl-dominated community, subject to natural processes	2006 diver observation and dropdown camera data (MERC, 2006). See marine supporting document for further details
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal sandy mud community complex; Intertidal sand community complex; Fine to medium sand with bivalves community complex; Sandy mud to mixed sediment community complex; Mixed sediment dominated by Mytilidae community complex; Shingle; Fucoid-dominated community complex; *Laminaria*-dominated community complex; and Shallow sponge-dominated community complex. See map 7	Based on intertidal and subtidal surveys undertaken in 2009 and 2010 (Aquafact, 2010a, b; RPS, 2012). See marine supporting document for further information

Conservation Objectives for : Galway Bay Complex SAC [000268]

1170 Reefs

To maintain the favourable conservation condition of Reefs in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Occurrence	The distribution of reefs is stable or increasing, subject to natural processes. See map 6 for mapped distribution	Based on information from 2009 and 2010 intertidal survey data and 2009 subtidal survey data (Aquafact, 2010a, b; RPS, 2012). See marine supporting document for further details
Habitat area	Hectares	The permanent habitat area is stable, subject to natural processes. See map 6	Habitat area estimated as 2773ha using 2009 and 2010 intertidal survey data and 2009 subtidal survey data (Aquafact, 2010a, b; RPS, 2012)
Community extent	Hectares	Maintain the extent of the *Mytilus*-dominated reef community, subject to natural processes. See map 7	Area established from 2009 intertidal survey (RPS, 2012)
Community structure: *Mytilus* density	Individuals per m^2	Conserve the high quality of the *Mytilus*-dominated reef community, subject to natural processes	Based on intertidal survey 2009 (RPS, 2012) and intertidal walkover 2012
Community structure	Biological composition	Conserve the following community types in a natural condition: Fucoid-dominated community complex; *Laminaria*-dominated community complex; and Shallow sponge-dominated community complex See map 7	Reef mapping based on information from 2009 subtidal reef survey (Aquafact, 2010b) and 2009 and 2010 intertidal surveys (RPS, 2012). See marine supporting document for further details

Conservation Objectives for : Galway Bay Complex SAC [000268]

1220 Perennial vegetation of stony banks

To maintain the favourable conservation condition of Perennial vegetation of stony banks in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession	Current area unknown. It was recorded from Rinville Point, Tawin Point and coastline from Blackhead to Carrickada during the National Shingle Beach Survey (Moore and Wilson, 1999), but the extent was not mapped. Two areas of vegetated shingle were recorded during the Coastal Monitoring Project (Ryle et al., 2009): Bishopsquarter - 0.18ha and Barna (Whitestrand) - 0.45ha. NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 8 for mapped locations	Full distribution unmapped at present, although the habitat has been recorded at Rinville Point, Tawin Point and coastline from Blackhead to Carrickada (Moore and Wilson, 1999). It has also been recorded from Barna and Bishopquarter by Ryle et al. (2009). See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	The Galway Bay shoreline supports good examples of shingle beaches along the more exposed shores to the south and west of Galway city and to the north-east of Finnavara, County Clare. Shingle features are relatively stable in the longterm (Moore and Wilson, 1999). See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Moore and Wilson (1999). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain the typical vegetated shingle flora including the range of sub-communities within the different zones. Typical species include sea sandwort (*Honckenya peploides*), sea beet (*Beta vulgaris* ssp *maritima*), rock samphire (*Crithmum maritimum*), sea mayweed (*Tripleurospermum maritimum*), yellow-horned poppy (*Glaucium flavum*) and sea campion (*Silene uniflora*)	Based on data from Moore and Wilson (1999). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Moore and Wilson (1999). Negative indicators include non-native species indicative of changes in nutrient status and species not considered characteristic of the habitat. See coastal habitats supporting document for further details

Conservation Objectives for : Galway Bay Complex SAC [000268]

1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)

To restore the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Barna House - 2.33ha, Seaweed Point - 1.41ha, Roscam West and South - 3.30ha, Oranmore North - 4.24ha, Kilcaimin - 6.82ha, Tawin Island - 53.85ha, Tyrone House-Dunbulcaun Bay - 9.83ha, Kileenaran - 15.37ha, Kinvara West - 13.33ha, Scanlan's Island - 4.13ha. See map 9	Based on data from Saltmarsh monitoring Project (SMP) (McCorry, 2007; McCorry and Ryle, 2009). Ten sub-sites that supported Atlantic salt meadow were mapped (114.612ha) and additional areas of potential saltmarsh (149.18ha) were identified by an examination of aerial photographs, giving a total estimated area of 263.80ha. NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 9 for known distribution	Based on data from SMP (McCorry, 2007; McCorry and Ryle, 2009). See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions	See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Based on data from SMP (McCorry, 2007; McCorry and Ryle, 2009). The efficiency of sediment circulation throughout a saltmarsh depends on the creek pattern. Creeks and pans are well developed at both Tawin Island and Kileenaran. See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from SMP (McCorry, 2007; McCorry and Ryle, 2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on data from SMP (McCorry, 2007; McCorry and Ryle, 2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% area outside creeks vegetated	Based on data from SMP (McCorry, 2007; McCorry and Ryle, 2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in SMP (McCorry and Ryle, 2009)	Based on data from SMP (McCorry, 2007; McCorry and Ryle, 2009). See coastal habitats supporting document for further details
Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	There is currently no common cordgrass (*Spartina anglica*) in this SAC. Prevent establishment of cordgrass	Based on data from SMP (McCorry, 2007; McCorry and Ryle, 2009). McCorry and Ryle, 2009). See coastal habitats supporting document for further details

Conservation Objectives for : Galway Bay Complex SAC [000268]

1410 Mediterranean salt meadows (Juncetalia maritimi)

To restore the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Barna House - 0.282ha, Seaweed Point - 0.931ha, Kilcaimin - 0.005ha, Tawin Island - 1.799ha. Tyrone House- Dunbulcan Bay - 8.184ha, Kileenaran - 0.271ha. See map 9	Based on data from the Saltmarsh Monitoring Project (SMP) (McCorry, 2007; McCorry and Ryle, 2009). Six sub-sites that support Mediterranean salt meadow were mapped (11.472ha) and additional areas of potential saltmarsh (8.415ha) were identified from an examination of aerial photographs, giving a total estimated area of 19.887ha. NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 9 for known distribution	See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions	See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Based on data from the SMP (McCorry, 2007; McCorry and Ryle, 2009). [Site-specific info.]. See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	Mediterranean salt meadows is found high up in the saltmarsh but requires occasional tidal inundation. [Site-specific info.] See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from SMP (McCorry, 2007; McCorry and Ryle, 2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation in the sward	Based on data from SMP (McCorry, 2007; McCorry and Ryle, 2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated	Based on data from SMP (McCorry, 2007; McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in SMP (McCorry and Ryle, 2009)	Based on data from SMP (McCorry, 2007; McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	There is currently no common cordgrass (*Spartina anglica*) in this SAC. Prevent establishment of cordgrass	Based on data from SMP (McCorry, 2007; McCorry and Ryle, 2009). See coastal habitats supporting document for further details

Conservation Objectives for : Galway Bay Complex SAC [000268]

1355 Otter *Lutra lutra*

To restore the favourable conservation condition of Otter in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. FCS target, based on 1980/81 survey findings, is 88% in SACs. Current range in the west is estimated at 70% (Bailey and Rochford, 2006).
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 262ha above high water mark (HWM); 14ha along river banks/around ponds	No field survey. Areas mapped to include 10m terrestrial buffer along shoreline (above HWM and along river banks) identified as critical for otters (NPWS, 2007)
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 2040ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (HWM) (NPWS, 2007; Kruuk, 2006)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 4km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Extent of freshwater (lake/lagoon) habitat	Hectares	No significant decline. Area mapped and calculated as 21ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (NPWS, 2007)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk, 2006; Kruuk and Moorhouse, 1991)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006) and wrasse and rockling in coastal waters (Kingston et al., 1999)
Barriers to connectivity	Number	No significant increase. For guidance, see map 11	Otters will regularly commute across stretches of open water up to 500m e.g. between the mainland and an island; between two islands; across an estuary (De Jongh and O'Neill, 2010). It is important that such commuting routes are not obstructed

Conservation Objectives for : Galway Bay Complex SAC [000268]

1365 Harbour seal *Phoca vitulina*

To maintain the favourable conservation condition of Harbour Seal in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use. See map 12	See marine supporting document for further details
Breeding behaviour	Breeding sites	Conserve breeding sites in a natural condition. See map 12	Attribute and target based on background knowledge of Irish breeding populations, review of data summarised by Summers et al. (1980), Warner (1983), Harrington (1990), Doyle (2002), Lyons (2004), and unpublished NPWS records. See marine supporting document for further details
Moulting behaviour	Moult haul-out sites	Conserve moult haul-out sites in a natural condition. See map 12	Attribute and target based on background knowledge of Irish populations, review of data from Doyle (2002), Lyons (2004), Cronin et al. (2004), NPWS (2010, 2011, 2012) and unpublished NPWS records. See marine supporting document for further details
Resting behaviour	Resting haul-out sites	Conserve resting haul-out sites in a natural condition. See map 12	Attribute and target based on background knowledge of Irish populations, review of data from Doyle (2002), Lyons (2004) and unpublished NPWS records. See marine supporting document for further details
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the harbour seal population at the site	See marine supporting document for further details

3.2.3 Inishbofin and Inishshark cSAC (000278)

The site is of considerable conservation significance for the presence of an excellent example of a lagoon, a habitat listed with priority status on Annex I of the E.U. Habitats Directive, and for the good examples of heath, sea cliff, hay meadow and other vegetation communities typical of exposed western islands that it supports. The presence of a breeding colony of Grey seal, a species that is listed on Annex II of the E.U. Habitats Directive, as well as populations of rare Red Data Book* plant species and of important bird populations adds significantly to the importance of the site.

The full list of cSAC QIs can be seen above in Table 2.9 and the conservation objectives for those with the potential to be impacted by the proposed development are shown below (NPWS, 2011b).

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected:

- [1364] Grey seal *Halichoerus grypus*

3.2.4 Lough Corrib cSAC (000297)

This site is of major conservation importance and includes 14 habitats listed on Annex I of the E.U. Habitats Directive. Six of these are priority habitats - petrifying springs, *Cladium* fen, active raised bog, limestone pavement, bog woodland and orchid-rich calcareous grassland. The other annexed habitats present include hard water lakes, lowland oligotrophic lakes, floating river vegetation, alkaline fens, degraded raised bogs, Rhynchosporion vegetation, *Molinia* meadows and old Oak woodlands. Species present

on the site that are listed on Annex II of this directive are Sea lamprey, Brook lamprey, Atlantic salmon, White-clawed crayfish, Freshwater pearl mussel, Otter, Lesser horseshoe bat, Slender naiad and the moss *Drepanocladus vernicosus*.

The full list of cSAC QIs can be seen above in Table 2.9 and the conservation objectives for those with the potential to be impacted by the proposed development are shown below (NPWS, 2011c).

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected:

- [1095] Sea lamprey *Petromyzon marinus*
- [1106] Atlantic salmon *Salmo salar* (only in fresh water)
- [1355] Otter *Lutra lutra*

3.2.5 Slyne Head Islands cSAC (000328)

This site is an important example of exposed low-lying western islands with good examples of reefs, a significant breeding grey seal population and important colonies of breeding birds.

The full list of cSAC QIs can be seen above in Table 2.9 and the conservation objectives for those with the potential to be impacted by the proposed development are shown below (NPWS, 2012a).

Conservation objectives for: Slyne Head Islands SAC [000328]

1364 Grey Seal *Halichoerus grypus*

To maintain the favourable conservation condition of Grey Seal in Slyne Head Islands SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use. See map 5	See marine supporting document for further details
Breeding behaviour	Breeding sites	Conserve the breeding sites in a natural condition. See map 5	Attribute and target based on background knowledge of Irish breeding populations, review of data from Summers (1983), Lyons (2004), Ó Cadhla et al. (2005), a comprehensive breeding survey in 2005 (Ó Cadhla et al., 2008) and unpublished National Parks and Wildlife Service records. See marine supporting document for further details
Moulting behaviour	Moult haul-out sites	Conserve the moult haul-out sites in a natural condition. See map 5	Attribute and target based on background knowledge of Irish populations, review of data from Ó Cadhla et al. (2006), a national moult survey (Ó Cadhla and Strong, 2007) and unpublished National Parks and Wildlife Service records. See marine supporting document for further details
Resting behaviour	Resting haul-out sites	Conserve the resting haul-out sites in a natural condition. See map 5	Attribute and target based on review of data from Lyons (2004), Cronin et al. (2004), Ó Cadhla et al. (2005) and unpublished National Parks and Wildlife Service records. See marine supporting document for further details
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the grey seal population at the site	See marine supporting document for further details

3.2.6 Duvillaun Islands cSAC (000495)

The Duvillauns form part of a larger group of islands, together with the Inishkeas, Inishkeeragh and Inishglora, which hold an important breeding population of Grey seal, an animal listed on Annex II of the EU Habitats Directive.

The full list of cSAC QIs can be seen above in Table 2.9 and the conservation objectives for those with the potential to be impacted by the proposed development are shown below (NPWS, 2011d).

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected:

- [1364] Grey seal *Halichoerus grypus*

3.2.7 Inishkea Islands cSAC (000507)

The Inishkeas, together with a group of neighbouring islands, including Inishglora, Inishkeeragh and the Duvillauns, are an important breeding site for Grey Seal, a species listed on Annex II of the EU Habitats Directive. An estimate of the total population for this assemblage made in 1983 suggests 700-900 animals, about a third of the known breeding population in Ireland.

The full list of cSAC QIs can be seen above in Table 2.9 and the conservation objectives for those with the potential to be impacted by the proposed development are shown below (NPWS, 2011e).

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected:

- [1364] Grey seal *Halichoerus grypus*

3.2.8 Maumturk Mountains cSAC (002008)

The site is a candidate SAC selected for blanket bog, a priority habitat on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for lowland oligotrophic lakes, alpine heath, siliceous rocky vegetation and Rhynchosporion, all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive – Slender Naiad and Atlantic Salmon.

The full list of cSAC QIs can be seen above in Table 2.9 and the conservation objectives for those with the potential to be impacted by the proposed development are shown below (NPWS, 2011f).

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected:

- [1106] Atlantic salmon *Salmo salar* (only in fresh water)

3.2.9 Connemara Bog Complex cSAC (002034)

The site is a candidate SAC selected for active blanket bog and lagoons, both priority habitats on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for floating river vegetation, wet and dry heath, alkaline fen, transition mires, lowland oligotrophic lakes, dystrophic lakes, Rhynchosporion, old Oak woodlands, *Molinia* meadows and reefs, all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive - Atlantic Salmon, Otter, the plant Slender Naiad and the Marsh Fritillary butterfly.

The full list of cSAC QIs can be seen above in Table 2.9 and the conservation objectives for those with the potential to be impacted by the proposed development are shown below (NPWS, 2011g).

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected:

- [1355] Otter *Lutra lutra*

3.2.10 Kilkieran Bay and Islands cSAC (002111)

This site is extremely important for subtidal reefs, lagoons, saltmarsh and numerous other marine and terrestrial E.U. Habitats Directive Annex I habitats. Otter, a species listed on Annex II of the E.U. Habitats Directive, occurs commonly throughout the site. The site is used by a small breeding population of Harbour seal. Grey Seal is a regular visitor and may breed.

The full list of cSAC QIs can be seen above in Table 2.9 and the conservation objectives for those with the potential to be impacted by the proposed development are shown below (NPWS, 2011h).

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected:

- [1365] Harbour seal *Phoca vitulina*

3.2.11 Lower River Shannon cSAC (002165)

The site is a candidate SAC selected for lagoons and alluvial wet woodlands, both habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for floating river vegetation, *Molinia* meadows, estuaries, tidal mudflats, Atlantic salt meadows, Mediterranean salt meadows, *Salicornia* mudflats, sand banks, perennial vegetation of stony banks, sea cliffs, reefs and large shallow inlets and bays all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive – Bottle-nosed dolphin, Sea lamprey, River lamprey, Brook lamprey, Freshwater pearl mussel, Atlantic salmon and Otter.

The full list of cSAC QIs can be seen above in Table 2.9 and the conservation objectives for those with the potential to be impacted by the proposed development are shown below (NPWS, 2012b).

Conservation objectives for: Lower River Shannon SAC [002165]

1349 Bottlenose Dolphin *Tursiops truncatus*

To maintain the favourable conservation condition of Bottlenose Dolphin in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use. See map 16 for suitable habitat	See marine supporting document for further details
Habitat use: critical areas	Location and hectares	Critical areas, representing habitat used preferentially by bottlenose dolphin, should be maintained in a natural condition. See map 16	Attribute and target based on Ingram and Rogan (2002), Englund et al. (2007), Englund et al. (2008), Berrow (2009), Berrow et al. (2010) and review of data from other studies. See marine supporting document for further details
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the bottlenose dolphin population at the site	See marine supporting document for further details

3.2.12 Blasket Islands cSAC (002172)

The site is a candidate SAC selected for vegetated sea cliffs, dry heath, marine caves and reefs, all habitats that are listed on Annex I of the E.U. Habitats Directive. The site is also selected for Grey Seal and Harbour Porpoise, species that are listed on Annex II of this directive.

The full list of cSAC QIs can be seen above in Table 2.9 and the conservation objectives for those with the potential to be impacted by the proposed development are shown below (NPWS, 2011i).

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected:

- [1351] Harbour porpoise *Phocoena phocoena*
- [1364] Grey seal *Halichoerus grypus*

3.2.13 West Connacht Coast cSAC (002998)

The site encompasses a diverse range of shallow marine habitats occurring in waters less than 100 m deep (DAHG, 2012). These include a variety of seabed structures including reefs, islets and sedimentary basins. The site contains physical and hydrographic features believed to be important for Bottlenose Dolphins *Tursiops truncatus,* one of two cetacean species listed on Annex II of the E.U. Habitats Directive. These features include shallow coastal bays, areas of steep seafloor topography and complex areas of strong current flow adjacent to estuaries, coastal headlands and islands, sandbanks, shoals and reefs. Its area borders existing designated sites for protected species and habitats, and lies adjacent to a wide array of coastal features including sheltered bays, estuaries, coastal cliffs and sea caves, several of which are located within protected sites.

The West Connacht Coast cSAC is currently going through the designation process and therefore there are no conservation objectives available for this site at present. It is assumed that the following will apply:

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected:

- [1351] Bottlenose dolphin *Tursiops truncatus*

3.2.14 Galway Bay SPA (004031)

This large coastal site is of immense ornithological importance, with two wintering species having populations of international importance and a further sixteen species having populations of national importance. The breeding colonies of Sandwich tern, Common tern and Cormorant are also of national importance. Also of note is that seven of the regularly occurring species are listed on Annex I of the E.U. Birds Directive, *i.e.* Red-throated diver, Black-throated diver, Great Northern diver, Golden plover, Bar-tailed godwit, Sandwich tern and Common tern.

The full list of SPA SCIs can be seen above in Table 2.10 and the conservation objectives for those with the potential to be impacted by the proposed development are shown below (NPWS, 2013c).

Conservation Objectives for : Inner Galway Bay SPA [004031]

A003 Great Northern Diver *Gavia immer*

To maintain the favourable conservation condition of Great Northern Diver in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by great northern diver, other than that occurring from natural patterns of variation	Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Inner Galway Bay SPA [004031]

A017 **Cormorant *Phalacrocorax carbo***

To maintain the favourable conservation condition of Cormorant in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline	This attribute applies to breeding cormorant. Measure based on standard survey methods (see Walsh et al., 1995). The Seabird Monitoring Programme (SMP) online database (JNCC, 2013) provides population data for this species. A recent survey of Deer Island (conducted in 2010) estimated 128 AONs at this colony, which represents an approximate decline of 38% since 1985
Productivity rate	Mean number	No significant decline	This attribute applies to breeding cormorant. Measure based on standard survey methods (see Walsh et al., 1995). The Seabird Monitoring Programme (SMP) online database (JNCC, 2013) provides population data for this species
Distribution: breeding colonies	Number; location; area (hectares)	No significant decline	This attribute applies to breeding cormorant. Cormorant colonies are usually sited on flat or rocky islets or sea stack tops, less often on cliffs (Walsh et al., 1995). Deer Island is a traditional breeding colony in this SPA
Prey biomass available	Kilogrammes	No significant decline	This attribute applies to breeding cormorant. Key prey items: fish (mostly benthic), some crustaceans. Key habitats: cormorants use sandy areas as well as rocky and vegetated substrates. Foraging range: max. 50km, mean max. 31.67km, mean 8.46km (BirdLife International Seabird Database (Birdlife International, 2013))
Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase	This attribute applies to breeding cormorant. Seabird species make extensive use of the marine waters adjacent to their breeding colonies. Foraging range: max. 50km, mean max. 31.67km, mean 8.46km (BirdLife International Seabird Database (Birdlife International, 2013))
Disturbance at breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the breeding cormorant population	This attribute applies to breeding cormorant. Cormorant colonies are usually sited on flat or rocky islets or sea stack tops, less often on cliffs (Walsh et al., 1995). Deer Island is a traditional breeding site
Population trend	Percentage change	Long term population trend stable or increasing	This attribute applies to non-breeding cormorant. Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by cormorant, other than that occurring from natural patterns of variation	This attribute applies to non-breeding cormorant. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Inner Galway Bay SPA [004031]

A028 Grey Heron *Ardea cinerea*

To maintain the favourable conservation condition of Grey Heron in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Number and range of areas used by waterbirds	No significant decrease in the range, timing and intensity of use of areas used by grey heron, other than that occurring from natural patterns of variation	Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Inner Galway Bay SPA [004031]

A046 Brent Goose *Branta bernicla hrota*

To maintain the favourable conservation condition of Light-bellied Brent Goose in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Number and range of areas used by waterbirds	No significant decrease in the range, timing and intensity of use of areas by light-bellied brent goose, other than that occurring from natural patterns of variation	Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Inner Galway Bay SPA [004031]

A050 Wigeon *Anas penelope*

To maintain the favourable conservation condition of Wigeon in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Number, range, timing and intensity of areas used by waterbirds	No significant decrease in the range, timing or intensity of use of areas by wigeon, other than that occurring from natural patterns of variation	Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Inner Galway Bay SPA [004031]

A052 Teal *Anas crecca*

To maintain the favourable conservation condition of Teal in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Number and range of areas used by waterbirds	No significant decrease in the range, timing or intensity of use of areas by teal, other than that occurring from natural patterns of variation	Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Inner Galway Bay SPA [004031]

A056 Shoveler *Anas clypeata*

To maintain the favourable conservation condition of Shoveler in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Number and range of areas used by waterbirds	No significant decrease in the range, timing or intensity of use of areas by shoveler, other than that occurring from natural patterns of variation	Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Inner Galway Bay SPA [004031]

A069 Red-breasted Merganser *Mergus serrator*

To maintain the favourable conservation condition of Red-breasted Merganser in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Number and range of areas used by waterbirds	No significant decrease in the range, timing and intensity of use of areas by red-breasted merganser, other than that occurring from natural patterns of variation	Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Inner Galway Bay SPA [004031]

A137 Ringed Plover *Charadrius hiaticula*

To maintain the favourable conservation condition of Ringed Plover in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Number and range of areas used by waterbirds	No significant decrease in the range, timing or intensity of use of areas by ringed plover, other than that occurring from natural patterns of variation	Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of conservation objectives supporting document

Conservation Objectives for : Inner Galway Bay SPA [004031]

A140 Golden Plover *Pluvialis apricaria*

To maintain the favourable conservation condition of Golden Plover in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of theconservation objectives supporting document
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by golden plover, other than that occurring from natural patterns of variation	Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Inner Galway Bay SPA [004031]

A142 Lapwing *Vanellus vanellus*

To maintain the favourable conservation condition of Lapwing in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by lapwing, other than that occurring from natural patterns of variation	Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives

Conservation Objectives for : Inner Galway Bay SPA [004031]

A149 Dunlin *Calidris alpina alpina*

To maintain the favourable conservation condition of Dunlin in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by dunlin, other than that occurring from natural patterns of variation	Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Inner Galway Bay SPA [004031]

A157 Bar-tailed Godwit *Limosa lapponica*

To maintain the favourable conservation condition of Bar-tailed Godwit in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Number, range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by bar-tailed godwit, other than that occurring from natural patterns of variation	Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Inner Galway Bay SPA [004031]

A160 Curlew *Numenius arquata*

To maintain the favourable conservation condition of Curlew in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Number, range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by curlew, other than that occurring from natural patterns of variation	Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Inner Galway Bay SPA [004031]

A162 Redshank *Tringa totanus*

To maintain the favourable conservation condition of Redshank in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Number, range, timing and intensity of use of area	There should be no significant decrease in the range, timing or intensity of use of areas by redshank, other than that occurring from natural patterns of variation	Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Inner Galway Bay SPA [004031]

A169 Turnstone *Arenaria interpres*

To maintain the favourable conservation condition of Turnstone in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the range, timing or intensity of use of areas by turnstone, other than that occurring from natural patterns of variation	Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Inner Galway Bay SPA [004031]

A179 Black-headed Gull *Chroicocephalus ridibundus*

To maintain the favourable conservation condition of Black-headed Gull in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the range, timing and intensity of use of areas used by black-headed gull other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Inner Galway Bay SPA [004031]

A182 Common Gull *Larus canus*

To maintain the favourable conservation condition of Common Gull in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Number and range of areas used by waterbirds	No significant decrease in the range,timing or intensity of use of areas by the common gull, other than that occurring from natural patterns of variation	Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Inner Galway Bay SPA [004031]

A191 Sandwich Tern *Sterna sandvicensis*

To maintain the favourable conservation condition of Sandwich Tern in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline	Measure based on standard tern survey methods (see Walsh et al., 1995). Hannon et al. (1997) and Mitchell et al. (2004) provide summary population information. The Seabird Monitoring Programme (SMP) online database (JNCC, 2013) provides population data for this species
Productivity rate: fledged young per breeding pair	Mean number	No significant decline	Measure based on standard tern survey methods (see Walsh et al., 1995). The Seabird Monitoring Programme (SMP) online database (JNCC, 2013) provides population data for this species
Distribution: breeding colonies	Number; location; area (Hectares)	No significant decline	Typical sandwich tern breeding sites are located on low-lying offshore islands or islets in bays or brackish lagoons on spits or remote mainland dunes (Cramp, 1985). Wide fluctuations between years in both breeding numbers and colony locations are known to occur for this species (Mitchell et al., 2004)
Prey biomass available	Kilogrammes	No significant decline	Key prey items: Mostly energy-rich fish, some crustaceans and occasionally insects and rag worms. Key habitats: sandwich tern forage in/over shallow marine waters such as bays, inlets and outflows, gullies, shoals, inshore waters, reefs, and sandbanks; also more open waters nearshore and offshore, including open sea. Foraging range: max. 70km, mean max. 42.3km, mean 14.7km (BirdLife International Seabird Database (Birdlife International, 2013))
Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase	Seabird species can make extensive use of the marine waters adjacent to their breeding colonies. Foraging range: Max 70km, mean max 42.3km, mean 14.7km (Birdlife International Seabird Database (Birdlife International, 2013))
Disturbance at breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the breeding sandwich tern population	Typical sandwich tern breeding sites are located on low-lying offshore islands or islets in bays or brackish bagoons on spits or remote mainland dunes (Cramp, 1985)

Conservation Objectives for : Inner Galway Bay SPA [004031]

A193 Common Tern *Sterna hirundo*

To maintain the favourable conservation condition of Common Tern in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline	Measure based on standard tern survey methods (see Walsh et al., 1995). Hannon et al. (1997) and Mitchell et al. (2004) provide summary population information. The Seabird Monitoring Programme (SMP) (JNCC, 2013) provides population data for this species
Productivity rate: fledged young per breeding pair	Mean number	No significant decline	Measure based on standard tern survey methods (see Walsh et al., 1995). The Seabird Monitoring Programme (SMP) (JNCC, 2013) provides population data for this species
Distribution: breeding colonies	Number; location; area (Hectares)	No significant decline	Common tern breeding colonies can be sited in both coastal and inland areas using a wide variety of habitats including sandy, rocky or well-vegetated islands in estuaries, lakes and rivers. This species can also use man-made subtrates (Del Hoyo et al., 1996)
Prey biomass available	Kilogrammes	No significant decline	Key prey items: Small fish, crustaceans, insects and occasionally squid. Key habitats: common tern forage in/over shallow coastal waters, bays, inlets, shoals, tidal-rips, drift lines, beaches, saltmarsh creeks, lakes, ponds, or rivers. Foraging range: max. 37km, mean max. 33.81km, mean 8.67km (BirdLife International Seabird Database (Birdlife International, 2013))
Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase	Seabird species can make extensive use of marine waters adjacent to their breeding colonies. Foraging range: max. 37km, mean max. 33.81km, mean 8.67km (BirdLife International Seabird Database (Birdlife International, 2013))
Disturbance at breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the breeding little tern population	Breeding colonies can be sited in both coastal and inland areas using a wide variety of habitats including sandy, rocky or well vegetated islands in estuaries, lakes and rivers. This species can also use man-made subtrates (Del Hoyo et al., 1996)

Conservation Objectives for : Inner Galway Bay SPA [004031]

A999 Wetlands

To maintain the favourable conservation condition of wetland habitat in Inner Galway Bay SPA as a resource for the regularly occurring migratory waterbirds that utilise it. This is defined by the following attribute and target:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 13,267ha, other than that occurring from natural patterns of variation	The wetland habitat area was estimated as 13,267ha using OSi data and relevant orthophotographs. For further information see part three of the conservation objectives supporting document

3.2.15 Lough Corrib SPA (004042)

Lough Corrib is one of the top ornithological sites in the country, and easily qualifies for international importance on the basis of numbers of wintering birds using it. It is also of international importance for its population of Pochard. There are a further seven species of wintering waterfowl that have populations of national importance. Its populations of breeding gulls and terns are also notable, with nationally important numbers of Common Tern, Arctic Tern, Common Gull and Black-headed Gull. The site is now the most important in the country for

nesting Common Scoter. It is of note that several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Greenland White-fronted Goose, Golden Plover, Common Tern and Arctic Tern.

The full list of SPA SCIs can be seen above in Table 2.10 and the conservation objectives for those with the potential to be impacted by the proposed development are shown below (NPWS, 2011j).

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

- [A065] Common scoter *Melanitta nigra* [breeding]
- [A179] Black-headed gull *Chroicocephalus ridibundus* [breeding]
- [A182] Common gull *Larus canus* [breeding]
- [A193] Common tern *Sterna hirundo* [breeding]
- [A194] Arctic tern *Sterna paradisaea* [breeding]

3.3 POTENTIAL IMPACTS

3.3.1 Impact Assessment

The main focus of impact assessment is to identify the nature of the impact, its magnitude and the likelihood that it will persist during the operation of the project.

The potential impacts associated with the development were identified in Section 2.4 of this document. The potential origin of the impacts was also identified in terms of direct, indirect or in combination effects. Section 2.2 of the document identified the baseline conditions associated with the proposed development site and development. This section examines the potential impacts of the development in light of the survey and modelling work, to assess the magnitude and likelihood of the impacts on the surrounding environment, with particular reference to the designated Natura 2000 European sites and their qualifying and special conservation interests.

3.3.1.1 Assessing Impact Significance

This section determines the significance of the predicted ecological impacts arising from the proposed development. It does so by assessing the anticipated impacts for each key ecological feature in light of the available information. Professional judgement is used to determine whether the effects related to these are expected to be ecologically significant. This evaluation has been carried out with reference to guidance produced by the Institute of Ecology and Environmental Management (IEEM, 2006). When describing changes/activities and impacts on ecosystem structure and function, reference should be made to the parameters, which are discussed below:

Magnitude: Magnitude should be predicted in a quantified manner wherever possible and relates to the quantum of an impact, for example, the number of individuals affected by an activity.

Extent: Extent should also be predicted in a quantified manner and relates to the area over which the impact occurs. Where the receptor is in an area of a particular plant community, for example Extent = Magnitude.

Duration: Duration is intended to refer to the time during which the impact is predicted to continue, until recovery or re-instatement (which may be longer than the impact-causing activity). This should be quantified wherever possible, and interpreted in relation to the ecological processes involved rather than on a human timescale.

Reversibility: Reversibility should be addressed by identifying whether an impact is ecologically reversible (either spontaneously or through specific action) and whether such an outcome is likely.

Timing and Frequency: The timing of impacts in relation to important seasonal and/or life-cycle constraints should be evaluated. Similarly, the frequency with which activities (and concomitant impacts) would take place can be an important determinant of the impact on receptors and should also be assessed and described.

3.3.1.1.1 Assessing Likelihood

Where possible, levels of certainty are given to indicate the likelihood that both the predicted impact/activity and the associated ecological effect will occur. The IEEM guidance suggests using the following four-point scale to identify the levels of confidence arrived at by professional judgement:

- Certain/High
- Probable/Moderate
- Unlikely/Low
- Extremely Unlikely/Negligible

3.3.1.1.2 Assessing Magnitude

Within this report, magnitude is taken to be the amount or level of impact. This is often a subjective assessment, and for this reason the following broad terms have been adopted within this report:

- High
- Medium
- Low
- Negligible

3.3.1.2Determining Significance

IEEM Guidance states that impacts should be determined as being significant when they have an adverse or positive effect 'on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area'.

3.3.1.2.1 Definition of Conservation Status

The concept of 'conservation status' is used to determine the significance of ecological impacts on a habitat or species. This is defined in IEEM Guidance as below:

For habitats, conservation status is determined by the sum of the influences acting on the habitat and its typical species that may affect its long-term distribution, structure and functions as well as the long term survival of its typical species within a given geographical area.

For species, conservation status is determined by the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its population within a given geographical area.

According to the EU Habitats Directive, 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, as defined below.

Favourable conservation status of a species is achieved when:

- The population data on the species concerned indicate that it is maintaining itself,
- 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 population on a long-term basis.

3.3.1.2.2 Definition of Integrity

A site can be regarded to have integrity (or 'favourable condition') when its ecological function remains whole, it continues to meet its conservation objectives and it retains the ability to recover from the disturbance and to evolve in ways favourable to conservation with a minimum of external management support (European Commission, 2011).

In considering the sites that could be affected, a number of different effects on the ecological integrity of the cSAC/SPA are possible, including:

- Interruption to progress towards achieving conservation objectives of the site
- Disruption of factors that help to maintain favourable conservation status onsite
- Interference with the balance, distribution and density of key species that are indicators of favourable conservation status of the site
- Changes to the vital defining aspects (*e.g.* nutrient balance) that determines how the site functions as a habitat or ecosystem
- Reduction in the area of key habitats
- Reduction in the population of key species
- Changes to the balance between key species
- Reduction of the diversity of the site
- Effects which result in fragmentation
- Effects which result in disturbance that could affect population size or density or the balance between key species

3.3.2 Potential Impacts on Natura 2000 Sites

3.3.2.1 Slieve Tooey / Tormore Island / Loughros Beg Bay cSAC (000190)

The grey seal *Halichoerus grypus*, is a more offshore species than the common seal and tends not to occur in shallow inner bays such as Inner Galway Bay and particularly at the proposed construction site. It is a QI of this cSAC and has the potential to travel up to 450km from its breeding site in Co. Donegal (Hayden & Harrington, 2000). This site is located *ca* 160km north of the proposed development site and individual adults from this site have the potential to enter Galway Bay and the proposed development area.

3.3.2.1.1 Pre-Construction & Construction Impacts

Disturbance - Noise

Tables 10.5.3, 10.5.4 and 10.5.5 of Chapter 10 of the EIS provide impact ranges (where available) from blasting and impulsive pile driving (Table 10.5.3 Chapter 10), construction activities (Table 10.5.4 Chapter 10) and shipping (Table 10.5.5 Chapter 10) on cetaceans, phocids, mustelids, fish, agnathans and diving birds. Predicted distances are included for permanent threshold shift (PTS), temporary threshold shift (TTS) and disturbance (for 3 distances *i.e.* <100m, <1,000m and >1,000m and at both an individual and population level).

For blasting and impulsive pile driving (Table 10.5.3 Chapter 10), PTS for the grey seal is estimated at 100m and for TTS it is 500 m. The likelihood of a disturbance within 100m of these activities for an individual grey seal is high and the likelihood of disturbance at a population level is low.

The likelihood of a disturbance within 1000 m of these activities for an individual grey seal is medium and the likelihood of disturbance at a population level is low.

The likelihood of disturbance at distances greater than 1000 m of these activities at the individual and population level is low.

The effect of blasting and impulsive pile driving on an individual grey seal is therefore considered as a potentially **Temporary Significant Negative Impact.**

For construction activities including construction traffic (Table 10.5.4 Chapter 10), PTS for the grey seal is estimated at 60 m. TTS for grey seal is 350m.

The likelihood of disturbance within 100 m of these activities for an individual grey seal is high and the likelihood of disturbance at a population level is medium.

The likelihood of disturbance within 1000 m of these activities for an individual grey seal is medium and the likelihood of disturbance at a population level is low.

The likelihood of disturbance at distances greater than 1000 m of these activities at the individual and population level for grey seal is low.

The effect of construction including construction traffic within 100m of these activities on an individual grey seal is therefore considered as a potentially **Temporary Significant Negative Impact.**

Physical damage
Seals found washed up in some UK waters (Scotland, Norfolk and Strangford Lough) over the period 2008 – 2010 (see Thompson *et al.* 2010) were found to have been mutilated with a spiral scoring along their bodies from head to tail. These workers suggest that the seals had been drawn into ducted propellers which are found in some vessels.

The number of seals recorded by Thompson *et al.* (2010) were low in terms of the total population size and ranged from a) 2 in 2008, 5 in 2009 and 7 in 2010 for off the Scottish coast, b) from 11 in 2009 to 26 for 2010 for off the Norfolk coast and for Strangford Lough from “several” between 2008 to 2010. This possibility may also occur during the preconstruction, construction and operation phases of the proposed harbour development. This phenomenon has not been recorded from the Galway Docks area to date.

As the number of grey seal that occur in Inner Galway Bay and particularly at the proposed Galway Harbour Extension site is low, it is considered that the impact of the construction phase of this development will have a **Negligible Impact** on the Slieve Tooey / Tormore Island / Loughros Beg Bay population of this species and on the integrity of this cSAC.

The Conservation Objective to maintain or restore the favourable conservation condition of this Annex II species for which the cSAC has been selected will not be affectyed by the construction phase.

3.3.2.1.2 Operational Impacts
With regards to shipping traffic and the grey seal, PTS does not occur and TTS occurs within 2m of the activity (Table 10.5.5 Chapter 10). The likelihood of disturbance to an individual grey seal within 100m of this activity is high; however at a population level the likelihood of disturbance is low. The likelihood of disturbance within 1000 m and beyond 1000m is low at the individual and population levels. The effect of noise from shipping activities is therefore considered a **Permanent Neutral or Negligible Direct Negative Impact.**

Physical damage
Seals found washed up in some UK waters (Scotland, Norfolk and Strangford Lough) over the period 2008 – 2010 (see Thompson *et al.* 2010) were found to have been mutilated with a spiral scoring along their bodies from head to tail. These workers suggest that the seals had been drawn into ducted propellers which are found in some vessels.

The number of seals recorded by Thompson *et al.* (2010) were low in terms of the total population size and ranged from a) 2 in 2008, 5 in 2009 and 7 in 2010 for off the Scottish coast, b) from 11 in 2009 to 26 for 2010 for off the Norfolk coast and for Strangford Lough from "several" between 2008 to 2010. This possibility may also occur during the preconstruction, construction and operation phases of the proposed harbour development. This phenomenon has not been recorded from the Galway Docks area to date.

As the number of grey seal that occur in Inner Galway Bay and particularly at the proposed Galway Harbour Extension site is low, it is considered that the impact of the construction phase of this development will have a **Negligible Impact** on the Slieve Tooey / Tormore Island / Loughros Beg Bay population of this species and on the integrity of this cSAC.

The Conservation Objective to maintain or restore the favourable conservation condition of this Annex II species for which the cSAC has been selected will not be affected by the operation phase.

3.3.2.2 Galway Bay cSAC (000268)

The qualifying interests taken from the conservation objectives of the Galway Bay cSAC (Source: NPWS, 2013b) are:

- [1140] Mudflats and sandflats not covered by sea water at low tide,
- [1150] * Coastal lagoons,
- [1160] Large shallow inlets and bays
- [1170] Reefs,
- [1220] Perennial vegetation of stony banks
- [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*),
- [1355] Otter *Lutra lutra*,
- [1365] Harbour seal *Phoca vitulina*,
- [1410] Mediterranean salt meadows (*Juncetalia maritimi*),

* indicates a priority habitat

3.3.2.2.1 Pre-Construction & Construction Impacts

Habitat Loss
The reclamation of land as part of the construction of the proposed development constitutes the direct and irreplaceable loss of 26.93 ha of habitat for marine plants and invertebrates. Of this 26.93 ha, there will be a loss of 5.93 ha of a mixture of mudflats and sandflats not covered by sea water at low tide [1140] and Reefs [1170]. This loss represents 0.1% of the total available foreshore in the cSAC and 0.17% of the mud and sandflats and reef habitat in the cSAC. This will have a **Permanent Significant Negative Impact.**

This loss of 26.93ha of subtidal and intertidal habitat will result in the direct loss of potential food and feeding habitat for otters [1355] and harbour seals [1365] as this area can act as a refuge for crustaceans and fish which are important food resources for otters and seals. In the context of the Galway Bay complex cSAC, this loss constitutes 1.2% of the total available foreshore (calculated at 2,555 ha). This will have a **Permanent Slight Negative Impact.**

Lough Atalia and Renmore Lough both fall under the definition of coastal lagoons **[1150].** Modelling studies indicated that the proposed Harbour Extension will alter the dispersion of River Corrib water in the estuary of the river. This has the potential to change the salinity regime in

Lough Atalia. Although the predictions are that the range in salinity will not change *e.g.* 0 – 30 psu, the median salinity will reduce by 1.29 psu from the present value. The cumulative annual frequency of zero salinity at the southern part of Lough Atalia will increase from 7 to 18 hours over an average year. The impact of the additional temporary, seasonal and spatially restricted decreases in salinity to 0 psu within parts of the ecosystems will not affect their status or their ecological functioning. This is considered as a Permanent Neutral Impact.

The habitat large shallow inlets and bays [1160] does not occur within the foot print of the development but may be temporarily affected by sediments suspended during the dredging operation. Due to the natural background suspended sediments loadings that already occur in the area, the impact of this on large shallow bays and inlets is considered as a Temporary, Neutral Impact.

There will be a **Short-term Moderate Negative Impact** on otters and harbour seals due to a loss of habitat due to the dredging of 46.48 hectares. This is a temporary impact: it would take several months for recolonisation to occur and *ca* 2 – 3 years for the original community and biomass to re-establish. Dredged areas would be subject to sediment import caused by the River Corrib flow and to periodic maintenance dredging.

Impacts on [1220] perennial vegetation of stony banks, [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) and [1410] Mediterranean salt meadows (*Juncetalia maritimi*) are unlikely but must be considered as Indeterminate.

Disturbance – Physical presence

There will be a **Temporary Slight Negative Impact** on otters and harbour seals due to the physical presence of survey personnel on the shore.

Disturbance - Noise

Tables 10.5.3, 10.5.4 and 10.5.5 of Chapter 10 provide impact ranges (where available) from blasting and impulsive pile driving (Table 10.5.3 Chapter 10), construction activities (Table 10.5.4 Chapter 10) and shipping (Table 10.5.5 Chapter 10) on cetaceans, phocids, mustelids, fish, agnathans and diving birds. Predicted distances are included for permanent threshold shift (PTS), temporary threshold shift (TTS) and disturbance (for 3 distances *i.e.*<100m, <1,000m and >1,000m and at both an individual and population level).

For blasting and impulsive pile driving (Table 10.5.3 Chapter 10), PTS for the otter is 90m and 100 m for the harbour seal. TTS for the otter and harbour seal is 500 m.

The likelihood of disturbance within 100 m of these activities for an individual otter or harbour seal is high and the likelihood of disturbance at the population level is medium for otter and low for the harbour seal.

The likelihood of disturbance within 1000 m of these activities for an individual otter or harbour seal is medium and the likelihood of disturbance is low at the population level for both species.

The likelihood of disturbance at distances greater than 1000 m of these activities at both the individual at the population level for otter and harbour seal is low.

The effect of blasting and impulsive pile driving is therefore considered a **Temporary Significant Negative Impact.** Harbour seals at the moulting, resting and breeding sites will not be disturbed by this activity.

For construction activities including construction traffic (Table 10.5.4 Chapter 10), PTS for the otter is 55 m and for the harbour seal is 60 m. TTS for the otter is 100m and 350m for the harbour seal.

The likelihood of disturbance within 100 m of these activities for an individual otter or harbour seal is high. At the population level, the likelihood of disturbance on both species is medium.

The likelihood of disturbance within 1000 m of these activities for an individual harbour seal or otter is medium and the likelihood of disturbance at the population level is low for both species.

The likelihood of disturbance at distances greater than 1000 m of these activities at both the individual and population level for both species is low.

The effect of construction activities including construction traffic is therefore considered a **Temporary Significant Negative Impact.** Harbour seals at the moulting, resting and breeding sites will not be disturbed by this activity.

Disturbance - Water Quality

Suspended solids can affect primary production by shading and increased sedimentation can disturb benthic communities. Newcombe and MacDonald (1991) state that high levels of suspended solids (typically of the order of 20,000 mg/l or more for exposure periods of 24 to 96 hours for smolts of several species) can be lethal for salmonids. The same authors also detail sub-lethal responses (including cellular damage and physiological stress) and behavioural responses (*e.g.* avoidance behaviour and alarm responses) to suspended solids. Results from the capital dredge sediment analysis (see Chapter 8 of the EIS) predict that levels of suspended material in the dredge plume will fall to concentrations of 5mg/l or less within tens of meters of the dredge site. For this reason, increased levels of suspended solids in the water column are considered as a **Temporary Moderate Direct Negative Impact** on lamprey, salmon, harbour seal.

Reduced oxygen levels in the water column may arise due to the temporary suspension of anoxic/hypoxic muds and muddy sands during the sediment dredging operations. This has the potential to affect otter and seal and is considered to be a **Temporary Moderate Direct Negative Impact.**

Increases in pH levels in the water column may arise due to the use of concrete during the construction phase. This has the potential to affect otter and seal and is considered to be a **Temporary Moderate Direct Negative Impact.**

Accidental spillages and leakages from vessel collisions may impact both the water column and the sea bed and have the potential to destroy marine habitats and species where they occur. They are considered to be a **Temporary Significant Direct Negative Impact.**

Physical damage

Seals found washed up in some UK waters (Scotland, Norfolk and Strangford Lough) over the period 2008 – 2010 (see Thompson *et al.* 2010) were found to have been mutilated with a spiral scoring along their bodies from head to tail. These workers suggest that the seals had been drawn into ducted propellers which are found in some vessels.

The number of seals recorded by Thompson *et al.* (2010) were low in terms of the total population size and ranged from a) 2 in 2008, 5 in 2009 and 7 in 2010 for off the Scottish coast, b) from 11 in 2009 to 26 for 2010 for off the Norfolk coast and for Strangford Lough from "several" between 2008 to 2010. This possibility may also occur during the preconstruction, construction and operation phases of the proposed harbour development. This phenomenon has not been recorded from the Galway Docks area to date.

As the number of grey seal that occur in Inner Galway Bay and particularly at the proposed Galway Harbour Extension site is low, it is considered that the impact of the construction phase of this development will have a **Negligible Impact** on the Galway Bay cSAC population of this species.

Regarding common seals, **this species is a QI of Galway Bay cSAC and frequently occurs at the proposed Galway Harbour Extension site. It is considered that the impact of the construction phase of this development will have a Temporary, Negative Impact on the** Galway Bay cSAC population of this species.

It is considered that the impact of the construction phase of this development will have a **Temporary Negative Impact on the integrity of this cSAC.**

3.3.2.2.2 Operational Impacts

Disturbance - Noise
With regards to shipping traffic and harbour seals and otters, PTS does not occur and TTS occurs within 2m. The likelihood of disturbance within 100m of this activity on an individual harbour seal or otter is high; however the likelihood of disturbance at the population level is low for both species. The likelihood of disturbance within and beyond 1000 m is low for both species at the individual and population levels. The effect of noise from shipping activities is therefore considered a **Permanent Neutral or Negligible Direct Negative Impact.** Harbour seals at the moulting, resting and breeding sites will not be disturbed by this activity.

Physical damage
Seals found washed up in some UK waters (Scotland, Norfolk and Strangford Lough) over the period 2008 – 2010 (see Thompson *et al.* 2010) were found to have been mutilated with a spiral scoring along their bodies from head to tail. These workers suggest that the seals had been drawn into ducted propellers which are found in some vessels.

The number of seals recorded by Thompson *et al.* (2010) were low in terms of the total population size and ranged from a) 2 in 2008, 5 in 2009 and 7 in 2010 for off the Scottish coast, b) from 11 in 2009 to 26 for 2010 for off the Norfolk coast and for Strangford Lough from "several" between 2008 to 2010. This possibility may also occur during the preconstruction, construction and operation phases of the proposed harbour development. This phenomenon has not been recorded from the Galway Docks area to date.

As the number of grey seal that occur in Inner Galway Bay and particularly at the proposed Galway Harbour Extension site is low, it is considered that the impact of the construction phase of this development will have a **Negligible Impact** on the Galway Bay cSAC population of this species.

Regarding common seals, this species is a QI of Galway Bay cSAC and frequently occurs at the proposed Galway Harbour Extension site. It is considered that the impact of the construction phase of this development will have a **Temporary, Negative Impact** on the Galway Bay cSAC population of this species.

Reduced oxygen levels in the water column may arise due to the temporary suspension of anoxic/hypoxic muds and muddy sands during the sediment dredging operations. This has the potential to affect otter and seal and is considered to be a **Temporary Moderate Direct Negative Impact.**

Increases in pH levels in the water column may arise due to the use of concrete during the construction phase. This has the potential to affect otter and seal and is considered to be a **Temporary Moderate Direct Negative Impact.**

Accidental spillages and leakages from vessel collisions may impact both the water column and the sea bed and have the potential to destroy marine habitats and species where they occur. They are considered to be a **Temporary Significant Direct Negative Impact.**

It is considered that the impact of the operation phase of this development will have a **Permanent, Negligible Impact on the integrity of this cSAC.**

3.3.2.3 Inishbofin and Inishshark cSAC (000278)

The grey seal *Halichoerus grypus*, which is a QI of this cSAC has the potential to travel up to 450km from its breeding site on these islands off the coast of Co. Galway (Hayden & Harrington, 2000). This site is located *ca* 80km northwest of the proposed development site and individual adults from this site have the potential to enter Galway Bay and the proposed development area.

3.3.2.3.1 Pre-Construction & Construction Impacts

Disturbance - Noise

Tables 10.5.3, 10.5.4 and 10.5.5 of Chapter 10 provide impact ranges (where available) from blasting and impulsive pile driving (Table 10.5.3 Chapter 10), construction activities (Table 10.5.4 Chapter 10) and shipping (Table 10.5.5 Chapter 10) on cetaceans, phocids, mustelids, fish, agnathans and diving birds. Predicted distances are included for permanent threshold shift (PTS), temporary threshold shift (TTS) and disturbance (for 3 distances *i.e.*<100m, <1,000m and >1,000m and at both an individual and population level).

For blasting and impulsive pile driving (Table 10.5.3 Chapter 10), PTS for the grey seal is estimated at 100 m. TTS for grey seal is 500 m. The likelihood of a disturbance within 100 m of these activities for an individual grey seal is high and the likelihood of disturbance at a population level is low.

The likelihood of a disturbance within 1000 m of these activities for an individual grey seal is medium and the likelihood of disturbance at a population level is low.

The likelihood of disturbance at distances greater than 1000 m of these activities at the individual and population level is low.

The effect of blasting and impulsive pile driving on an individual within 100m of the activity is therefore considered a **Temporary Significant Negative Impact.**

For construction activities including construction traffic (Table 10.5.4 Chapter 10), PTS for the grey seal is estimated at 60 m.

The likelihood of disturbance within 60 m of these activities for an individual grey seal is high and the likelihood of disturbance at a population level is medium. The likelihood of disturbance within 1000 m of these activities for an individual grey seal is medium and the likelihood of disturbance at a population level is low.

The likelihood of disturbance at distances greater than 1000 m of these activities at the individual and population level for grey seal is low.

The effect of construction including construction traffic within 100m of these activities on an individual grey seal is therefore considered as a potentially **Temporary Significant Negative Impact.**

Physical damage

Seals found washed up in some UK waters (Scotland, Norfolk and Strangford Lough) over the period 2008 – 2010 (see Thompson *et al.* 2010) were found to have been mutilated with a spiral scoring along their bodies from head to tail. These workers suggest that the seals had been drawn into ducted propellers which are found in some vessels.

The number of seals recorded by Thompson *et al.* (2010) were low in terms of the total population size and ranged from a) 2 in 2008, 5 in 2009 and 7 in 2010 for off the Scottish coast, b) from 11 in 2009 to 26 for 2010 for off the Norfolk coast and for Strangford Lough from

"several" between 2008 to 2010. This possibility may also occur during the preconstruction, construction and operation phases of the proposed harbour development. This phenomenon has not been recorded from the Galway Docks area to date.

As the number of grey seal that occur in Inner Galway Bay and particularly at the proposed Galway Harbour Extension site is low, it is considered that the impact of the construction phase of this development will have a **Negligible Impact** on the Inishbofin and Inishark population of this species and on the integrity of this cSAC.

3.3.2.3.2 Operational Impacts

With regards to shipping traffic and the grey seal, PTS does not occur and TTS occurs within 2m of the activity (Table 10.5.5 Chapter 10). The likelihood of disturbance to an individual grey seal within 100m of this activity is high; however at a population level the likelihood of disturbance is low. The likelihood of disturbance within 1000 m and beyond 1000m is low at the individual and population levels. The effect of noise from shipping activities is therefore considered a **Permanent Neutral or Negligible Direct Negative Impact.**

Physical damage

Seals found washed up in some UK waters (Scotland, Norfolk and Strangford Lough) over the period 2008 – 2010 (see Thompson *et al.* 2010) were found to have been mutilated with a spiral scoring along their bodies from head to tail. These workers suggest that the seals had been drawn into ducted propellers which are found in some vessels**.**

The number of seals recorded by Thompson *et al.* (2010) were low in terms of the total population size and ranged from a) 2 in 2008, 5 in 2009 and 7 in 2010 for off the Scottish coast, b) from 11 in 2009 to 26 for 2010 for off the Norfolk coast and for Strangford Lough from "several" between 2008 to 2010. This possibility may also occur during the preconstruction, construction and operation phases of the proposed harbour development. This phenomenon has not been recorded from the Galway Docks area to date.

As the number of grey seal that occur in Inner Galway Bay and particularly at the proposed Galway Harbour Extension site is low, it is considered that the impact of the construction phase of this development will have a **Negligible Impact** on the Inishbofin and Inishark population of this species and on the integrity of this cSAC.

3.3.2.4Lough Corrib cSAC (000297)

This cSAC is designated for the presence of two species which will migrate through the proposed development site travelling to and from freshwater spawning grounds: Sea lamprey *Petromyzon marinus* and Atlantic salmon *Salmo salar* (only in fresh water). A third species, Otter *Lutra lutra,* has a high probability of using the proposed development site as a feeding and foraging area.

3.3.2.4.1 Pre-Construction & Construction Impacts

Habitat Loss

The reclamation of land as part of the construction of the proposed development constitutes the direct and irreplaceable loss of 26.93ha of the intertidal and marine habitat which acts as a potential shelter for crustaceans and fish and a feeding area for salmon and otter. The loss of this area will result in the direct and irreplaceable loss of feeding habitat and food for otters and salmon. As lamprey parasitise salmon (and other salmonids), there will be an indirect impact on them if salmon are directly impacted by the reduction in available food and feeding habitat. In the context of the Galway Bay complex cSAC, this loss constitutes 1.2% of the total available foreshore (calculated at 2,555 ha). This will have a **Permanent Slight Secondary Negative Impact** on Lough Corrib cSAC**.**

There will be a **Short-term Moderate Negative Impact** on otters, lamprey and salmon due to a loss of habitat due to the dredging of 46.48 hectares. This is a temporary impact; it would take several months for recolonisation to occur and *ca* 2 – 3 years for the original community and

biomass to be re-established. Dredged areas would, of course, be subject to sediment export caused by the River Corrib flow and to periodic maintenance dredging.

Disturbance - Noise

Tables 10.5.3, 10.5.4 and 10.5.5 of Chapter 10 provide impact ranges (where available) from blasting and impulsive pile driving (Table 10.5.3 Chapter 10), construction activities (Table 10.5.4 Chapter 10) and shipping (Table 10.5.5 Chapter 10) on cetaceans, phocids, mustelids, fish, agnathans and diving birds. Predicted distances are included for permanent threshold shift (PTS), temporary threshold shift (TTS) and disturbance (for 3 distances *i.e.*<100, <1,000 and >1,000m and at both an individual and population level).

For blasting and impulsive pile driving (Table 10.5.3 Chapter 10), PTS for lamprey and salmon is 18 m and otter is 90 m. TTS for the otter is 500 m. There are no data available for lamprey or salmon.

The likelihood of disturbance within 100 m of these activities for an individual otter, salmon or lamprey is high and the likelihood of disturbance is low at the population level for salmon and lamprey and medium at the population level for otter.

The likelihood of disturbance within 1000 m of these activities for an individual otter, salmon or lamprey is medium and the likelihood of disturbance for all three species is low at the population level.

The likelihood of disturbance at distances greater than 1000 m of these activities at both the individual and population level for all three species is low.

The effect of blasting and impulsive pile driving is therefore considered a **Temporary Significant Negative Impact.**

For construction activities including construction traffic (Table 10.5.4 Chapter 10), PTS for otter is 55 m and 95m for salmon and lamprey. TTS for otter is 100 m. There are no data available for lamprey and salmon.

The likelihood of disturbance within 100 m of these activities for an individual otter, salmon or lamprey is high and the likelihood of disturbance is low at the population level for salmon and lamprey and medium at the population level for otter.

The likelihood of disturbance within 1000 m of these activities for an individual otter, salmon or lamprey is medium and the likelihood of disturbance is low at the population level for all three species.

The likelihood of disturbance at distances greater than 1000 m of these activities at both the individual and population level for all three species is low.

The effect of construction activities including construction traffic is therefore considered a **Temporary Significant Negative Impact.**

Disturbance - Water Quality

Suspended solids can impact primary production by shading and increased sedimentation can disturb benthic communities. Newcombe and MacDonald (1991) state that high levels of suspended solids (typically of the order of 20,000 mg/l or more for exposure periods of 24 to 96 hours for smolts of several species) can be lethal for salmonids. The same authors also detail sub-lethal responses (including cellular damage and physiological stress) and behavioural responses (*e.g.* avoidance behaviour and alarm responses) to suspended solids. Results from the capital dredge sediment analysis (see Chapter 8 of the EIS) predict that levels of suspended material in the dredge plume will fall to concentrations of 5mg/l or less within tens of meters of

the dredge site. For this reason, increased levels of suspended solids in the water column are considered as a **Temporary Moderate Direct Negative Impact** on lamprey, salmon and otter.

Reduced oxygen levels in the water column may arise due to the temporary suspension of anoxic/hypoxic muds and muddy sands during the sediment dredging operations. This has the potential to affect lamprey and salmon and is considered to be a **Temporary Moderate Direct Negative Impact.**

Increases in pH levels in the water column may arise due to the use of concrete during the construction phase. This has the potential to affect lamprey and salmon and is considered to be a **Temporary Moderate Direct Negative Impact.**

Accidental spillages and leakages from vessel collisions may impact both the water column and the sea bed and have the potential to destroy marine habitats and species where they occur. They are considered to be a **Temporary Significant Direct Negative Impact.**

3.3.2.4.2 Operational Impacts

With regards to shipping traffic and the otter, salmon and lamprey, PTS occurs within 2m for salmon and lamprey and it does not occur for otter (Table 10.5.5 Chapter 10). TTS occurs within 2m for otter and no data is available for salmon and lamprey. The likelihood of disturbance to an individual otter, salmon or lamprey within 100m of this activity is high; however at a population level the likelihood of disturbance is low. The likelihood of disturbance within 1000 m and beyond 1000m is low at the individual and population levels. The effect of noise from shipping activities is therefore considered a **Permanent Neutral or Negligible Direct Negative Impact.**

3.3.2.5Slyne Head Islands cSAC (000328)

The grey seal *Halichoerus grypus*, which is a QI of this cSAC has the potential to travel up to 450km from its breeding site on these islands off the coast of Co. Galway (Hayden & Harrington, 2000). This site is located *ca* 77km northwest of the proposed development site and individual adults from this site have the potential to enter Galway Bay and the proposed development area.

3.3.2.5.1 Pre-Construction & Construction Impacts

Disturbance - Noise

Tables 10.5.3, 10.5.4 and 10.5.5 of Chapter 10 provide impact ranges (where available) from blasting and impulsive pile driving (Table 10.5.3 Chapter 10), construction activities (Table 10.5.4 Chapter 10) and shipping (Table 10.5.5 Chapter 10) on cetaceans, phocids, mustelids, fish, agnathans and diving birds. Predicted distances are included for permanent threshold shift (PTS), temporary threshold shift (TTS) and disturbance (for 3 distances *i.e.*<100m, <1,000m and >1,000m and at both an individual and population level).

For blasting and impulsive pile driving (Table 10.5.3 Chapter 10), PTS for the grey seal is estimated at 100 m. TTS for grey seal is 500 m. The likelihood of a disturbance within 100 m of these activities for an individual grey seal is high and the likelihood of disturbance at a population level is low.

The likelihood of a disturbance within 1000 m of these activities for an individual grey seal is medium and the likelihood of disturbance at a population level is low.

The likelihood of disturbance at distances greater than 1000 m of these activities at the individual and population level is low.

The effect of blasting and impulsive pile driving is therefore considered a **Temporary Significant Negative Impact.**

For construction activities including construction traffic (Table 10.5.4 Chapter 10), PTS for the grey seal is estimated at 60 m. TTS for grey seal is 350m.

The likelihood of disturbance within 100 m of these activities for an individual grey seal is high and the likelihood of disturbance at a population level is medium. The likelihood of disturbance within 1000 m of these activities for an individual grey seal is medium and the likelihood of disturbance at a population level is low.

The likelihood of disturbance at distances greater than 1000 m of these activities at the individual and population level for grey seal is low.

The effect of construction including construction traffic within 100m of these activities on an individual grey seal is therefore considered as a potentially **Temporary Significant Negative Impact.**

Physical damage
Seals found washed up in some UK waters (Scotland, Norfolk and Strangford Lough) over the period 2008 – 2010 (see Thompson *et al.* 2010) were found to have been mutilated with a spiral scoring along their bodies from head to tail. These workers suggest that the seals had been drawn into ducted propellers which are found in some vessels.

The number of seals recorded by Thompson *et al.* (2010) were low in terms of the total population size and ranged from a) 2 in 2008, 5 in 2009 and 7 in 2010 for off the Scottish coast, b) from 11 in 2009 to 26 for 2010 for off the Norfolk coast and for Strangford Lough from "several" between 2008 to 2010. This possibility may also occur during the preconstruction, construction and operation phases of the proposed harbour development. This phenomenon has not been recorded from the Galway Docks area to date.

As the number of grey seal that occur in Inner Galway Bay and particularly at the proposed Galway Harbour Extension site is low, it is considered that the impact of the construction phase of this development will have a **Negligible Impact** on the Slyne Head and Islands population of this species and on the integrity of this cSAC.

3.3.2.5.2 Operational Impacts
With regards to shipping traffic and the grey seal, PTS does not occur and TTS occurs within 2m of the activity (Table 10.5.5 Chapter 10). The likelihood of disturbance to an individual grey seal within 100m of this activity is high; however at a population level the likelihood of disturbance is low. The likelihood of disturbance within 1000 m and beyond 1000m is low at the individual and population levels. The effect of noise from shipping activities is therefore considered a **Permanent Neutral or Negligible Direct Negative Impact.**

Physical damage
Seals found washed up in some UK waters (Scotland, Norfolk and Strangford Lough) over the period 2008 – 2010 (see Thompson *et al.* 2010) were found to have been mutilated with a spiral scoring along their bodies from head to tail. These workers suggest that the seals had been drawn into ducted propellers which are found in some vessels.

The number of seals recorded by Thompson *et al.* (2010) were low in terms of the total population size and ranged from a) 2 in 2008, 5 in 2009 and 7 in 2010 for off the Scottish coast, b) from 11 in 2009 to 26 for 2010 for off the Norfolk coast and for Strangford Lough from "several" between 2008 to 2010. This possibility may also occur during the preconstruction, construction and operation phases of the proposed harbour development. This phenomenon has not been recorded from the Galway Docks area to date.

As the number of grey seal that occur in Inner Galway Bay and particularly at the proposed Galway Harbour Extension site is low, it is considered that the impact of the construction phase of this development will have a **Negligible Impact** on the Slyne Head and Islands population of this species and on the integrity of this cSAC.

3.3.2.6Duvillaun Islands cSAC (000495)

The grey seal *Halichoerus grypus*, which is a QI of this cSAC has the potential to travel up to 450km from its breeding site on these islands off the coast of Co. Mayo (Hayden & Harrington, 2000). This site is located *ca* 116km northwest of the proposed development site and individual adults from this site have the potential to enter Galway Bay and the proposed development area.

3.3.2.6.1 Pre-Construction & Construction Impacts

Disturbance - Noise

Tables 10.5.3, 10.5.4 and 10.5.5 of Chapter 10 provide impact ranges (where available) from blasting and impulsive pile driving (Table 10.5.3 Chapter 10), construction activities (Table 10.5.4 Chapter 10) and shipping (Table 10.5.5 Chapter 10) on cetaceans, phocids, mustelids, fish, agnathans and diving birds. Predicted distances are included for permanent threshold shift (PTS), temporary threshold shift (TTS) and disturbance (for 3 distances *i.e.*<100m, <1,000m and >1,000m and at both an individual and population level).

For blasting and impulsive pile driving (Table 10.5.3 Chapter 10), PTS for the grey seal is estimated at 100 m. TTS for grey seal is 500 m. The likelihood of a disturbance within 100 m of these activities for an individual grey seal is high and the likelihood of disturbance at a population level is low.

The likelihood of a disturbance within 1000 m of these activities for an individual grey seal is medium and the likelihood of disturbance at a population level is low.

The likelihood of disturbance at distances greater than 1000 m of these activities at the individual and population level is low.

The effect of blasting and impulsive pile driving is therefore considered a **Temporary Significant Negative Impact.**

For construction activities including construction traffic (Table 10.5.4 Chapter 10), PTS for the grey seal is estimated at 60 m. TTS for grey seal is 350m.

The likelihood of disturbance within 100 m of these activities for an individual grey seal is high and the likelihood of disturbance at a population level is medium. The likelihood of disturbance within 1000 m of these activities for an individual grey seal is medium and the likelihood of disturbance at a population level is low.

The likelihood of disturbance at distances greater than 1000 m of these activities at the individual and population level for grey seal is low.

The effect of construction including construction traffic within 100m of these activities on an individual grey seal is therefore considered as a potentially **Temporary Significant Negative Impact.**

Physical damage

Seals found washed up in some UK waters (Scotland, Norfolk and Strangford Lough) over the period 2008 – 2010 (see Thompson *et al.* 2010) were found to have been mutilated with a spiral scoring along their bodies from head to tail. These workers suggest that the seals had been drawn into ducted propellers which are found in some vessels.

The number of seals recorded by Thompson *et al.* (2010) were low in terms of the total population size and ranged from a) 2 in 2008, 5 in 2009 and 7 in 2010 for off the Scottish coast, b) from 11 in 2009 to 26 for 2010 for off the Norfolk coast and for Strangford Lough from “several” between 2008 to 2010. This possibility may also occur during the preconstruction, construction and operation phases of the proposed harbour development. This phenomenon has not been recorded from the Galway Docks area to date.

As the number of grey seal that occur in Inner Galway Bay and particularly at the proposed Galway Harbour Extension site is low, it is considered that the impact of the construction phase of this development will have a **Negligible Impact** on the Duvilaun population of this species and on the integrity of this cSAC.

3.3.2.6.2 Operational Impacts

With regards to shipping traffic and the grey seal, PTS does not occur and TTS occurs within 2m of the activity (Table 10.5.5 Chapter 10). The likelihood of disturbance to an individual grey seal within 100m of this activity is high; however at a population level the likelihood of disturbance is low. The likelihood of disturbance within 1000 m and beyond 1000m is low at the individual and population levels. The effect of noise from shipping activities is therefore considered a **Permanent Neutral or Negligible Direct Negative Impact.**

Physical damage

Seals found washed up in some UK waters (Scotland, Norfolk and Strangford Lough) over the period 2008 – 2010 (see Thompson *et al.* 2010) were found to have been mutilated with a spiral scoring along their bodies from head to tail. These workers suggest that the seals had been drawn into ducted propellers which are found in some vessels.

The number of seals recorded by Thompson *et al.* (2010) were low in terms of the total population size and ranged from a) 2 in 2008, 5 in 2009 and 7 in 2010 for off the Scottish coast, b) from 11 in 2009 to 26 for 2010 for off the Norfolk coast and for Strangford Lough from "several" between 2008 to 2010. This possibility may also occur during the preconstruction, construction and operation phases of the proposed harbour development. This phenomenon has not been recorded from the Galway Docks area to date.

As the number of grey seal that occur in Inner Galway Bay and particularly at the proposed Galway Harbour Extension site is low, it is considered that the impact of the construction phase of this development will have a **Negligible Impact** on the Duvilaun population of this species and on the integrity of this cSAC.

3.3.2.7Inishkea Islands cSAC (000507)

The grey seal *Halichoerus grypus*, which is a QI of this cSAC has the potential to travel up to 450km from its breeding site on these islands off the coast of Co. Mayo (Hayden & Harrington, 2000). This site is located *ca* 121km northwest of the proposed development site and individual adults from this site have the potential to enter Galway Bay and the proposed development area.

3.3.2.7.1 Pre-Construction & Construction Impacts

Disturbance - Noise

Tables 10.5.3, 10.5.4 and 10.5.5 of Chapter 10 provide impact ranges (where available) from blasting and impulsive pile driving (Table 10.5.3 Chapter 10), construction activities (Table 10.5.4 Chapter 10) and shipping (Table 10.5.5 Chapter 10) on cetaceans, phocids, mustelids, fish, agnathans and diving birds. Predicted distances are included for permanent threshold shift (PTS), temporary threshold shift (TTS) and disturbance (for 3 distances *i.e.*<100m, <1,000m and >1,000m and at both an individual and population level).

For blasting and impulsive pile driving (Table 10.5.3 Chapter 10), PTS for the grey seal is estimated at 100 m. TTS for grey seal is 500 m. The likelihood of a disturbance within 100 m of these activities for an individual grey seal is high and the likelihood of disturbance at a population level is low.

The likelihood of a disturbance within 1000 m of these activities for an individual grey seal is medium and the likelihood of disturbance at a population level is low.

The likelihood of disturbance at distances greater than 1000 m of these activities at the individual and population level is low.

The effect of blasting and impulsive pile driving is therefore considered a **Temporary Significant Negative Impact.**

For construction activities including construction traffic (Table 10.5.4 Chapter 10), PTS for the grey seal is estimated at 60 m. TTS for grey seal is 350m.

The likelihood of disturbance within 100 m of these activities for an individual grey seal is high and the likelihood of disturbance at a population level is medium. The likelihood of disturbance within 1000 m of these activities for an individual grey seal is medium and the likelihood of disturbance at a population level is low.

The likelihood of disturbance at distances greater than 1000 m of these activities at the individual and population level for grey seal is low.

The effect of construction including construction traffic within 100m of these activities on an individual grey seal is therefore considered as a potentially **Temporary Significant Negative Impact.**

Physical damage
Seals found washed up in some UK waters (Scotland, Norfolk and Strangford Lough) over the period 2008 – 2010 (see Thompson *et al.* 2010) were found to have been mutilated with a spiral scoring along their bodies from head to tail. These workers suggest that the seals had been drawn into ducted propellers which are found in some vessels.

The number of seals recorded by Thompson *et al.* (2010) were low in terms of the total population size and ranged from a) 2 in 2008, 5 in 2009 and 7 in 2010 for off the Scottish coast, b) from 11 in 2009 to 26 for 2010 for off the Norfolk coast and for Strangford Lough from "several" between 2008 to 2010. This possibility may also occur during the preconstruction, construction and operation phases of the proposed harbour development. This phenomenon has not been recorded from the Galway Docks area to date.

As the number of grey seal that occur in Inner Galway Bay and particularly at the proposed Galway Harbour Extension site is low, it is considered that the impact of the construction phase of this development will have a **Negligible Impact** on the Inishkea Islands population of this species and on the integrity of this cSAC.

3.3.2.7.2 Operational Impacts
With regards to shipping traffic and the grey seal, PTS does not occur and TTS occurs within 2m of the activity (Table 10.5.5 Chapter 10). The likelihood of disturbance to an individual grey seal within 100m of this activity is high; however at a population level the likelihood of disturbance is low. The likelihood of disturbance within 1000 m and beyond 1000m is low at the individual and population levels. The effect of noise from shipping activities is therefore considered a **Permanent Neutral or Negligible Direct Negative Impact.**

Physical damage
Seals found washed up in some UK waters (Scotland, Norfolk and Strangford Lough) over the period 2008 – 2010 (see Thompson *et al.* 2010) were found to have been mutilated with a spiral scoring along their bodies from head to tail. These workers suggest that the seals had been drawn into ducted propellers which are found in some vessels.

The number of seals recorded by Thompson *et al.* (2010) were low in terms of the total population size and ranged from a) 2 in 2008, 5 in 2009 and 7 in 2010 for off the Scottish coast, b) from 11 in 2009 to 26 for 2010 for off the Norfolk coast and for Strangford Lough from "several" between 2008 to 2010. This possibility may also occur during the preconstruction, construction and operation phases of the proposed harbour development. This phenomenon has not been recorded from the Galway Docks area to date.

As the number of grey seal that occur in Inner Galway Bay and particularly at the proposed Galway Harbour Extension site is low, it is considered that the impact of the construction phase of this development will have a **Negligible Impact** on the Inishkea Islands population of this species and on the integrity of this cSAC.

3.3.2.8Maumturk Mountains cSAC (002008)

The Atlantic salmon *Salmo salar* enter the Maumturk Mountains cSAC through the Corrib system and therefore will be in the vicinity of the proposed development site during their migratory periods.

3.3.2.8.1 Pre-Construction & Construction Impacts

Disturbance - Noise

Tables 10.5.3, 10.5.4 and 10.5.5 of Chapter 10 provide impact ranges (where available) from blasting and impulsive pile driving (Table 10.5.3 Chapter 10), construction activities (Table 10.5.4 Chapter 10) and shipping (Table 10.5.5 Chapter 10) on cetaceans, phocids, mustelids, fish, agnathans and diving birds. Predicted distances are included for permanent threshold shift (PTS), temporary threshold shift (TTS) and disturbance (for 3 distances *i.e.*<100, <1,000 and >1,000m and at both an individual and population level).

For blasting and impulsive pile driving (Table 10.5.3 Chapter 10), PTS for salmon is 18 m. There are no TTS data available for salmon.

The likelihood of disturbance within 100 m of these activities for an individual salmon is high and the likelihood of disturbance is low at the population level for salmon.

The likelihood of disturbance within 1000 m of these activities for an individual salmon is medium and the likelihood of disturbance is low at the population level.

The likelihood of disturbance at distances greater than 1000 m of these activities at both the individual and population level for salmon is low.

The effect of blasting and impulsive pile driving is therefore considered a **Temporary Significant Negative Impact.**

For construction activities including construction traffic (Table 10.5.4 Chapter 10), PTS for salmon is 95m. There are no TTS data available for salmon.

The likelihood of disturbance within 100 m of these activities for an individual salmon is high and the likelihood of disturbance is low at the population level for salmon.

The likelihood of disturbance within 1000 m of these activities for an individual salmon is medium and the likelihood of disturbance is low at the population level.

The likelihood of disturbance at distances greater than 1000 m of these activities at both the individual and population level for salmon is low.

The effect of construction activities including construction traffic is therefore considered a **Temporary Significant Negative Impact.**

Disturbance - Water Quality

Suspended solids can impact primary production by shading and increased sedimentation can disturb benthic communities. Newcombe and MacDonald (1991) state that high levels of suspended solids (typically of the order of 20,000 mg/l or more for exposure periods of 24 to 96 hours for smolts of several species) can be lethal for salmonids. The same authors also detail sub-lethal responses (including cellular damage and physiological stress) and behavioural

responses (*e.g.* avoidance behaviour and alarm responses) to suspended solids. Results from the capital dredge sediment analysis (see Chapter 8 of the EIS) predict that levels of suspended material in the dredge plume will fall to concentrations of 5mg/l or less within tens of meters of the dredge site. For this reason, increased levels of suspended solids in the water column are considered as a **Temporary Moderate Direct Negative Impact** on salmon.

Reduced oxygen levels in the water column may arise due to the temporary suspension of anoxic/hypoxic muds and muddy sands during the sediment dredging operations. This has the potential to affect salmon and is considered to be a **Temporary Moderate Direct Negative Impact.**

Increases in pH levels in the water column may arise due to the use of concrete during the construction phase. This has the potential to affect salmon and is considered to be a **Temporary Moderate Direct Negative Impact.**

Accidental spillages and leakages from vessel collisions may impact both the water column and the sea bed and have the potential to impact salmon. They are considered to be a **Temporary Significant Direct Negative Impact.**

3.3.2.8.2 Operational Impacts

With regards to shipping traffic and salmon, PTS occurs within 2m for salmon (Table 10.5.5 Chapter 10). No TTS data is available for salmon. The likelihood of disturbance to an individual salmon within 100m of this activity is high; however at a population level the likelihood of disturbance is low. The likelihood of disturbance within 1000 m and beyond 1000m is low at the individual and population levels. The effect of noise from shipping activities is therefore considered a **Permanent Neutral or Negligible Direct Negative Impact.**

3.3.2.9Connemara Bog Complex cSAC (002034)

The otter *Lutra lutra* is a QI of this cSAC and has the potential to forage within the proposed development area if food is scarce within its immediate range (Bailey & Rochford, 2006).

3.3.2.9.1 Pre-Construction & Construction Impacts

Disturbance - Noise

Tables 10.5.3, 10.5.4 and 10.5.5 of Chapter 10 provide impact ranges (where available) from blasting and impulsive pile driving (Table 10.5.3 Chapter 10), construction activities (Table 10.5.4 Chapter 10) and shipping (Table 10.5.5 Chapter 10) on cetaceans, phocids, mustelids, fish, agnathans and diving birds. Predicted distances are included for permanent threshold shift (PTS), temporary threshold shift (TTS) and disturbance (for 3 distances *i.e.*<100, <1,000 and >1,000m and at both an individual and population level).

For blasting and impulsive pile driving (Table 10.5.3 Chapter 10), PTS for otter is 90 m. TTS for the otter is 500 m.

The likelihood of disturbance within 100 m of these activities for an individual otter is high and the likelihood of disturbance is medium at the population level for otter.

The likelihood of disturbance within 1000 m of these activities for an individual otter is medium and the likelihood of disturbance is low at the population level.

The likelihood of disturbance at distances greater than 1000 m of these activities at both the individual and population level for the otter is low.

The effect of blasting and impulsive pile driving is therefore considered a **Temporary Significant Negative Impact.**

For construction activities including construction traffic (Table 10.5.4 Chapter 10), PTS for otter is 55 m and TTS for otter is 100 m.

The likelihood of disturbance within 100 m of these activities for an individual otter is high and the likelihood of disturbance is medium at the population level for otter.

The likelihood of disturbance within 1000 m of these activities for an individual otter is medium and the likelihood of disturbance is low at the population level for otter.

The likelihood of disturbance at distances greater than 1000 m of these activities at both the individual and population level for otter is low.

The effect of construction activities including construction traffic is therefore considered a **Temporary Significant Negative Impact.**

Disturbance - Water Quality
Suspended solids can impact primary production by shading and increased sedimentation can disturb benthic communities. Newcombe and MacDonald (1991) state that high levels of suspended solids (typically of the order of 20,000 mg/l or more for exposure periods of 24 to 96 hours for smolts of several species) can be lethal for salmonids. The same authors also detail sub-lethal responses (including cellular damage and physiological stress) and behavioural responses (*e.g.* avoidance behaviour and alarm responses) to suspended solids. Results from the capital dredge sediment analysis (see Chapter 8 of the EIS) predict that levels of suspended material in the dredge plume will fall to concentrations of 5mg/l or less within tens of meters of the dredge site. For this reason, increased levels of suspended solids in the water column are considered as a **Temporary Moderate Direct Negative Impact** on otter.

3.3.2.9.2 Operational Impacts
With regards to shipping traffic and the otter, PTS does not occur for otter (Table 10.5.5 Chapter 10). TTS occurs within 2m for otter. The likelihood of disturbance to an individual otter within 100m of this activity is high; however at a population level the likelihood of disturbance is low. The likelihood of disturbance within 1000 m and beyond 1000m is low at the individual and population levels. The effect of noise from shipping activities is therefore considered a **Permanent Neutral or Negligible Direct Negative Impact.**

3.3.2.10 Kilkieran Bay and Islands cSAC (002111)

The harbour seal *Phoca vitulina* is a QI of the Kilkieran Bay and Islands cSAC and this species has the potential to travel the *ca* 37km into the proposed development site.

3.3.2.10.1 Pre-Construction & Construction Impacts
Disturbance - Noise
Tables 10.5.3, 10.5.4 and 10.5.5 of Chapter 10 provide impact ranges (where available) from blasting and impulsive pile driving (Table 10.5.3 Chapter 10), construction activities (Table 10.5.4 Chapter 10) and shipping (Table 10.5.5 Chapter 10) on cetaceans, phocids, mustelids, fish, agnathans and diving birds. Predicted distances are included for permanent threshold shift (PTS), temporary threshold shift (TTS) and disturbance (for 3 distances *i.e.*<100m, <1,000m and >1,000m and at both an individual and population level).

For blasting and impulsive pile driving (Table 10.5.3 Chapter 10), PTS for the harbour seal is estimated at 100 m. TTS for harbour seal is 500 m. The likelihood of a disturbance within 100 m of these activities for an individual harbour seal is high and the likelihood of disturbance at a population level is low.

The likelihood of a disturbance within 1000 m of these activities for an individual harbour seal is medium and the likelihood of disturbance at a population level is low.

The likelihood of disturbance at distances greater than 1000 m of these activities at the individual and population level is low.

The effect of blasting and impulsive pile driving is therefore considered a **Temporary Significant Negative Impact.**

For construction activities including construction traffic (Table 10.5.4 Chapter 10), PTS for the harbour seal is estimated at 60 m. TTS for the harbour seal is 350m.

The likelihood of disturbance within 100 m of these activities for an individual harbour seal is high and the likelihood of disturbance at a population level is medium.

The likelihood of disturbance within 1000 m of these activities for an individual harbour seal is medium and the likelihood of disturbance at a population level is low.

The likelihood of disturbance at distances greater than 1000 m of these activities at the individual and population level for harbour seal is low.

The effect of construction including construction traffic within 100m of these activities on an individual common seal is therefore considered as a potentially **Temporary Significant Negative Impact.**

Physical damage
Seals found washed up in some UK waters (Scotland, Norfolk and Strangford Lough) over the period 2008 – 2010 (see Thompson *et al.* 2010) were found to have been mutilated with a spiral scoring along their bodies from head to tail. These workers suggest that the seals had been drawn into ducted propellers which are found in some vessels.

The number of seals recorded by Thompson *et al.* (2010) were low in terms of the total population size and ranged from a) 2 in 2008, 5 in 2009 and 7 in 2010 for off the Scottish coast, b) from 11 in 2009 to 26 for 2010 for off the Norfolk coast and for Strangford Lough from "several" between 2008 to 2010. This possibility may also occur during the preconstruction, construction and operation phases of the proposed harbour development. This phenomenon has not been recorded from the Galway Docks area to date.

It is considered unlikely that significant numbers of common seal from Kilkieran Bay cSAC will travel into Inner Galway Bay and to the proposed Galway Harbour Extension. It is concluded therefore that the impact of the construction phase of this development will have a **Negligible Impact** on the Kilkieran Bay and Islands population of this species and on the integrity of this cSAC.

3.3.2.10.2 Operational Impacts
With regards to shipping traffic and the harbour seal, PTS does not occur and TTS occurs within 2m of the activity (Table 10.5.5 Chapter 10). The likelihood of disturbance to an individual harbour seal within 100m of this activity is high; however at a population level the likelihood of disturbance is low. The likelihood of disturbance within 1000 m and beyond 1000m is low at the individual and population levels. The effect of noise from shipping activities is therefore considered a **Permanent Neutral or Negligible Direct Negative Impact.**

Physical damage
Seals found washed up in some UK waters (Scotland, Norfolk and Strangford Lough) over the period 2008 – 2010 (see Thompson *et al.* 2010) were found to have been mutilated with a spiral scoring along their bodies from head to tail. These workers suggest that the seals had been drawn into ducted propellers which are found in some vessels.

The number of seals recorded by Thompson *et al.* (2010) were low in terms of the total population size and ranged from a) 2 in 2008, 5 in 2009 and 7 in 2010 for off the Scottish coast, b) from 11 in 2009 to 26 for 2010 for off the Norfolk coast and for Strangford Lough from "several" between 2008 to 2010. This possibility may also occur during the preconstruction, construction and operation phases of the proposed harbour development. This phenomenon has not been recorded from the Galway Docks area to date.

It is considered unlikely that significant numbers of common seal from Kilkieran Bay cSAC will travel into Inner Galway Bay and to the proposed Galway Harbour Extension. It is concluded therefore that the impact of the construction phase of this development will have a **Negligible Impact** on the Kilkieran Bay and Islands population of this species and on the integrity of this cSAC.

3.3.2.11 Lower River Shannon cSAC (002165)

There is a resident population of bottle nosed dolphin *Tursiops truncatus* in the Shannon Estuary and they are a QI of this cSAC. The site ranges in distance from 53 to 100km south/southwest of the proposed development site and it cannot be ruled out that individuals from the Shannon would enter Inner Galway Bay and the proposed Galway Harbour Extension site.

3.3.2.11.1 Pre-Construction & Construction Impacts

Disturbance - Noise

Tables 10.5.3, 10.5.4 and 10.5.5 of Chapter 10 provide impact ranges (where available) from blasting and impulsive pile driving (Table 10.5.3 Chapter 10), construction activities (Table 10.5.4 Chapter 10) and shipping (Table 10.5.5 Chapter 10) on cetaceans, phocids, mustelids, fish, agnathans and diving birds. Predicted distances are included for permanent threshold shift (PTS), temporary threshold shift (TTS) and disturbance (for 3 distances *i.e.*<100m, <1,000m and >1,000m and at both an individual and population level).

For blasting and impulsive pile driving (Table 10.5.3 Chapter 10), PTS for the bottlenose dolphin is estimated at 19 m. TTS for the bottlenose dolphin is 100 m. The likelihood of a disturbance within 100 m of these activities for an individual bottlenose dolphin is high and the likelihood of disturbance at a population level is low.

The likelihood of a disturbance within 1000 m of these activities for an individual bottlenose dolphin is medium and the likelihood of disturbance at a population level is low.

The likelihood of disturbance at distances greater than 1000 m of these activities at the individual and population level is low.

The effect of blasting and impulsive pile driving is therefore considered a **Temporary Significant Negative Impact.**

For construction activities including construction traffic (Table 10.5.4 Chapter 10), PTS for the bottlenose dolphin is estimated at 13 m. TTS for the bottlenose dolphin is 75m.
The likelihood of disturbance within 100 m of these activities for an individual bottlenose dolphin is high and the likelihood of disturbance at a population level is low.

The likelihood of disturbance within 1000 m of these activities for an individual bottlenose dolphin is low and the likelihood of disturbance at a population level is low.

The likelihood of disturbance at distances greater than 1000 m of these activities at the individual and population level for bottlenose dolphin is low.

Numbers of bottle nosed dolphins in Inner Galway Bay are low and therefore represent a small percentage of the Lower River Shannon cSAC. The effect of construction activities including

construction traffic is therefore considered a **Temporary Negligible Negative Impact on the** population of this species and on the integrity of this cSAC.

3.3.2.11.2 Operational Impacts

With regards to shipping traffic and the bottlenose dolphin, PTS and TTS do not occur (Table 10.5.5 Chapter 10). The likelihood of disturbance to an individual bottlenose dolphin within 100m of this activity is high; however at a population level the likelihood of disturbance is low. The likelihood of disturbance within 1000 m and beyond 1000m is low at the individual and population levels. Therefore, shipping traffic will have a **Permanent Neutral or Negligible Direct Negative Impact** on Lower River Shannon population of bottlenose dolphins and on the integrity of this cSAC.

3.3.2.12 Blasket Islands cSAC (002172)

The grey seal *Halichoerus grypus*, which is a QI of this cSAC has the potential to travel up to 450km from its breeding site on these islands off the coast of Co. Kerry (Hayden & Harrington, 2000). This site is located *ca* 156km southwest of the proposed development site and individual adults from this site have the potential to enter Galway Bay and the proposed development area. The Harbour porpoise *Phocoena phocoena* is also a QI of this cSAC and it cannot be ruled out that individuals from the Blaskets would enter Inner Galway Bay as species may range over many hundreds or thousands of kilometres (NPWS, 2011k).

3.3.2.12.1 Pre-Construction & Construction Impacts

Disturbance - Noise

Tables 10.5.3, 10.5.4 and 10.5.5 of Chapter 10 provide impact ranges (where available) from blasting and impulsive pile driving (Table 10.5.3 Chapter 10), construction activities (Table 10.5.4 Chapter 10) and shipping (Table 10.5.5 Chapter 10) on cetaceans, phocids, mustelids, fish, agnathans and diving birds. Predicted distances are included for permanent threshold shift (PTS), temporary threshold shift (TTS) and disturbance (for 3 distances *i.e.*<100m, <1,000m and >1,000m and at both an individual and population level).

For blasting and impulsive pile driving (Table 10.5.3 Chapter 10), PTS for the harbour porpoise is 16 m and 100m for the grey seal. TTS for the harbour porpoise is 90m and 500m for the grey seal. The likelihood of a disturbance within 100 m of these activities for an individual harbour porpoise or grey seal is high and the likelihood of disturbance at a population level for either species is low.

The likelihood of a disturbance within 1000 m of these activities for an individual harbour porpoise or grey seal is medium and the likelihood of disturbance at a population level for either species is low.

The likelihood of disturbance at distances greater than 1000 m of these activities at the individual and population level is low for both species.

The effect of blasting and impulsive pile driving is therefore considered a **Temporary Significant Negative Impact.**

For construction activities including construction traffic (Table 10.5.4 Chapter 10), PTS for the harbour porpoise is 55 m and for the grey seal is 60 m. TTS for the harbour porpoise is 300 m and 350m for the grey seal.

The likelihood of disturbance within 100 m of these activities for an individual harbour porpoise or grey seal is high and the likelihood of disturbance at a population level is medium for both species. The likelihood of disturbance within 1000 m of these activities for an individual harbour porpoise or grey seal is medium and the likelihood of disturbance at a population level is low for both species.

The likelihood of disturbance at distances greater than 1000 m of these activities at the individual and population level for grey seal and habour porpoise is low.

The effect of construction including construction traffic within 100m of these activities on an individual grey seal is therefore considered as a potentially **Temporary Significant Negative Impact.**

Physical damage
Seals found washed up in some UK waters (Scotland, Norfolk and Strangford Lough) over the period 2008 – 2010 (see Thompson *et al.* 2010) were found to have been mutilated with a spiral scoring along their bodies from head to tail. These workers suggest that the seals had been drawn into ducted propellers which are found in some vessels.

The number of seals recorded by Thompson *et al.* (2010) were low in terms of the total population size and ranged from a) 2 in 2008, 5 in 2009 and 7 in 2010 for off the Scottish coast, b) from 11 in 2009 to 26 for 2010 for off the Norfolk coast and for Strangford Lough from "several" between 2008 to 2010. This possibility may also occur during the preconstruction, construction and operation phases of the proposed harbour development. This phenomenon has not been recorded from the Galway Docks area to date.

As the number of grey seal that occur in Inner Galway Bay and particularly at the proposed Galway Harbour Extension site is low, it is considered that the impact of the construction phase of this development will have a **Negligible Impact** on the Blasket Islands population of this species and on the integrity of this cSAC.

3.3.2.12.2 Operational Impacts
With regards to shipping traffic and the grey seal, PTS does not occur and TTS occurs within 2m of the activity (Table 10.5.5 Chapter 10). The likelihood of disturbance to an individual grey seal within 100m of this activity is high; however at a population level the likelihood of disturbance is low. The likelihood of disturbance within 1000 m and beyond 1000m is low at the individual and population levels. The effect of noise from shipping activities is therefore considered a **Permanent Neutral or Negligible Direct Negative Impact.**

With regards to shipping traffic and the harbour porpoise, PTS and TTS do not occur (Table 10.5.5 Chapter 10). The likelihood of disturbance to an individual harbour porpoise within 100m of this activity is high; however at a population level the likelihood of disturbance is low. The likelihood of disturbance within 1000 m and beyond 1000m is low at the individual and population levels. The effect of noise from shipping activities is therefore considered a **Permanent Neutral or Negligible Direct Negative Impact.**

Physical damage
Seals found washed up in some UK waters (Scotland, Norfolk and Strangford Lough) over the period 2008 – 2010 (see Thompson *et al.* 2010) were found to have been mutilated with a spiral scoring along their bodies from head to tail. These workers suggest that the seals had been drawn into ducted propellers which are found in some vessels.

The number of seals recorded by Thompson *et al.* (2010) were low in terms of the total population size and ranged from a) 2 in 2008, 5 in 2009 and 7 in 2010 for off the Scottish coast, b) from 11 in 2009 to 26 for 2010 for off the Norfolk coast and for Strangford Lough from "several" between 2008 to 2010. This possibility may also occur during the preconstruction, construction and operation phases of the proposed harbour development. This phenomenon has not been recorded from the Galway Docks area to date.

As the number of grey seal that occur in Inner Galway Bay and particularly at the proposed Galway Harbour Extension site is low, it is considered that the impact of the operation phase of

this development will have a **Negligible Impact** on the Blasket Islands population of this species and on the integrity of this cSAC.

3.3.2.13 West Connacht Coast cSAC (002998)

The bottlenose dolphin *Tursiops truncatus*, which is a QI of this cSAC has the potential to travel from this site, which is located *ca* 75km northwest of the proposed development site, and enter Galway Bay and the proposed development area.

3.3.2.13.1 Pre-Construction & Construction Impacts

Disturbance - Noise

Tables 10.5.3, 10.5.4 and 10.5.5 of Chapter 10 provide impact ranges (where available) from blasting and impulsive pile driving (Table 10.5.3 Chapter 10), construction activities (Table 10.5.4 Chapter 10) and shipping (Table 10.5.5 Chapter 10) on cetaceans, phocids, mustelids, fish, agnathans and diving birds. Predicted distances are included for permanent threshold shift (PTS), temporary threshold shift (TTS) and disturbance (for 3 distances *i.e.*<100m, <1,000m and >1,000m and at both an individual and population level).

For blasting and impulsive pile driving (Table 10.5.3 Chapter 10), PTS for the bottlenose dolphin is estimated at 19 m. TTS for the bottlenose dolphin is 100 m. The likelihood of a disturbance within 100 m of these activities for an individual bottlenose dolphin is high and the likelihood of disturbance at a population level is low.
The likelihood of a disturbance within 1000 m of these activities for an individual bottlenose dolphin is medium and the likelihood of disturbance at a population level is low.

The likelihood of disturbance at distances greater than 1000 m of these activities at the individual and population level is low.

The effect of blasting and impulsive pile driving is therefore considered a **Temporary Significant Negative Impact.**

For construction activities including construction traffic (Table 10.5.4 Chapter 10), PTS for the bottlenose dolphin is estimated at 13 m. TTS for the bottlenose dolphin is 75m.

The likelihood of disturbance within 100 m of these activities for an individual bottlenose dolphin is high and the likelihood of disturbance at a population level is low.

The likelihood of disturbance within 1000 m of these activities for an individual bottlenose dolphin is low and the likelihood of disturbance at a population level is low.

The likelihood of disturbance at distances greater than 1000 m of these activities at the individual and population level for bottlenose dolphin is low.

Numbers of bottle nosed dolphins in Inner Galway Bay are low and therefore represent a small percentage of the Lower River Shannon cSAC. The effect of construction activities including construction traffic on this population is therefore considered a **Temporary Negligible Negative Impact.** and therefore also on the integrity of this cSAC.

3.3.2.13.2 Operational Impacts

With regards to shipping traffic and the bottlenose dolphin, PTS and TTS do not occur (Table 10.5.5 Chapter 10). The likelihood of disturbance to an individual bottlenose dolphin within 100m of this activity is high; however at a population level the likelihood of disturbance is low. The likelihood of disturbance within 1000 m and beyond 1000m is low at the individual and population levels. Therefore, shipping traffic will have a **Permanent Neutral or Negligible Direct Negative Impact** on bottlenose dolphins. There will be a **Permanent Neutral or Negligible Direct Negative Impact** on the integrity of this cSAC.

3.3.2.14 Galway Bay SPA (004031)

- [A003] Great Northern Diver *Gavia immer,*
- [A017] Cormorant *Phalacrocorax carbo,*
- [A028] Grey Heron *Ardea cinerea,*
- [A046] Brent Goose *Branta bernicla hrota,*
- [A050] Wigeon *Anas penelope,*
- [A052] Teal *Anas crecca,*
- [A056] Shoveler *Anas clypeata,*
- [A069] Red-breasted Merganser *Mergus serrator,*
- [A137] Ringed Plover *Charadrius hiaticula,*
- [A140] Golden Plover *Pluvialis apricaria,*
- [A142] Lapwing *Vanellus vanellus,*
- [A149] Dunlin *Calidris alpina alpina,*
- [A157] Bar-tailed Godwit *Limosa lapponica,*
- [A160] Curlew *Numenius arquata,*
- [A162] Redshank *Tringa totanus,*
- [A169] Turnstone *Arenaria interpres,*
- [A179] Black-headed Gull *Chroicocephalus ridibundus,*
- [A182] Common Gull *Larus canus,*
- [A191] Sandwich Tern *Sterna sandvicensis,*
- [A193] Common Tern *Sterna hirundo,*
- [A999] Wetlands & Waterbirds

3.3.2.15.1 Pre-Construction and Construction

This loss of 26.93ha of habitat will result in the direct loss of potential feeding habitat for all SCI bird species. This will have a **Permanent Significant Negative Impact**

Disturbance – Physical presence

The likelihood of disturbance due to the physical presence of machinery and humans within *ca* 50 m of bird feeding sites is high at the population level of all SCI bird species.

The likelihood of disturbance within 1000 m of these activities for an individual species is medium and the likelihood of disturbance is low at the population level for all species.

The likelihood of disturbance at distances greater than 1000 m of these activities at both the individual at the population level for all SCI species is low.

The effect of disturbance due to physical presence is therefore considered a **Temporary Moderate Negative Impact.**

Disturbance – Noise

Blasting and impulsive pile driving

Tables 10.5.3, 10.5.4 and 10.5.5 of Chapter 10 provide impact ranges (where available) from blasting and impulsive pile driving (Table 10.5.3 Chapter 10), construction activities (Table 10.5.4 Chapter 10) and shipping (Table 10.5.3 Chapter 10) on cetaceans, phocids, mustelids, fish, agnathans and diving birds. Only diving bird species are considered under noise from blasting and pile driving. Predicted distances are included for permanent threshold shift (PTS), temporary threshold shift (TTS) and disturbance (for 3 distances *i.e.* <100m, <1,000m and >1,000m and at both an individual and population level).

No data exist for PTS and TTS for diving birds in response to blasting and impulsive driving, construction activities and shipping traffic (Tables 10.5.3 – 10.5.5 Chapter 10).

The likelihood of disturbance within 100 m of blasting and impulsive pile driving activities for an individual cormorant, great northern diver or red-breasted merganser is high and the likelihood of

disturbance at the population level is medium for great northern diver and red-breasted merganser and low for cormorants.

The likelihood of disturbance within 1000 m of these activities for an individual cormorant, great northern diver or red-breasted merganser is medium and the likelihood of disturbance is low at the population level for all three species.

The likelihood of disturbance at distances greater than 1000 m of these activities at both the individual at the population level for cormorant, great northern diver and red-breasted merganser is low.

The effect of blasting and impulsive pile driving is therefore considered a **Temporary Significant Negative Impact.**

Disturbance – Noise
Bathymetric survey, borehole drilling, rock dredging, sediment dredging
The likelihood of disturbance within 100 m of construction activities including pre-construction survey work, and construction activities such as borehole drilling, and dredging of rock and sediment and construction traffic for any SCI species and at the population level is high.

The likelihood of disturbance within 1000 m of these activities for any SCI species is medium and the likelihood of disturbance is low at the population level for all species.

The likelihood of disturbance at distances greater than 1000 m of these activities at both the individual at the population level for all species is low.

The effect of preconstruction and construction activities including construction traffic is therefore considered a **Temporary Moderate Negative Impact**

3.3.2.14.2 Operational Impacts
Disturbance - Noise
The likelihood of disturbance within 100m of shipping activities on an individual cormorant, great northern diver or red-breasted merganser is medium; however, the likelihood of disturbance at the population level is low for all three species. The likelihood of disturbance within and beyond 1000 m is low for all three species at the individual and population levels. The effect of noise from shipping activities is therefore considered a **Permanent Moderate Negative Impact.**

3.3.2.15 Lough Corrib SPA (004042)

- [A065] Common scoter *Melanitta nigra* [breeding]
- [A179] Black-headed gull *Chroicocephalus ridibundus* [breeding]
- [A182] Common gull *Larus canus* [breeding]
- [A193] Common tern *Sterna hirundo* [breeding]
- [A194] Arctic tern *Sterna paradisaea* [breeding]

All of these species have the possibility of flying from Lough Corrib to feed and forage in Galway Bay SPA during the construction and operation phases.

3.3.2.15.1 Pre-Construction and Construction
This loss of 26.93ha of habitat will result in the direct loss of potential feeding habitat for the above 5 bird species. This will have a **Permanent Significant Negative Impact**

Disturbance – Physical presence
The likelihood of disturbance due to the physical presence of machinery and humans within *ca* 50 m of bird feeding sites is high at the population level of all SCI bird species.

The likelihood of disturbance within 1000 m of these activities for an individual species is medium and the likelihood of disturbance is low at the population level for all five species.

The likelihood of disturbance at distances greater than 1000 m of these activities at both the individual at the population level for the above 5 bird species is low.

The effect of disturbance due to physical presence is therefore considered a **Temporary Moderate Negative Impact.**

Disturbance – Noise
Blasting and impulsive pile driving
Tables 10.5.3, 10.5.4 and 10.5.5 of Chapter 10 provide impact ranges (where available) from blasting and impulsive pile driving (Table 10.5.3 Chapter 10), construction activities (Table 10.5.4 Chapter 10) and shipping (Table 10.5.5 Chapter 10) on cetaceans, phocids, mustelids, fish, agnathans and diving birds. Only diving bird species are considered under noise from blasting and pile driving. Predicted distances are included for permanent threshold shift (PTS), temporary threshold shift (TTS) and disturbance (for 3 distances *i.e.* <100m, <1,000m and >1,000m and at both an individual and population level).

No data exist for PTS and TTS for diving birds in response to blasting and impulsive driving, construction activities and shipping traffic (Tables 10.5.4-10.5.6 Chapter 10).

The likelihood of disturbance within 100 m of blasting and impulsive pile driving activities for an individual common scoter is high and the likelihood of disturbance at the population level is medium for common scoter.

The likelihood of disturbance within 1000 m of these activities for an individual common scoter is medium and the likelihood of disturbance is low at the population level for all three species.

The likelihood of disturbance at distances greater than 1000 m of these activities at both the individual at the population level for common scoter is low.

The effect of blasting and impulsive pile driving is therefore considered a **Temporary Significant Negative Impact.**

Disturbance – Noise
Bathymetric survey, borehole drilling, rock dredging, sediment dredging
The likelihood of disturbance within 100 m of construction activities including pre-construction survey work, and construction activities such as borehole drilling, and dredging of rock and sediment and construction traffic for the above 5 bird species and at the population level is high.

The likelihood of disturbance within 1000 m of these activities for any SCI species is medium and the likelihood of disturbance is low at the population level for all five species.

The likelihood of disturbance at distances greater than 1000 m of these activities at both the individual at the population level for the above 5 bird species is low.

The effect of preconstruction and construction activities including construction traffic is therefore considered a **Temporary Moderate Negative Impact.**

3.3.2.15.2 Operational Impacts

Disturbance - Noise

The likelihood of disturbance within 100m of shipping activities on an individual common scoter is medium; however, the likelihood of disturbance at the population level is low. The likelihood of disturbance within and beyond 1000 m is low for common scoter at the individual and population levels. The effect of noise from shipping activities is therefore considered a **Permanent Moderate Negative Impact.**

3.3.3 Conclusion

As it has been shown that both the integrity and population status of QI migratory species including Lamprey, Salmon, Grey seal, Common seal, Bottle nosed dolphin, Harbour porpoise for Slieve Tooey/Tormore Island/Loughros Beg Bay, Inishbofin and Inishark, Slyne Head Islands, Duvilaun Islands, Inishkea Islands, Maumturk Mountains, Connemara Bog Complex, Kilkieran Bay and Islands, Lower River Shannon, Blasket Islands and West Connacht Coast cSACs, there will be no residual impacts. For this reason they are not considered under the mitigation measures or residual impact assessment sections.

3.4 MITIGATION MEASURES

3.4.1 Summary of Mitigation Measures

A summary of the proposed mitigation measures is outlined below.

Mitigation by Design

- The layout and footprint of the proposed development has evolved over the course of the design processes with a view to minimising the impact on Natura 2000 sites and their qualifying interests.
- Semi-vertical breakwaters have been proposed to mitigate seal predation on salmonids.
- Native species to be used as part of landscaping plan.
- Storm water treated using valved outfall lines with petrol interceptor and silt traps.
- Sensitive lighting plan to avoid lighting of water body.
- Rock built sea walls on the eastern side will more than replace existing rock walls to be lost.
- The use of textured construction material to enhance settlement by algae and invertebrates.

Construction Methods and Timing

- The proposed use of geotextiles to minimise escape of silt during construction of lagoons will ensure minimised impact on water quality and associated impacts on qualifying interests of Natura 2000 sites.
- Limit timing of works in line with sensitive months for salmon avoiding April – July inclusive.
- Monitoring of suspended solids and dissolved oxygen as part of Environmental Management Plan.
- Restricting dredging of sediments within 800m of the mouth of Lough Atalia during ebb tides to avoid the possibility of suspended sediments entering Lough Atalia
- Implementation of Best Practice construction methods and Environmental Management Framework (see Appendix 4.2 of the EIS).
- Implementation of Emergency Spill Contingency Plan in the form of Galway Harbour Company's Oil Spill Contingency Plan (see Appendix 4.3 of the EIS).

Monitoring Programmes

- Marine Mammal Watch Plan including marine observers prior to blasting and use of acoustic deterrent devices if required.
- Monitoring of birds and common seal populations prior to, during and after construction as part of the environmental management plan.

Mitigation for the construction and operational phases of the development were considered and proposed as part of the Environmental Impact Assessment process and have been taken into consideration in the preparation of this Natura Impact Statement. A more detailed summary of mitigation measures is outlined below.

3.4.2 Construction Mitigation

3.4.2.1 Underwater Blasting and Pile Driving

In order to minimise the effects of the construction phase on migrating Atlantic salmon, blasting and piling will be limited to periods when juvenile stage salmonids are not passing in the vicinity of the proposed development. Work will be completed between 1st August and 31st March inclusive to eliminate the impact of these activities by avoiding April to July downriver run of smolts. This proposed timing of works would also avoid most of the upstream spawning migration of Sea Lamprey. Additionally, European Eel, while not an Annex II species and therefore not a Qualifying Interest for either cSAC, which also migrates through the area at this time will not be impacted by blasting or pile driving. Furthermore, the April – July closed season also protects Common Tern which breed at Rabbit Island and spans the Harbour Seal pupping season.

The maximum instanteous charges will be limited to a maximum of 10kg.

Dredged material will be used as fill material during land reclamation, thus completely eliminating disposal at sea during construction.

Blasting work will not be undertaken during the night, thus limiting the effects of noise on the movements of populations of migratory fish in the area *i.e.* they will be able to migrate undisturbed during non-blasting hours.

Pile driving will not be undertaken during the night, thus limiting the effects of noise on the movements of populations of migratory fish in the area *i.e.* they will be able to migrate undisturbed for a minimum of 8 hours during night-time hours.

Underwater noise levels will be monitored prior to commencement of development, with particular emphasis on the presence of seals and during the smolt and eel migration period.

In order to ensure that diving bird species are not present during blasting activities, a Rigid Inflatable Boat RIB will be used to deter species from the area.

3.4.2.2 Impact of Blasting/Pile driving on Mammals

Blasting will not be permitted if cetaceans or seals are sighted within one kilometre of the blast site; this area is defined as the exclusion area. Marine Mammal Observers will take up position before a day's blasting begins. They will be equipped with binoculars, telescopes and tripods with which to watch for the animals, and two-way radios with which to communicate with each other and the explosives engineers. Blasting will not occur if a seal or cetacean is sighted within one kilometre of the blast site, or for a period of 30 minutes after one has been sighted within the 'exclusion area'. Observers will use Mutton Island and Hare Island as watch points. A Marine Mammal Watch Plan (see Chapter 7 of the EIS) giving full details of the methodology and standard operating procedures for the blasting watches will be carried out before blasting works begin.

The IWDG runs a national strandings scheme that covers Galway Bay. It is anticipated that the project team will arrange with IWDG to receive news of any strandings that occur in the area during the construction period, but it is further proposed that:

i. after episodes of blasting a search party will be sent out in a RIB to search the area around the blast site for dead or injured seals or cetaceans.
ii. a public awareness campaign will be launched in which members of the public are encouraged to report dead or injured seals in the inner Galway Bay via a designated phone line.

3.4.2.3 Suspended Solids and Construction/Operational Dredging

In order to minimise the effects of the construction phase on migrating Atlantic Salmon, dredging will be limited to periods when juvenile stage salmonids are not passing through the vicinity of the proposed development. Work will be completed between 1st August and 31st March inclusive to remove the impact of these activities by avoiding April to July downriver run of smolts. This proposed timing of works would also avoid most of the upstream spawning migration of Sea Lamprey. It is proposed that dredged material will be used as fill material during land reclamation, thus completely eliminating disposal at sea during construction. This material has been assessed following site investigations and is suitable for use in the land reclamation.

The design of the proposed development includes the use of geotextiles to line the filled area and also incorporates the continuous gradual filtered release of dredged transport water. This will minimise the possibility of silt escaping back into the marine environment from the development. The geotextile mesh will be sized to retain suspended solids in the land reclamation lagoons. These lagoons are shown in Drgs 2139-2142 & 2139-2143 which outlines the various construction elements and shows the proposed areas where the lagoons will be formed as the land is reclaimed and Chapter 4 of the EIS includes images of the stages of development.

Suspended solids levels will be continuously monitored at a number of points in the vicinity of the works as part of the Environmental Management Framework. The position and distance of the sampling points are described in the Environmemtal Management Framework (see Appendix 4.2 of the EIS) and will be such that raised suspended solids concentrations do not occur at distances that are greater than the moderate areas of raised suspended sediments that have been predicted by capital dredge sediment plume model analysis.

3.4.2.4 Potential Spillages

All machinery used in the construction of the proposed development will be checked to ensure that it is well maintained and not likely to leak fuel, lubricating oils, greases etc. into the aquatic environment. Any onsite refueling or maintenance will be carried out on securely bunded temporary hard standing areas. All oily wastes generated will be stored in leak-proofs tanks for removal by a licensed operative holding a valid Waste Collection Permit. Dredgers will be re-fuelled at sea using best available practice to ensure no spillages into the designated sites.

3.4.2.5 Use of Concrete

Normal best construction practice with regard to the use and pouring of concrete will be adhered to. If concrete cannot be poured in dry protected areas away from water until full curing has taken place, particular attention will be paid to the quality and security of the shuttering used for pouring. Pre-cast concrete elements will be used wherever possible and these will be designed to allow for enhanced settlement of Flora and Fauna as reported in recent scientific papers (Firth 2013, Chapman and Brown 2011, Martins and Thompson, 2009). Any wash water contaminated with concrete will not be allowed to enter the marine environment and will be disposed of elsewhere. Contaminated equipment (*e.g.* concrete delivery trucks, pumping equipment and tools) will be cleaned where there is no possibility of the drainage of wash water to the marine

environment. The design by using sheet pile and rock armour has ensured a minimal underwater concrete requirement. While the main quays will be concrete, these will be above tide level.

3.4.3 Operation Mitigation

3.4.3.1 Lighting

Mitigation for impacts of lighting during the operational phase has been provided through the use of energy efficient lighting in a configuration designed to provide the minimum lighting level required for safety. The lights used will be of a design that casts light downwards only and the lamp standards will be positioned in such a way that only the newly reclaimed land or new breakwater will be illuminated, not any areas of water.

3.4.3.2 Predation of Fish by Seals

The design of the proposal with steel sheet pile to act as a toe for the rock armour will create a steep drop into the water and thus mitigate against the possibility of seal haul out areas being created in this area (mitigation by design).

3.4.3.3 Water Pollution and Increased Risk of Spillage when Operational

The storm water from the existing Phase 1 of the Galway Harbour Park currently discharges from three discharge points. It is proposed that these three discharge points will be linked up, as part of the Phase 2 development, so that there will be only one discharge point from the existing GHEP. This new system will divert storm water to petrol interceptors fitted with silt traps prior to its discharge to sea. In the event of an oil or other spill entering the storm water system, the discharge of contaminated water will be prevented by the use of control valves.

A detailed spill response plan has been prepared. This will limit the negative effects of any spills. In addition, Galway Harbour Company GHC has an Environmental Management policy to ensure that there are no spillages to the sea.

3.4.3.4 Disposing of Maintenance Dredge Material

Spoil from maintenance dredging will be disposed of to an EPA permitted site located outside Natura 2000 sites.

3.4.3.5 Regulation of vessel speeds

Commercial vessels approach Black Head at *ca* 12 knots and by the Outer Margaretta Buoy, have reduced this to 6 knots. Pilot transfer takes place at 3.5 /4 knots and vessels enter the docks at a velocity of *ca* 3 knots.

3.4.4 ADDITIONAL MONITORING

3.4.4.1 Biological

3.4.4.1.1 Intertidal benthos

Intertidal annual seasonal sampling should commence pre-construction and for one year post-construction at the following locations: Ballyloughan, Lough Atalia, Renmore Lough, east and west of the causeway and at an agreed control site to record macrofaunal assemblages and sediment granulometry at High, Mid and Low water. Sampling should incorporate quadrates, cores and photography (including Sediment Profile Imagery). Post-completion, the additional 1 year's data can be reviewed to see if seasonal sampling is still required or if it can be reduced to once a year.

3.4.4.1.2 Subtidal benthos

Annual benthic sampling should be commenced pre-construction at the following sites: south of Ballyloughan Beach, Lough Atalia, Renmore Lough, west of the causeway, south of Mutton Island and at an agreed control southwest of the Margaretta using a 0.1 sqm grab and a 1 mm sieve. 3 faunal samples a 1 sediment sample should be collected and analysed using the same techniques as were used in the EIS. Sediment Profile Imagery should also be incorporated into the monitoring methodologies. The sampling should continue for at least 5 years post-completion.

3.4.4.1.3 Salmon smolts

The acoustic tagging study that was carried out as part of the EIS should be re-done during and post the construction period to document changes in patterns of migration routes that the smolts undertake.

3.4.4.1.4 Marine Mammals

A Marine Mammal Watch Plan including marine observers should be employed, during the construction phase, prior to and during blasting. The use of acoustic deterrent devices will be employed if required.

Monitoring of common seal populations prior to, during and for at least two years post construction should be completed as part of ecological monitoring of the development. This will follow a similar methodology to that employed as part of the baseline surveying, using similar techniques and haul out locations to allow for comparative analysis with baseline information.

Survey for otter holt sites should be completed immediately prior to construction phase and on two occasions post construction phase, following a similar methodology to that employed as part of baseline surveys. During the construction phase, observation surveys for otter activity will be made and notes from marine observers and bird surveyors will also be included as part of the dataset.

3.4.4.1.5 Birds

Monitoring of bird populations prior to, during and for at least two years post construction should be completed as part of ecological monitoring of the development. This will follow a similar methodology to that employed as part of the baseline surveying, using similar techniques and point count locations to allow for comparative analysis with baseline information.

3.4.4.2 Marine chemistry

As the proposed development has the potential to alter salinity regimes in the area, *in situ* monitoring of salinity should commence prior to construction at the following sites: at the mouth and within Lough Atalia, Renmore Lough, off Ballyloughan, south of Mutton Island and southwest of the Margaretta. This monitoring should continue for at least two years post-construction.

3.4.4.3 Marine physics

As the proposed development has the potential to alter current velocities and wave heights in the area, appropriate measuring devices should be deployed pre-construction to measure current speeds and wave heights at the following sites: south of Ballyloughan, east of the existing shipping channel, south of Mutton Island and southwest of the Outer Margaretta Buoy.

3.5 ANALYSIS OF IN COMBINATION EFFECTS

3.5.1 Aquaculture impacts

The nearest licensed area for oysters to the proposed new structure is Mweeloon Bay at a distance of *ca* 4 km. Given the low intensity level of activity arising from aquaculture activities and the distance from the proposed development site, no interaction between aquaculture and the development is foreseen.

3.5.2 Harbour Flights

This proposal underwent an appropriate assessment and this concluded that as there would be no impact on the Natura sites, an NIS was not required. Possible in combination effects foreseen between aeroplane activity and the construction and operation of the proposed harbour include the combined noise and disturbance effects arising from both activities. As the aeroplane noise will only have a significant impact on noise levels in the air, there will be no in combination effects of pre-construction, construction nor operation on noise levels in the water. As the level of noise generated by sea planes during take off on the aquatic environment is an order of magnitude lower than that of preconstruction, construction or operation activities, in combination effect are considered negligible.

3.5.3 Changed Galway coastline

None of these alterations/structures are considered large enough to have had a significant impact on local oceanography and no in combination effects are considered likely.

An in combination consequence of the causeway and the harbour extension construction will be to “canalise” the River Corrib, increase current velocities and alter salinity patterns. Migratory fish species will be restricted to this “canal” with the potential for some increased predation by cormorants and seals. However, long term studies have not indicated that either of these potential predators are selective of migratory species. The increases in velocities are predicted to alter sediment and sedimentation patterns in the area with mobilisation occurring to the west of the harbour extension and deposition happening further to the south of where it currently takes place. The impact of this on benthic fauna is regarded as short term as they will recolonise sediments once the system returns to equilibrium. The changes in salinity in the “canal” are considered too small to have any impact on benthic fauna in that area; however, to the east of the new structure where higher salinity patterns are predicted to occur, some species that are less tolerant to low salinities *e.g.* echinoderms, may colonise the benthos.

Overall, the in combination effects of the causeway and the new structure are not regarded as having any effect on the functioning of the cSAC.

3.5.4 Ocean Energy Test Site

AQUAFACT carried out a benthic survey during the trial period and after the buoy had been removed. The site had been surveyed as part of a broader benthic survey of Galway Bay in 1975 as part of a Ph. D. programme and these data were used to establish background benthic faunal conditions. The surveys found that mussels which had not been recorded in the 1975 survey, had settled on the buoy and had been sloughed off and had settled to the sea bed.

Although the buoy has been removed, there is a possibility that another buoy might be installed sometime in the future. However, due to the distance between the test site and the Galway Harbour Extension location, there will be no in combination effects in possible future use of the site.

3.5.5 Tarrea Pontoon

AQUAFACT was commissioned to carry out an appropriate assessment of this development. The size of the area that will be partly (floating not equal to land take) lost from the cSAC was determined 1,400 m^2. The appropriate assessment identified no issues of concerns for the integrity of the cSAC nor the SPA and their associated habitats, flora and fauna and no significant negative impacts on these sites. Tarrea is *ca.* 13 km from the proposed development site at Galway City and no in combination effects are predicted if the pontoon is constructed.

3.5.6 Legacy Issues

The historic development of the site and surrounding area since the late 1990s has had an effect on the Galway Bay Complex cSAC and Inner Galway Bay SPA resulting in the loss of 8.15 ha of fucoid dominated intertidal reef complex and 7.69 ha of saltmarsh. There are areas of the site which were developed prior to designation and detailed baseline information is not available as to the condition or quality of the habitat which was lost. However, on the basis of the precautionary principal, these effects are considered to be indeterminate in terms of loss of Annex I habitat including intertidal habitats, Atlantic Salt and Mediterranean Salt Meadows and loss of feeding habitat for Otter, Common Seal and some bird species.

3.5.7 Conclusion of In Combination Effects

Having considered other plans and projects within the vicinity of the relevant Natura 2000 sites, it is regarded that the proposed project and implementation of effective mitigation measures to avoid impacts does not have the potential for further in combination impacts arising in combination with any other plans or projects. This will not result in significant negative impacts on the conservation objectives or integrity of such Natura 2000 sites.

3.6 ASSESSMENT OF RESIDUAL IMPACTS

An assessment of the residual impacts arising following the implementation of proposed mitigation measures are considered below. These are presented in the context of the residual impacts on the qualifying interests, special conservation interests and conservation objectives of the Lough Corrib cSAC, Lough Corrib SPA, Galway Bay Complex cSAC and Inner Galway Bay SPA.

3.6.1 Attributes and Targets to provide for Favourable Conservation Condition of Relevant Annex I Habitats and Annex II Species

Conservation Objectives for Galway Bay Complex cSAC and Inner Galway Bay SPA can be seen in Section 3.2. NPWS has not yet prepared detailed conservation objectives for Lough Corrib cSAC and Lough Corrib SPA. Indicative conservation objectives and targets for many of the qualifying interests of Lough Corrib cSAC and SPA can be anticipated based on conservation objective documents for Galway Bay cSAC and SPA and these have been considered in the context of the proposed development in the following sections.

Attributes and Targets which are considered to be required to maintain or restore the favourable conservation condition of the screened Annexed Habitats and Species as listed above are outlined below in Table 3.1 – 3.12 for Galway Bay Complex cSAC and Inner Galway Bay SPA.

Areas noted in Tables 3.1-3.12 are to be read in conjunction with the impact areas and asscociated cell references presented in Summary of Impacts Table 3.13.

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annex I Habitat	**Mudflats and sandflats not covered by seawater at low tide [1140]** and reefs [1170]**** **NPWS describes the intertidal community at the proposed development site as "fucoid-dominated intertidal reef complex", these two habitats are considered together.	
	Attribute: Distribution **Target:** The distribution of reefs is stable or increasing, subject to natural processes.	Permanent loss of *ca* 5.93 ha (see 6B of table 3.13) of this habitat.
	Attribute: Habitat Area **Target:** The permanent habitat area is stable or increasing, subject to natural processes. The mud/sandflat habitat area was estimated using OSI data as 744ha. The reef habitat area was estimated as 2,773ha using survey data.	Permanent loss of *ca 5.93* ha of this habitat.
	Attribute: Community Distribution **Target:** Conserve the following community types in a natural condition: intertidal sandy mud community complex and intertidal sand community complex	Permanent loss of *ca* 5.93 ha of this habitat.
	Attribute: Community Extent **Target:** Maintain the extent of the *Mytilus*-dominated reef community, subject to natural processes.	*Permanent loss of ca 5.93 ha of this habitat.*
	Attribute: Community Structure: *Mytilus* density **Target:** Conserve the high quality of the *Mytilus*-dominated community, subject to natural processes.	Permanent loss of *ca* 5.93 ha of this habitat.
	Attribute: Community Structure **Target:** Conserve the following community types in a natural condition: fucoid-dominated community complex, *Laminaria*-dominated community complex, and shallow sponge-dominated community complex.	Permanent loss of *ca* 5.93 ha of this habitat.

Table 3.1 - Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annex I Habitat	**Mudflats and sandflats not covered by seawater at low tide [1140]** and reefs [1170]**** **NPWS describes the intertidal community at the proposed development site as "fucoid-dominated intertidal reef complex", these two habitats are considered together.	
Impacts during Construction Phase	Permanent loss of intertidal plant and animal communities due to infilling in the construction site. Suspended sediment levels will temporarily increase around the construction site; this will have a minimal impact on the neighboring intertidal communities. There is the potential for contamination of the nearby intertidal area if spillages occur during the construction phase; however, strict adherence to the Environmental Management Plan will minimise the impact. (Refer Figure 3.1 overleaf).	
Impacts during Operational Phase	The changes to the physical oceanography of the area will result in a change in grain size distribution and therefore faunal communities present; however, model predictions show these changes will only occur in the dredge site and approach channel and these are too far from the intertidal areas to have an impact. The predicted increase in traffic levels will have no impact on the intertidal areas. The intertidal communities to the east of the proposed development will experience increases in salinity and as a result euryhaline species will dominate in these areas. There will be no discharges from the development into the marine environment and therefore there will be no impact from this activity.	
In Combination Effects	Permanent loss of 14.51 ha (6A+6B of table 3.13)	
Proposed Mitigation	There are no specific mitigation measures available to reduce the loss of habitat.	
Level of Residual Impact	The permanent loss of 5.93 ha (6A of table 3.13) of this Annex I habitat equates to a residual negative impact on one of the targets and attributes of the qualifying interest of the Galway Bay Complex cSAC. This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered to be significant as the habitats present are of poor quality; however, a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate.	

Table 3.1 cont'd . Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

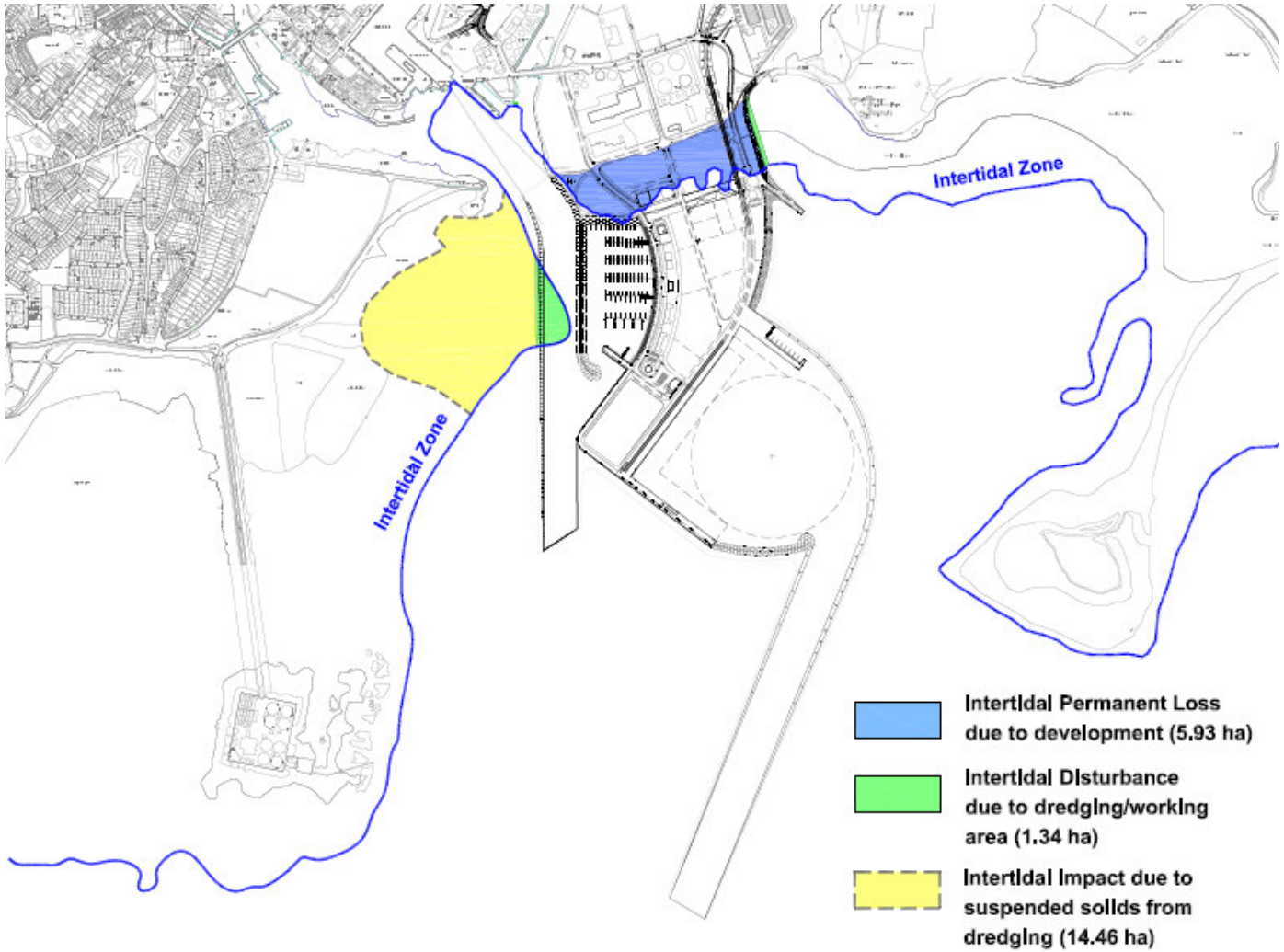


Figure 3.1 - Map showing intertidal areas

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Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annex I Habitat	. **Coastal lagoons* [1150]**	
	Attribute: Habitat Area **Target:** Area stable subject to slight natural variation.	There will be no impact on the area of Lough Atalia and Renmore Lough.
	Attribute: Habitat distribution **Target:** No decline subject to natural processes.	There will be no impact on the area of Lough Atalia and Renmore Lough.
	Attribute: Salinity regime **Target:** Median annual salinity and temporal variation within natural ranges. The lagoons in the site vary from oligohaline to euhaline. Lough Atalia and Renmore Lough are poikilohaline systems	Fluctuations on the existing variability possible though deemed not to have any impact on the functioning of the ecosystem.
	Attribute: Hydrological regime **Target:** Annual water level fluctuations and minima within natural ranges. Most of the lagoons listed for the site are considered to be shallow; however, Aughinish and Lough Atalia do have deeper (at least 3m) parts.	Water levels will be maintained and will not be altered by the development.
	Attribute: Barrier **Target:** Permeability of barrier maintained. Appropriate hydrological connections between lagoons and sea, including where necessary, appropriate management. The lagoons within this site exhibit a variety of barrier types including cobble/shingle, karst and artificial embankment/causeway. Several are recorded as having sluices.	There will be no impact on the barrier/silll.

Table 3.2 - Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annex I Habitat	. **Coastal lagoons* [1150]**	
	Attribute: Water Quality (Chlorophyll a) **Target:** Annual median chlorophyll a reduced within natural ranges and less than 5µg/L. Target based on Roden and Oliver (2010).	There will be no impact on chlorophyll a.
	Attribute: Water Quality (MRP) **Target:** Annual median MRP within natural ranges 0.1mg/L. Target based on Roden and Oliver (2010).	The development will not alter MRP level.
	Attribute: Water Quality (DIN) **Target:** Annual median DIN within natural ranges and less than 0.15mg/L. Target based on Roden and Oliver (2010).	The development will not alter DIN level.
	Attribute: Depth of Macrophyte Colonisation **Target:** Macrophyte colonisation at least 2m depth.	Development will not alter macrophyte communities.
	Attribute: Typical Plant Species **Target:** Maintain number and extent of listed lagoonal specialists, subject to natural variation. Species listed in Oliver (2007).	The development will not alter floral lagoonal specialists.
	Attribute: Typical Animal Invertebrate Species **Target:** Maintain listed lagoon specialists, subject to natural variation. Species listed in Oliver (2007).	The development will not alter faunal lagoonal specialists.

Table 3.2 contd/ Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annex I Habitat	. **Coastal lagoons* [1150]**	
	Attribute: Negative Indicator Species **Target:** Negative indicator species absent or under control. Low salinity, shallow water and elevated nutrient levels increase the threat of accelerated encroachment by reedbeds.	The development will not alter negative indicator species.
Impacts during Construction Phase	Sediments suspended during the dredging operations have the potential to enter the lagoon. As a result of the oceanographic conditions within the lagoon, this sediment will not be remobilised and will be retained within the lagoon system. The result will be the loss of water depth *(ca* 10mm) in the northeastern portion of the lagoon. This will be controlled by allowing dredging under ebb tides.	
Impacts during Operational Phase	The present range of salinities which vary from 0 to 30 psu, within Lough Atalia will not change, the cumulative annual frequency of zero salinity at the southern part of Lough Atalia will increase from 7 to 18 hours over an average year and the median salinity will reduce by 1.29 psu from the present value. The impact of the additional temporary, seasonal and spatially restricted decreases in salinity to 0 psu within parts of the ecosystems will not affect their status or their ecological functioning.	
In Combination Effects	None identified.	
Mitigation	Impacts from dredging operations will be controlled by only allowing dredging under ebb tides.	
Level of Residual Impact	Fluctuations on the existing variability possible though deemed not to have any impact on the functioning of the ecosystem.	

Table 3.2 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

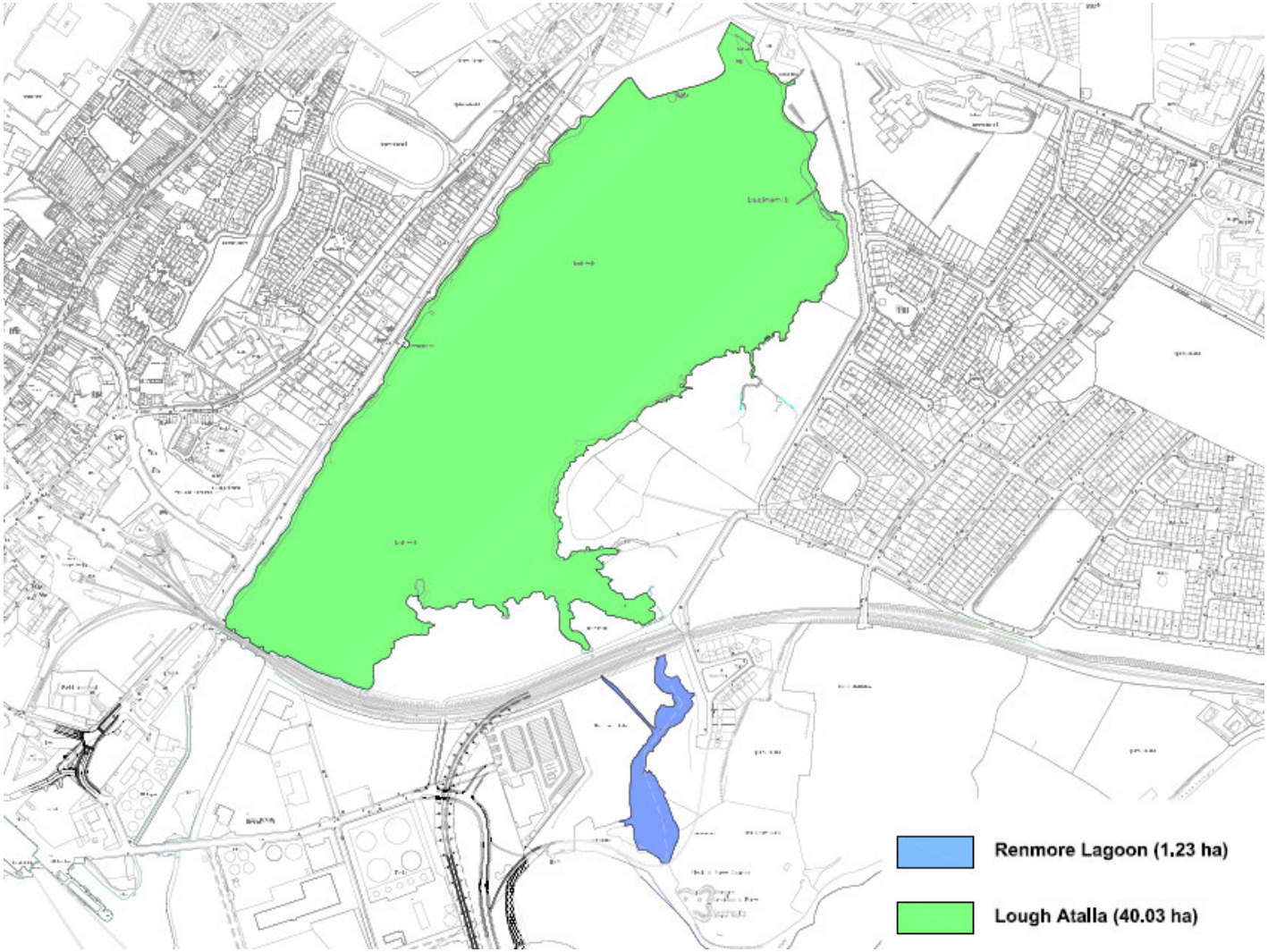


Figure 3.2 - Map showing Coastal Lagoons [Priority Habitats]

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annex I Habitat	**Large shallow inlets and bays [1160]**	
	Attribute: Habitat Area **Target:** The permanent habitat area is stable or increasing, subject to natural processes. The large shallow bay and inlet habitat area is estimated at 10,825 ha using NPWS data	No loss predicted of this habitat.
	Attribute: Community Distribution **Target:** Conserve the following community types in a natural condition: intertidal sandy mud community complex, fine to medium sand with bivalve community complex, mixed sediment dominated by Mytilidae community complex, *Laminaria*-dominated community complex and shallow sponge dominated community complex.	No loss predicted of these communities
	Attribute: Community Extent **Target:** Maintain the extent of the *Zostera* dominated community complex and the maerl dominated community, subject to natural processes.	Neither of these communities are present within or near the proposed development.
	Attribute: Community Structure: *Zostera* shoots per m^2 **Target:** Conserve the high quality of the maerl dominated community, subject to natural processes.	This community is not present within or near the proposed development
	Attribute: Community Structure **Target:** Conserve the high quality of maerl dominated community subject to natural processes.	This community is not present within or near the proposed development

Table 3.3. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Impacts during Construction Phase	Possible settlement of sediments suspended during the rock dredging phase of construction.	
Impacts during Operational Phase	Possible settlement of sediments suspended during maintenance dredging phase of operation	
In Combination Effects	None predicted	
Proposed Mitigation	None required	
Level of Residual Impact	The level of impact of sediment settling out is very low. The level of residual impact is not considered to be significant on this habitat.	

Table 3.3 contd./ Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annex I Habitat	**Perennial vegetation of stony banks [1220] and Annual vegetation of drift lines (Natura 2000 Code 1210)**	
	Attribute: Habitat Area **Target:** Area stable or increasing, subject to natural processes, including erosion and succession.	Potential slight impact associated with increased shelter of area. Cannot predict exact level of change.
	Attribute: Habitat Distribution **Target:** No decline or change in habitat distribution subject to natural processes.	Potential slight impact associated with increased shelter of area. Cannot predict exact level of change.
	Attribute: Physical Structure: functionality and sediment supply **Target:** Maintain the natural circulation of sediment and organic matter, without any physical obstructions.	No impact anticipated.
	Attribute: Vegetation structure: zonation **Target:** Maintain range of coastal habitats including transitional zone, subject to natural processes.	Potential slight impact associated with increased shelter of area. Cannot predict exact level of change.
	Attribute: Vegetation composition: typical species and sub communities **Target:** Maintain the typical vegetated shingle flora including range of subcommunities within the different zones.	Potential slight impact associated with increased shelter of area. Cannot predict exact level of change.
	Attribute: Vegetation composition: negative indicator species **Target:** Negative indicator species (including non-natives) to represent less than 5% cover.	Potential slight impact associated with increased shelter of area. Cannot predict exact level of change.

Table 3.4 - Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annex I Habitat	**Perennial vegetation of stony banks [1220] and Annual vegetation of drift lines (Natura 2000 Code 1210)**	
Impacts during Construction Phase	No loss of, or impact on this habitat is expected during the construction phase.	
Impacts during Operational Phase	Potential for slight impact associated with possible increased exposure shelter of habitat following construction of proposed development.	
In Combination Effects	An assessment of previous works completed at the Galway Harbour Enterprise Park has identified loss of this habitat, of a total extent of *ca* 0.28 ha (1A of table 3.13)	
Proposed Mitigation	Further to mitigation by design, no additional suitable mitigation is considered available.	
Level of Residual Impact	Potential for residual negative impact on the targets and attributes of this habitat, a qualifying interest of the Galway Bay Complex cSAC exist. This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered likely to be significant as the extent and quality of habitat present is limited, however a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate. A lilkely significant adverse effect on this habitat cannot be discounted at present based on current information.	

Table 3.4 cont'd. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annex I Habitat	**Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]**	
	Attribute: Habitat Area **Target:** Area increasing, subject to natural processes, including erosion and succession.	No impact anticipated.
	Attribute: Habitat Distribution **Target:** No decline or change in habitat distribution, subject to natural processes.	No impact anticipated.
	Attribute: Physical Structure: sediment supply **Target:** Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions.	No impact anticipated.
	Attribute: Physical Structure: sediment supply **Target:** Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions.	No impact anticipated.
	Attribute: Physical Structure: creeks and pans **Target:** Maintain creek and pan structure subject to natural processes, including erosion and succession.	No impact anticipated.
	Attribute: Physical Structure: flooding regime **Target:** Maintain natural tidal regime.	No impact anticipated.
	Attribute: Vegetation Structure: zonation **Target:** Maintain range of coastal habitat zonations including transitional zones, subject to natural processes, including erosion and succession.	No impact anticipated.

Table 3.5 - Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annex I Habitat	**Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]**	
	Attribute: Vegetation structure: vegetation height **Target:** Maintain structural variation within sward.	No impact anticipated.
	Attribute: Vegetation structure: vegetation cover. **Target:** Maintain more than 90% area outside creeks vegetated.	No impact anticipated.
	Attribute: Vegetation composition: typical species and sub-communities. **Target:** Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project.	No impact anticipated.
	Attribute: Vegetation composition: negative indicator species – *Spartina anglica* **Target:** There is currently no spartina in this cSAC.	No impact anticipated.
Impacts during Construction Phase	No loss of, or impact on this habitat is expected during the construction phase.	
Impacts during Operational Phase	No impacts are expected during the operational phase.	
In Combination Effects	An assessment of previous works completed at the Galway Harbour Enterprise Park have identified loss of Salt Marsh habitat, of a total extent of *ca* 7.69 ha (2A+3A of table 3.13) - mosaic of Atlantic and Mediterranean Salt Meadows habitats.	
Proposed Mitigation	Further to mitigation by design, no additional suitable mitigation is considered available.	
Level of Residual Impact	The permanent historic loss of *ca* 7.69 ha (2A+3A of table 3.13) of this Annex I habitat equates to a residual negative impact on one of the targets and attributes of the qualifying interest of the Galway Bay Complex cSAC. This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered to be significant as the habitats present are of poor quality, however, a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate.	

Table 3.5 cont'd. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annex I Habitat	**Mediterranean salt meadows (*Juncetalia maritimi*) [1410]**	
	Attribute: Habitat Area **Target:** Area stable or increasing, subject to natural processes including erosion and succession.	No impact anticipated.
	Attribute: Habitat Distribution **Target:** No decline, subject to natural processes.	No impact anticipated.
	Attribute: Physical Structure: sediment supply **Target:** Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions.	No impact anticipated.
	Attribute: Physical Structure: Creeks and Pans **Target:** Maintain creek and pan structure, subject to natural processes, including erosion and succession.	No impact anticipated.
	Attribute: Physical Structure: flooding regime **Target:** Maintain natural tidal regime.	No impact anticipated.
	Attribute: Vegetation Structure: zonation **Target:** Maintain range of coastal habitat zonations including transitional zones, subject to natural processes, including erosion and succession.	No impact anticipated.
	Attribute: Vegetation structure: vegetation height **Target:** Maintain structural variation in the sward.	No impact anticipated.

Table 3.6. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annex I Habitat	**Mediterranean salt meadows (*Juncetalia maritimi*) [1410]**	
	Attribute: Vegetation structure: vegetation cover. **Target:** Maintain more than 90% of area outside creeks vegetated.	No impact anticipated.
	Attribute: Vegetation composition: typical species and sub-communities. **Target:** Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project.	No impact anticipated.
	Attribute: Vegetation composition: negative indicator species – *Spartina anglica* **Target:** No *Spartina* in the SAC at present.	No impact anticipated.
Impacts during Construction Phase	No loss of, or impact on this habitat is expected during the construction phase.	
Impacts during Operational Phase	No impacts are expected during the operational phase.	
In Combination Effects	An assessment of previous works completed at the Galway Harbour Enterprise Park has identified loss of Salt Marsh habitat, of a total extent of *ca* 7.69ha (2A+3A of table 3.13) - mosaic of Atlantic and Mediterranean Salt Meadows habitats).	
Proposed Mitigation	Further to mitigation by design, no additional suitable mitigation is considered available.	
Level of Residual Impact	The permanent historic loss of *ca* 7.69 ha (2A+3A of table 3.13) of this Annex I habitat equates to a residual negative impact on one of the targets and attributes of the qualifying interest of the Galway Bay Complex cSAC. This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered to be significant as the habitats present are of poor quality, however, a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate.	

Table 3.6 cont'd. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Annex II Species Table

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annexed Species		
Annex II Species	**Otter (*Lutra lutra*) [1355]**	
	Attribute: Distribution **Target:** No significant decline	Standard Otter survey technique normally applied to riverine rather than purely marine sites. Current range in Western RBD estimated at 70% (Bailey and Rochford 2006). No decline in overall distribution expected.
	Attribute: Extent of terrestrial habitat **Target:** No significant decline	Area mapped to include 10 metre buffer above HWM on shoreline. HWM on shoreline is against the rock wall of the existing harbour park. Since the land above this rock wall is open dry spoil and bare ground (ED2), this terrestrial habitat is of low potential for Otter. 0.58 ha will be lost (see Fig 3.3). A further 0.67 ha will be created (see Fig 3.3) by the new land reclamation area. Thus, the development will result in an increase in the total area of the type of terrestrial habitat that is currently available to Otter in the harbour park phase I.
	Attribute: Extent of marine habitat **Target:** No significant decline	Area mapped based on evidence that Otter tend to forage within 80 m of shoreline (HWM). 4.21 ha will be lost (Figure 3.4 & 7B of table 3.13). A further 16.04 hectares (Fig. 3.5 & 7D of table 3.13) will be created adjacent to new land reclamation area. Thus, the development will result in an increase in the total area of the type of marine habitat (*i.e.* within 80 m of shoreline) that is currently available to Otter in the harbour park area.
	Attribute: Extent of freshwater (river) habitat **Target:** No significant decline	Proposed development will not affect extent of freshwater habitat.

Table 3.7 - Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annexed Species		
Annex II Species	**Otter (*Lutra lutra*) [1355]**	
	Attribute: Extent of freshwater (lake/lagoon) habitat **Target:** No significant decline	Proposed development will not affect extent of freshwater habitat.
	Attribute: Couching sites and holts **Target:** No significant decline	No known sites/holts will be affected.
	Attribute: Fish biomass available **Target:** No significant decline	Resident freshwater fish, anadromous and catadromous fish are not expected to be affected. No significant effects expected on coastal fish prey species (*e.g.* rockling and wrasse), except loss of 21.00 ha (5B of table 3.13) of shallow subtidal habitat at development site (excluding 5.93 ha of intertidal). This is 0.25% of the total designated subtidal area. Probable minor but indeterminate negative impact.
	Attribute: Barriers to connectivity **Target:** No significant increase	Otter will regularly commute across stretches of open water up to 500m wide. The development will lengthen some potential commuting routes (*e.g.* from river mouth to Renmore Lough) but no complete barriers will be formed. No significant loss of connectivity.
Impacts during Construction Phase	There will be direct disturbance within 71.44 ha (5B+5C of table 3.13) of subtidal habitat (excluding 5.93 ha of intertidal) as a result of the proposed development and disturbance in the wider area around this, although the available area of terrestrial habitat and subtidal foraging area within 80 metres of the shoreline will be increased. There is potential for physical damage and/or disturbance to be caused to individuals by noise/vibration/shock waves during blasting, dredging and pile driving operations during construction. There is potential for disturbance to feeding by individuals as a result of suspended solids generated during the construction works. There is also potential for negative impacts due to pollution from work areas during construction.	

Table 3.7 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annexed Species		
Annex II Species	**Otter (*Lutra lutra*) [1355]**	
Impacts during Operational Phase	There will be the loss of 21.00 ha (5B of table 3.13) of shallow subtidal habitat at development site (excluding 5.93 ha of intertidal), although the available area of terrestrial habitat and subtidal foraging area within 80 metres of the shoreline will be increased. There is potential for physical damage and/or disturbance to be caused to individuals by noise/vibration/shock waves during regular maintenance dredging. There is potential for disturbance to feeding by individuals as a result of suspended solids generated during regular maintenance dredging.	
In Combination Effects	An assessment of previous works completed at the Galway Harbour Enterprise Park has identified loss of suitable habitat for Otter of a total extent of 5.52ha (5A of table 3.13)	
Proposed Mitigation	Exclusion of drilling, blasting and pile driving during the hours of darkness. Limiting individual sizes of blasting charges. Infill/reclamation area lined with geotextile membrane to minimize impacts from suspended solid run off. Environmental Management Framework including measures on the storage and disposal of oily wastes, maintenance procedures for machinery etc, monitoring of levels of suspended solids and best practice with respect to the pouring of concrete.	
Level of Residual Impact	The permanent loss of 21.00 ha (5B of table 3.13) of shallow subtidal habitat at development site (excluding 5.93 ha of intertidal), and disturbance within an area of a further 50.44 ha (5C of table 3.13) of subtidal habitat equates to a residual negative impact on one of the targets and attributes of otter, a qualifying interest of the Galway Bay Complex cSAC and Lough Corrib cSAC. Similarly, a previous historic loss of *ca* 16 ha associated with previous development within the Galway Harbour Enterprise Park has resulted in cumulative impacts associated with the development (see Fig. 3.8 & Drg. 2139-2118 for Habitat Map of Lands pre 1990). This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered to be significant as the habitats present are extensive in the surrounding area and usage of the site by otter was recorded but not extensive, however, a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate.	

Table 3.7 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

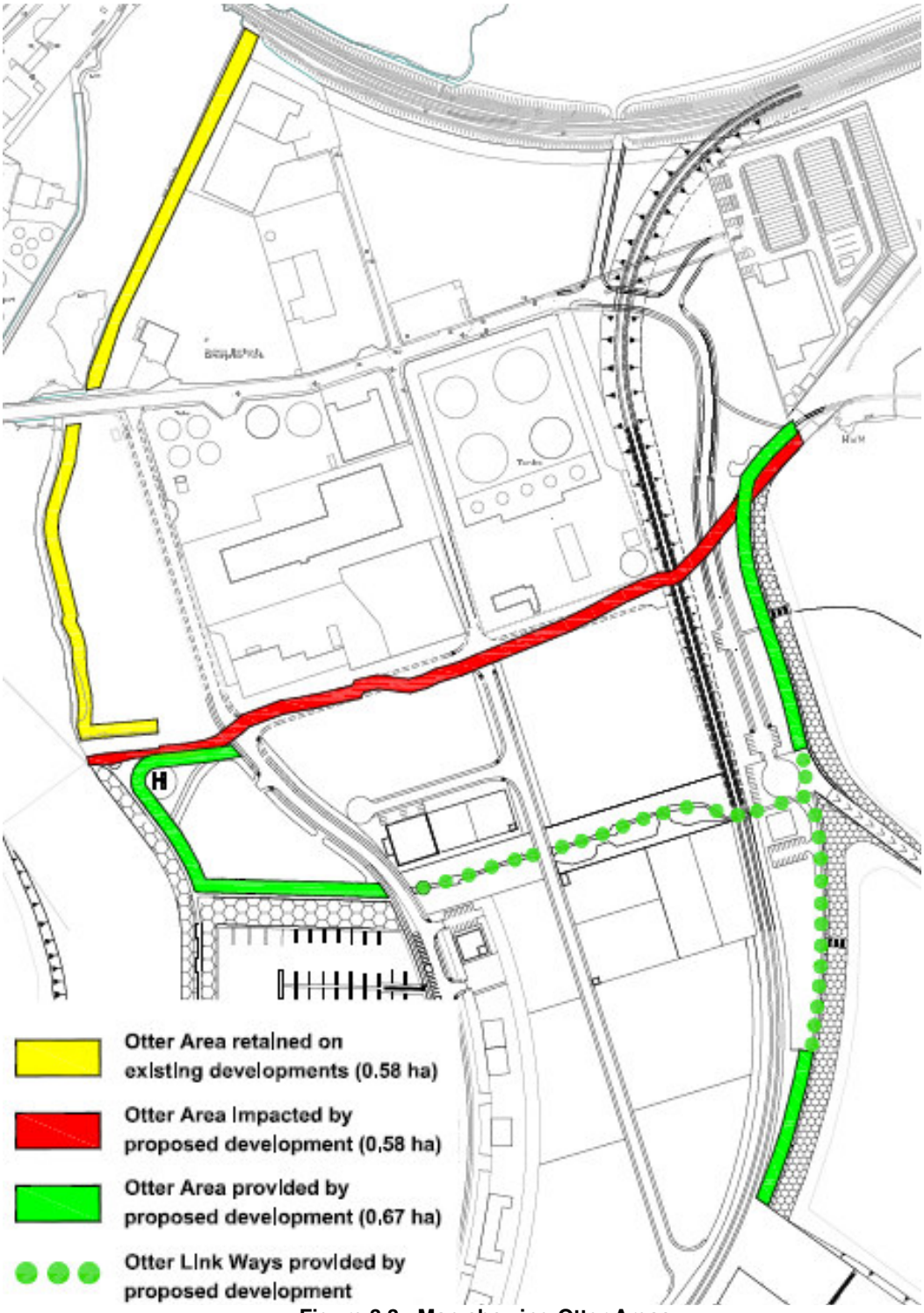
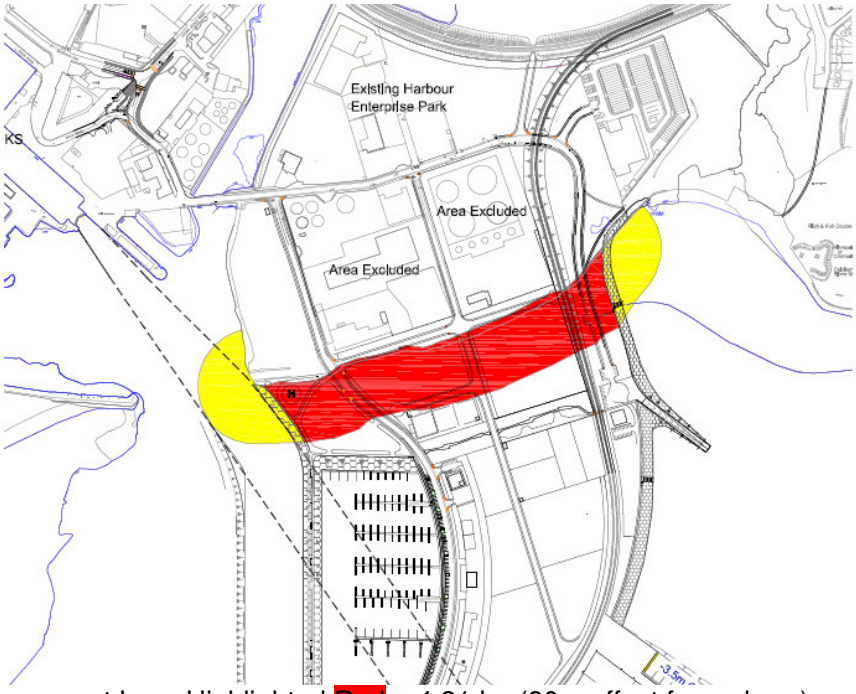


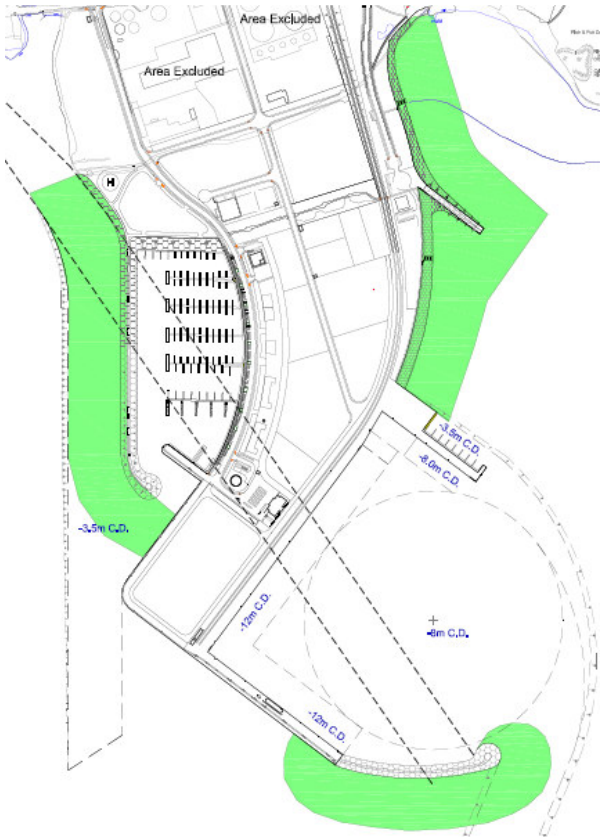
Figure 3.3 - Map showing Otter Areas

The above map shows the terrestrial areas relevant to the Otter.



Permanent Loss Highlighted Red = 4.21 ha (80m offset from shore)
Temporary Loss Highlighted Yellow 2.04 ha

Figure 3.4 - Map showing Otter Marine Habitat Loss



Area of Gain Highlighted Green = 16.04 ha (80m offset from shore)

Figure 3.5 - Map showing Otter Marine Habitat Gain

The above maps show the marine area gain relevant to the Otter.

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annexed Species		
Annex II Species	**Harbour seal (*Phoca vitulina*) [1365]**	
	Attribute: Access to suitable habitat **Target:** Species range within the site should not be restricted by artificial barriers to site use.	The proposed development will alter potential commuting routes for this species in the river mouth area, but the proposed development will not constitute an effective barrier to the movement of this species.
	Attribute: Breeding behaviour **Target:** Conserve breeding sites in a natural condition.	Haul out sites where pups are born will not be affected. Mating occurs in water with male visual and vocal displays (probably lekking) occurring near to haul out sites. These areas will not be affected by the proposed development.
	Attribute: Moulting behaviour **Target:** Conserve moult haul-out sites in a natural condition.	Moult haul-out sites will not be affected by proposed development.
	Attribute: Resting behavior **Target:** Conserve resting haul-out sites in a natural condition.	Resting haul-out sites will not be affected by proposed development.
	Attribute: Disturbance **Target:** Human activities should occur at levels that do not adversely affect the harbour seal population at the site.	Important breeding sites will not be affected by the development. Smaller non-breeding haul-outs are at distance from development footprint. No significant disturbance effects expected post-construction.
	Attribute: Loss of foraging habitat **Target:** No decline, subject to natural processes.	Loss of 26.93 ha (8B of table 3.13) of shallow subtidal habitat and intertidal at development site. This is 0.25% of the total designated subtidal area. Probable minor but indeterminate negative impact.

Table 3.8 - Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annexed Species		
Annex II Species	**Harbour seal (*Phoca vitulina*) [1365]**	
Impacts during Construction Phase	There will be direct disturbance within 71.44 ha (5B+5C of table 3.13) of subtidal habitat (excluding 5.93 ha of intertidal habitat) (and disturbance in the wider area around this) as a result of the proposed development. There is potential for physical damage and/or disturbance to be caused to individuals by noise/vibration/shock waves during blasting, dredging and pile driving operations during construction. Research from the U.K. suggests that there is the potential for seals to be killed by ducted propellers if barges etc. with this propeller type are used in the construction works and perform manoeuvres while either static or moving slowly (*i.e.* while still operating the propeller/propellers). Examination of seal corpses found in the U.K. (eastern Scotland, north Norfolk and Strangford Lough) has led researchers (Thompson *et al*., 2010) to believe that the seal had been killed by being drawn through ducted or cowled ship propellers, such as fixed Kort or Rice nozzles, or ducted azimuth thrusters. Indications are that these accidents are unlikely to have happened as a result of casual collisions. The workers have theorised that the seals were killed after being attracted to the vicinity of the propellers, either as a result of concentrations of prey fish close to vessels, or as an inappropriate response to the acoustic output of the propellers. This type of propeller is common in tugs, construction vessels and construction barges and is used when such vessels are either manoeuvring slowly, or trying to maintain position. This situation could occur for long periods during the construction phase. It should be possible to specify that vessels used by contractors are fitted with grilles or guards to prevent seals being pulled through the ducts. However, there is no way of stopping vessels fitted with such propellers from using the port of Galway and (if the mechanism is as the Sea Mammal Research Unit have posited) speed limits would not have any effect on the impact. It is worth stating that: (1) no dead seals with similar injuries have been found in Galway Bay (2) the impact, as suggested by the report, is theoretical in nature and may not actually exist, (3) it is not possible knowing if the port development will lead to an increase in the use of these types of propeller, or if the use of these types of propeller will change over time even if the development does not go ahead. There is potential for disturbance to feeding by individuals as a result of suspended solids generated during the construction works. There is also potential for negative impacts due to pollution from work areas during construction.	

Table 3.8 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annexed Species		
Annex II Species	**Harbour seal (*Phoca vitulina*) [1365] contd/..**	
Impacts during Operational Phase	There will be a loss of 26.93 ha (8B of table 3.13) of potential sub-tidal and intertidal foraging habitat. There is potential for physical damage and/or disturbance to be caused to individuals by noise/vibration/shock waves during regular maintenance dredging. There is potential for disturbance to feeding by individuals as a result of suspended solids generated during regular maintenance dredging. Research from the U.K. suggests that there is the potential for seals to be killed by ducted propellers if the volume of shipping traffic with this propeller type that is either static or moving slowly while still operating propellers is increased as a consequence of the development.	
In Combination Effects	An assessment of previous works completed at the Galway Harbour Enterprise Park has identified loss of suitable habitat for Harbour Seal of a total extent of 35.51 ha (8A+8B of table 3.13)	
Proposed Mitigation	Blasting, drilling and pile driving will be carried out during daylight hours and at low tide. This blasting schedule will coincide with the time when the maximum number of seals are hauled out of the water and will thus be less at risk from blasting activities. The individual sizes of blasting charges will be limited to minimize the size of the area of the zone of potential effect from any individual blast event. If barges with ducted propellers are used during the construction stage and these are likely to be making the types of manoeuvres mentioned above, the fitting of acoustic deterrent devices (ADDs) to them will be considered or vessels will be fitted with mesh screens at the ends of the ducts to prevent seal entry to ducts.	

Table 3.8 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annexed Species		
Annex II Species	**Harbour seal (*Phoca vitulina*) [1365]**	
	Infill/reclamation area lined with geotextile membrane to minimize impacts from suspended solid run off. Environmental Management Plan including measures on the storage and disposal of oily wastes, maintenance procedures for machinery etc, monitoring of levels of suspended solids and best practice with respect to the pouring of concrete.	
Level of Residual Impact	The permanent loss of 26.93ha (8B of table 3.13) of subtidal and intertidal habitat and disturbance within an area of 71.44 ha of subtidal habitat (excluding intertidal) equates to a residual negative impact on one of the targets and attributes of Harbour Seal, a qualifying interest of the Galway Bay Complex cSAC. Similarly, a previous historic loss of 8ha associated with previous development within the Galway Harbour Enterprise Park has resulted in combination effects associated with the development. This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered to be significant as the habitats present are extensive in the surrounding area and usage of the site by Harbour Seal was recorded but not extensive, however, a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate.	

Table 3.8 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annexed Species		
Annex II Species	**Salmon (*Salmo salar*) [1106]**	
	Attribute: Distribution and extent of anadromy **Target:** Accessibility of river channels from estuary	The proposed development will not affect the accessibility of river channels from the bay.
	Attribute: Adult spawning fish **Target:** Conservation Limit for each system consistently exceeded.	Current Conservation Limit for the Corrib system (1SW & MSW) is being exceeded. It is not expected that this will be affected by the proposed development.
	Attribute: Salmon fry abundance **Target:** Maintain or exceed 0+ fry mean catchment-wide abundance threshold value.	Fry abundance will not be directly affected by proposed development.
	Attribute: Out migrating smolt abundance **Target:** No significant decline.	The proposed development will not affect migrating smolt abundance.
	Attribute: Number and distribution of redds. **Target:** No decline in number and distribution of spawning redds due to anthropogenic causes.	Salmon spawn in freshwater gravels. Redds/red sites will therefore not be affected.
	Attribute: Water quality **Target:** At least Q4 at all sites sampled by EPA.	River/lake quality will not be affected by proposed development.
Impacts during Construction Phase	There will be direct disturbance within 71.44 ha (5B+5C of table 3.13) of subtidal habitat (excluding 5.93 ha of intertidal habitat) (and disturbance in the wider area around this) as a result of the proposed development. There is potential for physical damage and/or disturbance to be caused to individuals during blasting, dredging and pile driving operations during construction.	

Table 3.9 - Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annexed Species		
Annex II Species	**Salmon (*Salmo salar*) [1106]**	
	There is potential for disturbance and/or physical damage to individuals as a result of suspended solids generated during the construction works. However, as salmon regularly swim through estuaries they are conditioned to tolerate increased suspended solids loadings. There is also potential for negative impacts due to pollution from work areas during construction. As no toxic sediments have been discovered in the site investigations, there is no potential of impact of such chemicals during construction.	
Impacts during Operational Phase	There will be a permanent loss of 26.93 ha (9B of table 3.13) of subtidal and intertidal habitat. There is potential for physical damage and/or disturbance to be caused to individuals by noise/vibration during dredging operations. There is potential for disturbance and/or physical damage to individuals as a result of suspended solids generated during regular maintenance dredging.	
In Combination Effects	None identified.	
Proposed Mitigation	Blasting, drilling and pile driving will not be carried out during the hours of darkness. Blasting works will be carried out between 1st August and 31st of March inclusive. The individual sizes of blasting charges will be limited to minimize the size of the area of the zone of potential effect from any individual blast event. Infill/reclamation area lined with geotextile membrane to minimize impacts from suspended solid run off. Environmental Management Plan including measures on the storage and disposal of oily wastes, maintenance procedures for machinery etc, monitoring of levels of suspended solids and best practice with respect to the pouring of concrete.	
Level of Residual Impact	No significant residual impact is predicted.	

Table 3.9 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annexed Species		
Annex II Species	**Sea lamprey (*Petromyzon marinus*) [1095]**	
	Attribute: Extent of anadromy **Target:** % of river accessible.	Changes to the vicinity of the eastern side of the mouth of the River Corrib should not affect river accessibility for this species.
	Attribute: Population structure of juveniles **Target:** At least three age/size groups present.	Sites where juveniles likely or possibly found will not be affected.
	Attribute: Juvenile density in fine sediment **Target:** Mean catchment juvenile density at least 1/m^3	Juvenile sites and thus juvenile density will not be directly affected.
	Attribute: Extent and distribution of spawning habitat. **Target:** No decline in extent and distribution of spawning beds.	Spawning bed sites will not be affected.
	Attribute: Availability of juvenile habitat **Target:** More than 50% of sample sites positive	Juvenile habitat will not be affected by proposed development.
Impacts during Construction Phase	There will be direct disturbance within 71.44 ha (5B+5C of table 3.13) of subtidal habitat (excluding 5.93 ha of intertidal habitat) (and disturbance in the wider area around this) as a result of the proposed development. There is potential for physical damage and/or disturbance to be caused to individuals by noise/vibration/shock waves during blasting, dredging and pile driving operations during construction. There is potential for disturbance and/or physical damage to individuals as a result of suspended solids generated during the construction works. However, as sea lamprey regularly swim through estuaries they are conditioned to tolerate increased suspended solids loadings. There is also potential for negative impacts due to pollution from work areas during construction. As no toxic sediments have been discovered in the site investigations, there is no potential of impact of such chemicals during construction.	

Table 3.10 - Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

Attributes and Targets to Provide for Favourable conservation Condition of Relevant Qualifying Interests of cSACs		
Attributes	**Targets**	**Comment on Potential Impact on Attribute/Target**
Annexed Species		
Annex II Species	**Sea lamprey (*Petromyzon marinus*) [1095]**	
Impacts during Operational Phase	There will be a permanent loss of 26.93 ha (10B of table 3.13) of subtidal and intertidal habitat. There is potential for physical damage and/or disturbance to be caused to individuals by noise/vibration during operations during regular maintenance dredging. There is potential for disturbance and/or physical damage to individuals as a result of suspended solids generated during regular maintenance dredging.	
In Combination Effects	None identified.	
Proposed Mitigation	Blasting, drilling and pile driving will not be carried out during the hours of darkness. Blasting works will be carried out between 1st August and 31st of March inclusive. The individual sizes of blasting charges will be limited to minimize the size of the area of the zone of potential effect from any individual blast event. Infill/reclamation area lined with geotextile membrane to minimize impacts from suspended solid run off. Environmental Management Plan including measures on the storage and disposal of oily wastes, maintenance procedures for machinery etc, monitoring of levels of suspended solids and best practice with respect to the pouring of concrete.	
Level of Residual Impact	No significant residual impact is predicted.	

Table 3.10 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of cSACs

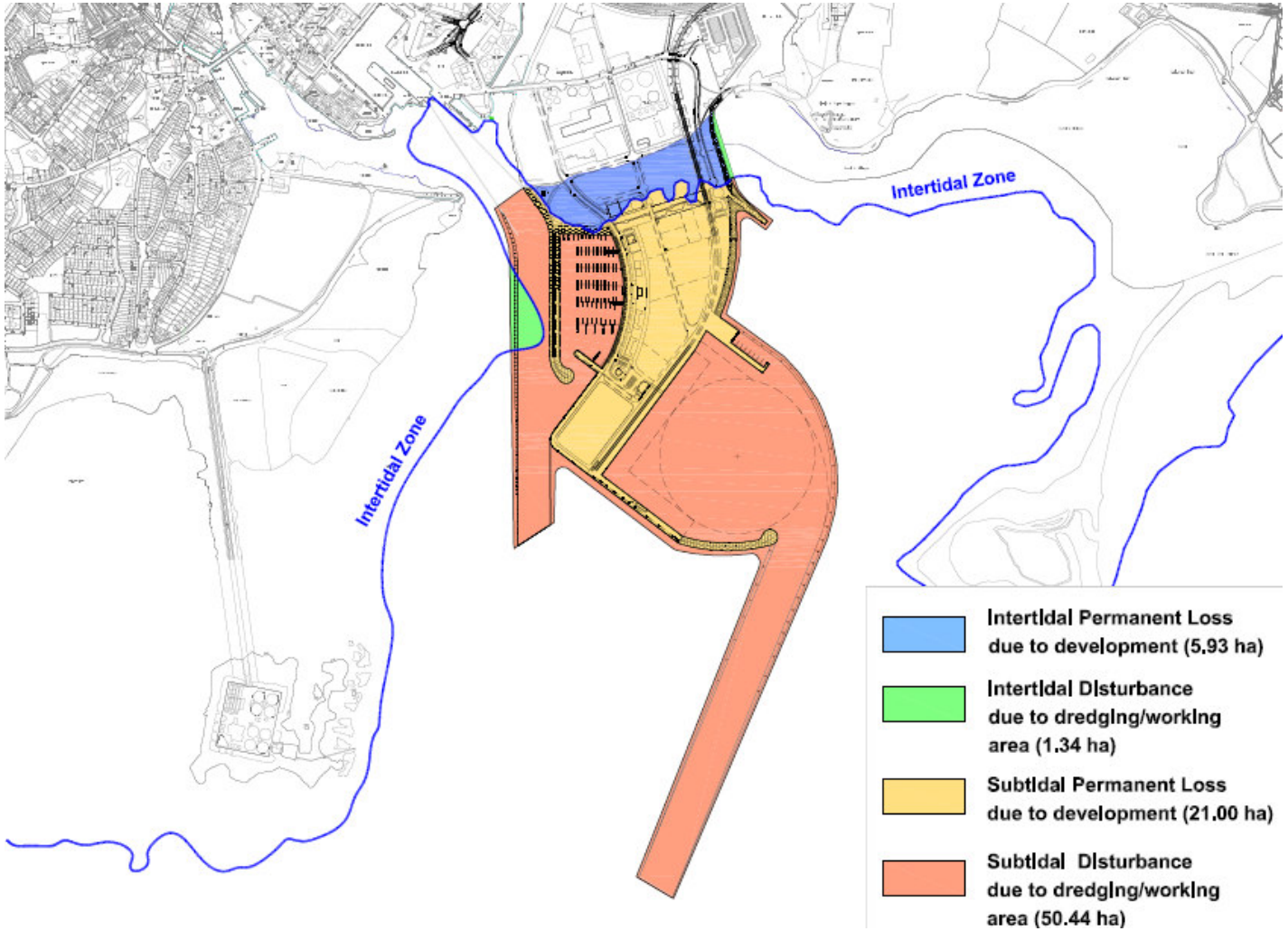
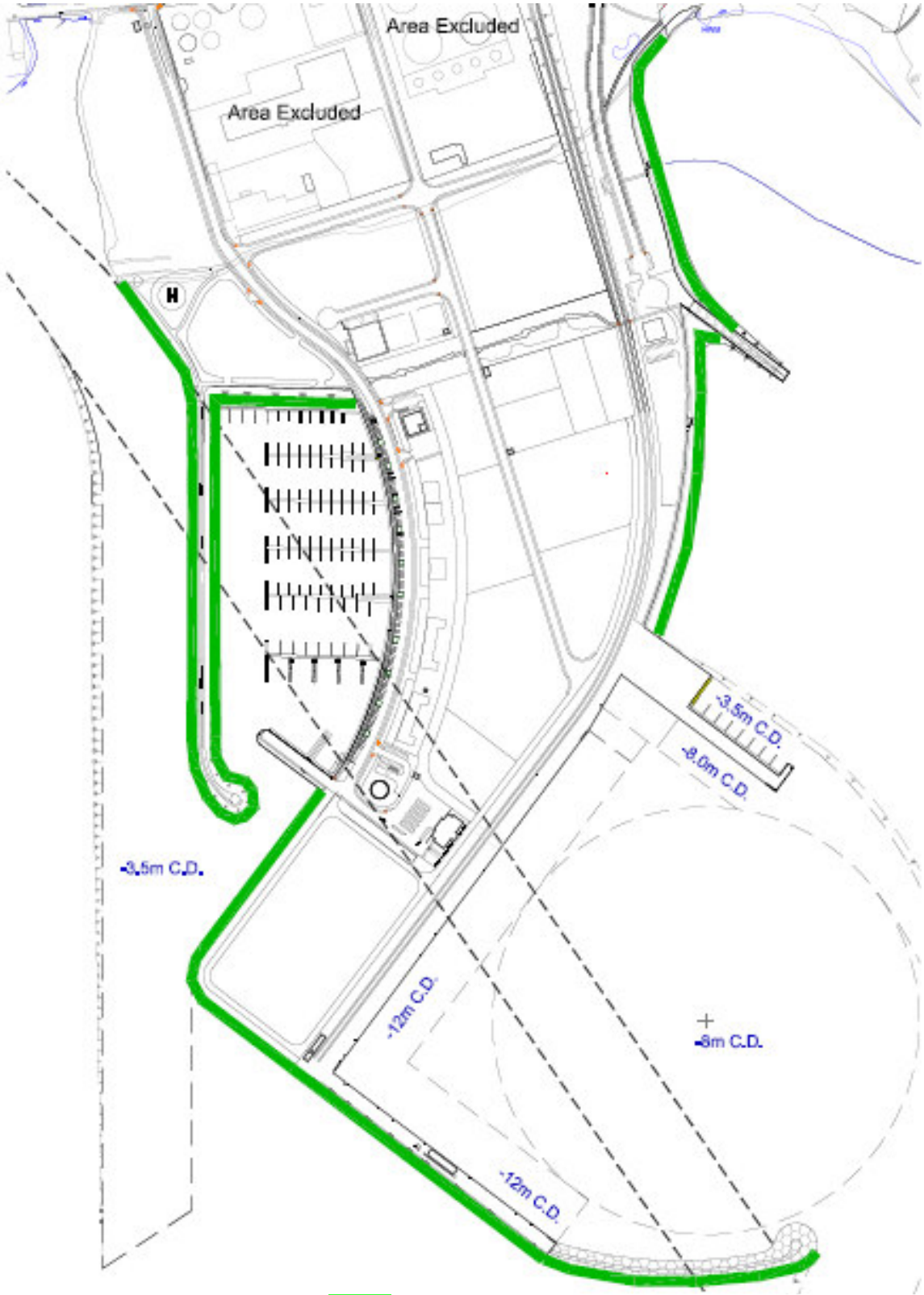


Figure 3.6 - Birds, intertidal and subtidal losses



Intertidal Gain shown highlighted Green = 1.69 ha

Figure 3.7 – Map Showing Intertidal Gain

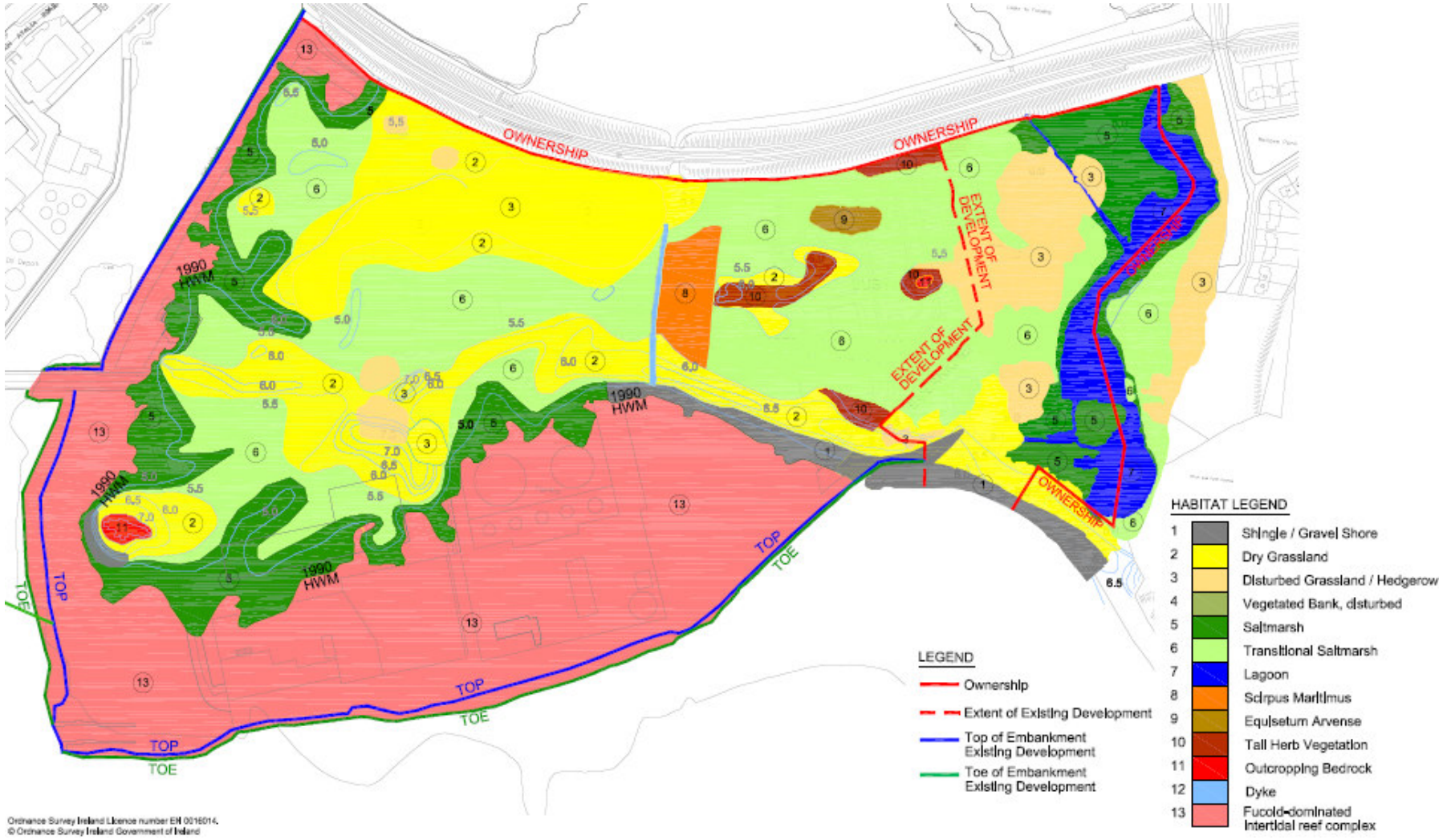


Figure 3.8 – Map Showing GHEP Lands Pre 1990 – (Extract from Drg 2139-2118)

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
Annex I species	**Great Northern Diver (*Gavia immer*) [A003]**	
	Attribute: Population trend **Target:** Long term population trend stable or increasing	The loss of *ca* 26.93 ha (11B of table 3.13) of foraging and roosting habitat is unlikely to influence the population trend, although this impact is indeterminate.
	Attribute: Distribution **Target:** No significant decrease in the range, timing or intensity of use of areas by Great Northern Diver, other than that occurring from natural patterns of variation	Loss of *ca* 26.93 ha (11B of table 3.13) of marine subtidal and intertidal habitat will constitute a potential range decrease of approximately 0.2% of the 12,912 hectares of marine subtidal habitat (as per NPWS SPA polygons) in the SPA. The potential significance of this loss in the wider Galway Bay area (*i.e.* including areas not designated, but where the species does winter) will be less.
Impacts during Construction Phase	Expected impacts during the construction phase include various forms of disturbance. These include direct disturbance to foraging and roosting birds and disturbance to prey species (e.g. due to noise and inaudible vibrations and potentially due to suspension of solids during construction work). These impacts would be short-term and, since the area affected (potentially the marine area of the development footprint, 78.71 ha (11B+11C of table 3.13)) is small in relation to the overall available marine area, they are not likely to be significant, but are indeterminate.	
In Combination Effects	Permanent loss of 35.51 ha marine habitat (11A+11B of table 3.13) Temporary loss of 51.78 ha subtidal habitat(11C of table 3.13)	
Impacts during Operational Phase	There will be the permanent loss of 26.93 ha (11B of table 3.13) of marine habitat (foraging and roosting) caused by the construction of the proposed harbour and land reclamation area. Since the area affected is small in relation to the overall available marine area, this impact is not likely to be significant, but is indeterminate.	
Proposed Mitigation	No mitigation for loss of foraging and roosting habitat within the current SPA boundary is possible.	
Level of Residual Impact	The permanent loss of 26.93 ha (11B of table 3.13)of subtidal and intertidal habitat and disturbance within an area of 51.78 ha (11C of table 3.13) of subtidal and intertidal habitat equates to a residual negative impact on one of the targets and attributes of this special conservation interest of the Inner Galway Bay SPA. This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered to be significant as similar suitable habitat is present in the surrounding area and usage of the site by the species was recorded but not extensive. However, a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate.	

Table 3.11 - Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
	Cormorant (*Phalacrocorax carbo*) [A017]	
	Attribute: Breeding population abundance: apparently occupied nests (AONs) **Target:** No significant decline	No significant decline is predicted as a result of the proposed development.
	Attribute: Productivity rate **Target:** No significant decline	No significant decline is predicted.
	Attribute: Distribution: breeding colonies **Target:** No significant decline	No negative effect on the current breeding colony on Deer Island is expected.
	Attribute: Prey biomass available **Target:** No significant decline	No significant decline is predicted.
	Attribute: Barriers to connectivity **Target:** No significant increase	This species regularly flies over land, built areas in port sites and over urban areas. The proposed port development will not constitute a barrier between remaining marine areas of the SPA for the species.
	Attribute: Disturbance at breeding site **Target:** Human activities should occur at levels that do not adversely affect the breeding cormorant population	Activities connected with the construction and operation of the proposed development are not expected to cause disturbance at the known current breeding site.
	Attribute: Population trend **Target:** Long term population trend stable or increasing	The loss of *ca* 26.93 (11B of table 3.13) ha of foraging including *ca* 5.93 ha of roosting habitat is unlikely to influence the population trend, although this impact is indeterminate.
	Attribute: Distribution **Target:** No significant decrease in the numbers or range of areas used by Cormorant, other than that occurring from natural patterns of variation	Loss of *ca* 26.93 ha (11B of table 3.13) of marine subtidal habitat will constitute a potential range decrease of approximately 0.2% of the 12,912 hectares of marine subtidal habitat (as per NPWS SPA polygons) in the SPA. The loss of *ca* 5.93 ha (6B of table 3.13) of potential roosting habitat rocky shore is also minor, since there is a large amount of such habitat in the SPA. The decrease in range within the within the SPA will probably be insignificant, but this is indeterminate. The potential significance of this loss in the wider Galway Bay area (i.e. including areas not designated, but where the species does winter) will be negligible.

Table 3.11 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
	Cormorant (*Phalacrocorax carbo*) [A017] contd/.	
Impacts during Construction Phase	Expected impacts during the construction phase include various forms of disturbance. These include direct disturbance to foraging and roosting birds and disturbance to prey species (*e.g.* due to noise and inaudible vibrations and potentially due to suspension of solids during construction work). These impacts would be short-term and, since the area affected (potentially the marine area of the development footprint, 51.78 ha) is small in relation to the overall available marine area, they are not likely to be significant, but are indeterminate.	
Impacts during Operational Phase	There will be the permanent loss of 26.93 ha (11B of table 3.13) of marine habitat (foraging and roosting) including 5.93 ha (6B of table 3.13) of inter-tidal habitat (roosting) caused by the construction of the proposed harbour and land reclamation area. Since the area affected is small in relation to the overall available marine area, this impact is not likely to be significant, but is indeterminate. No direct impacts are expected on the breeding colony on Deer Island.	
In Combination Effects	Permanent loss of 35.51 ha marine habitat (11A+11B of table 3.13) Temporary loss of 51.78 ha (11C of table 3.13) subtidal habitat	
Proposed Mitigation	No mitigation for loss of foraging and roosting habitat within the current SPA boundary is possible.	
Level of Residual Impact	The permanent loss of 26.93 ha (11B of table 3.13) of subtidal and intertidal habitat and disturbance within an area of 51.78 ha (11C of table 3.13) of subtidal and intertidal habitat equates to a residual negative impact on one of the targets and attributes of this special conservation interest of the Inner Galway Bay SPA. This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered to be significant as similar suitable habitat is present in the surrounding area and usage of the site by the species was recorded but not extensive. However, a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate.	

Table 3.11 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
	Grey Heron (*Ardea cinerea*) [A028]	
	Attribute: Population trend **Target:** Long term population trend stable or increasing	The loss of *ca* 5.93 ha (6B of table 3.13) of intertidal foraging and roosting habitat are unlikely to influence the population trend, although this impact is indeterminate.
	Attribute: Distribution **Target:** No significant decrease in the range, timing or intensity of use of areas by Grey Heron, other than that occurring from natural patterns of variation	The range decrease caused by the loss of *ca* 5.93 ha (6B of table 3.13) of intertidal foraging and roosting habitat will probably be insignificant, but this is indeterminate.
Impacts during Construction Phase	Expected impacts during the construction phase include various forms of disturbance. These include direct disturbance to foraging and roosting birds and disturbance to prey species (*e.g.* due to noise and inaudible vibrations and potentially due to suspension of solids during construction work). These impacts would be short-term and, since the area affected (potentially the intertidal area of the development footprint, 5.93 ha) is small in relation to the overall available marine area, they are not likely to be significant, but are indeterminate.	
Impacts during Operational Phase	There will be the permanent loss of 5.93 ha of intertidal habitat (foraging and roosting) caused by the construction of the proposed harbour and land reclamation area. Since the area affected is small in relation to the overall available marine area, this impact is not likely to be significant, but is indeterminate.	
In Combination Effects	Permanent loss of 5.93 ha intertidal habitat (6B of table 3.13) Permanent loss of 7.97 ha terrestrial habitat (4A of table 3.13)	
Proposed Mitigation	No mitigation for loss of foraging and roosting habitat within the current SPA boundary is possible.	
Level of Residual Impact	The permanent loss of 5.93 ha of intertidal habitat and disturbance within an area of 51.78 ha of subtidal and intertidal habitat equates to a residual negative impact on one of the targets and attributes of this special conservation interest of the Inner Galway Bay SPA. This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered to be significant as similar suitable habitat is present in the surrounding area and usage of the site by the species was recorded but not extensive. However, a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate.	

Table 3.11contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
	Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]	
	Attribute: Population trend **Target:** Long term population trend stable or increasing	The loss of *ca* 5.93 ha (6B of table 3.13) of intertidal and *ca* 21.00 ha (5B of table 3.13) of subtidal habitat are unlikely to influence the population trend, although this impact is indeterminate.
	Attribute: Distribution **Target:** No significant decrease in the range, timing or intensity of use of areas by Brent Goose, other than that occurring from natural patterns of variation	The range decrease caused by the loss of *ca* 5.93 ha of intertidal and *ca* 21.00 ha of subtidal habitat will probably be insignificant, but this is indeterminate.
Impacts during Construction Phase	Expected impacts during the construction phase include various forms of disturbance. These include direct disturbance to foraging and roosting birds and disturbance to food sources. These impacts would be short-term, but would be followed by a permanent loss of habitat. The area affected is 5.93 ha of inter-tidal habitat and 21.00 ha of subtidal habitat. The supra-tidal habitat that will be lost being unsuitable for this species. Since the area that will be lost is small in relation to the overall available intertidal area of this type (which is virtually ubiquitous within the SPA, as is the Brent Goose itself), these impacts are not likely to be significant, but are indeterminate.	
Impacts during Operational Phase	There will be the permanent loss of 5.93 ha of inter-tidal habitat and 21.00 ha of subtidal habitat (foraging and roosting) caused by the construction of the proposed harbour and land reclamation area. Since the area affected is small in relation to the overall available intertidal area of this type and the number of birds using the site of the proposed development is relatively few, this impact is not likely to be significant, but is indeterminate.	
In Combination Effects	Permanent loss of 35.51 ha marine habitat (11A+11B of table 3.13) Permanent loss of 7.97 ha terrestrial habitat (4A of table 3.13)	
Proposed Mitigation	No mitigation for loss of foraging and roosting habitat within the current SPA boundary is possible.	
Level of Residual Impact	The permanent loss of 5.93 ha (6B of table 3.13) of intertidal habitat, 21.00 ha (5B of table 3.13) of subtidal habitat and disturbance within an area of 51.78 ha of subtidal and intertidal habitat (11C of table 3.13) equates to a residual negative impact on one of the targets and attributes of this special conservation interest of the Inner Galway Bay SPA. This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered to be significant as similar suitable habitat is present in the surrounding area and usage of the site by the species was recorded but not extensive. However, a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate.	

Table 3.11 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
	Wigeon (*Anas penelope*) [A050]	
	Attribute: Population trend **Target:** Long term population trend stable or increasing	The loss of *ca* 5.93 ha (6B of table 3.13) of intertidal and *ca* 21.00 ha (5B of table 3.13) of subtidal habitat are unlikely to influence the population trend, although this impact is indeterminate.
	Attribute: Distribution **Target:** No significant decrease in the range, timing or intensity of use of areas by Wigeon, other than that occurring from natural patterns of variation	The range decrease caused by the loss of *ca* 5.93 ha of intertidal and *ca* 21.00 ha of subtidal habitat will probably be insignificant, but this is indeterminate.
Impacts during Construction Phase	Expected impacts during the construction phase include various forms of disturbance. These include direct disturbance to foraging and roosting birds and disturbance to food sources. These impacts would be short-term, but would be followed by a permanent loss of habitat. The area affected is 5.93 ha of inter-tidal habitat and 21.00 ha of subtidal habitat. The supra-tidal habitat that will be lost being unsuitable for this species. Since the area that will be lost is small in relation to the overall available intertidal area of this type (which is virtually ubiquitous within the SPA, as is Wigeon itself), these impacts are not likely to be significant, but are indeterminate.	
Impacts during Operational Phase	There will be the permanent loss of 5.93ha of inter-tidal habitat and 21.00 ha of subtidal habitat (foraging and roosting) caused by the construction of the proposed harbour and land reclamation area. Since the area affected is small in relation to the overall available intertidal area of this type and the number of birds using the site of the proposed development is relatively few, this impact is not likely to be significant, but is indeterminate.	
In Combination Effects	Permanent loss of 35.51 ha marine habitat (11A+11B of table 3.13) Permanent loss of 7.97 ha terrestrial habitat (4A of table 3.13)	
Proposed Mitigation	No mitigation for loss of foraging habitat within the current SPA boundary is possible.	
Level of Residual Impact	The permanent loss of 5.93 ha (6B of table 3.13) of intertidal habitat, 21.00 ha (5B of table 3.13) of subtidal habitat and disturbance within an area of 51.78 ha of subtidal and intertidal habitat (11C of table 3.13) equates to a residual negative impact on one of the targets and attributes of this special conservation interest of the Inner Galway Bay SPA. This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered to be significant as similar suitable habitat is present in the surrounding area and usage of the site by the species was recorded but not extensive. However, a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate.	

Table 3.11contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
	Teal (*Anas crecca*) [A052]	
	Attribute: Population trend **Target:** Long term population trend stable or increasing	The loss of *ca* 5.93 ha (6B of table 3.13) of intertidal habitat is unlikely to influence the population trend (especially since Teal was not recorded at the site of the proposed development), although this impact is indeterminate.
	Attribute: Distribution **Target:** No significant decrease in the range, timing or intensity of use of areas by Teal, other than that occurring from natural patterns of variation	The range decrease caused by the loss of *ca* 5.93 ha of intertidal habitat will probably be zero/insignificant, but this is indeterminate.
Impacts during Construction Phase	Due to the fact that this species has not been recorded using the site during one year of survey work in 2011/2012, potential disturbance impacts during the construction phase are not considered significant.	
Impacts during Operational Phase	There will be the permanent loss of 5.93 ha of intertidal habitat (potential for foraging and roosting) caused by the construction of the proposed harbour and land reclamation area. Since survey work has indicated that this area is not significant for Teal within the SPA and the species has not been recorded at the site, this impact is not adjudged to be significant.	
In Combination Effects	Permanent loss of 14.51 ha intertidal habitat (6A+6B of table 3.13) Permanent loss of 7.97 ha terrestrial habitat (4A of table 3.13)	
Proposed Mitigation	None proposed.	
Level of Residual Impact	No significant residual impact is expected.	

Table 3.11 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
	Shoveler (*Anas clypeata*) [A056]	
	Attribute: Population trend **Target:** Long term population trend stable or increasing	The loss of *ca* 5.93 ha (6B of table 3.13) of intertidal habitat is unlikely to influence the population trend (especially since Shoveler was not recorded at the site of the proposed development), although this impact is indeterminate.
	Attribute: Distribution **Target:** No significant decrease in the range, timing or intensity of use of areas by Shoveler, other than that occurring from natural patterns of variation	The range decrease caused by the loss of *ca* 5.93 ha of intertidal habitat will probably be zero/insignificant, but this is indeterminate.
Impacts during Construction Phase	Due to the fact that this species has not been recorded using the site during one year of survey work in 2011/2012, potential disturbance impacts during the construction phase are not considered significant.	
Impacts during Operational Phase	There will be the permanent loss of 5.93 ha of intertidal habitat (potential for foraging and roosting) caused by the construction of the proposed harbour and land reclamation area. Since survey work has indicated that this area is not significant for Shoveler within the SPA and the species has not been recorded at the site, this impact is not adjudged to be significant.	
In Combination Effects	Permanent loss of 14.51 ha intertidal habitat (6A+6B of table 3.13) Permanent loss of 7.97 ha terrestrial habitat (4A of table 3.13)	
Proposed Mitigation	None proposed.	
Level of Residual Impact	No significant residual impact is expected.	

Table 3.11 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
	Red-breasted Merganser (*Mergus serrator*) [A069]	
	Attribute: Population trend **Target:** Long term population trend stable or increasing	The loss of *ca* 26.93 ha (11B of table 3.13) of foraging habitat is unlikely to influence the population trend, although this impact is indeterminate.
	Attribute: Distribution **Target:** No significant decrease in the range, timing or intensity of use of areas by Red-breasted Merganser, other than that occurring from natural patterns of variation	Loss of *ca* 26.93 ha of marine subtidal and intertidal habitat will constitute a potential range decrease of approximately 0.2% of the 12,912 ha of marine subtidal habitat (as per NPWS SPA polygons) in the SPA, the significance of which is debatable. The potential significance of this loss in the wider Galway Bay area (i.e. including areas not designated, but where the species does winter) will be less.
Impacts during Construction Phase	Expected impacts during the construction phase include various forms of disturbance. These include direct disturbance to foraging and roosting birds and disturbance to food sources. These impacts would be short-term, but would be followed by a permanent loss of habitat. The area affected is 51.78 ha (11C of table 3.13) of subtidal and intertidal marine habitat within the construction footprint. Since the area that will be lost is small in relation to the overall available marine area of this type (which is common within the SPA close to shoreline), these impacts are not likely to be significant, but are indeterminate.	
Impacts during Operational Phase	There will be the permanent loss of approximately 21.00 ha (5B of table 3.13) of subtidal habitat (foraging) caused by the construction of the proposed harbour and land reclamation area. Since the area affected is small in relation to the overall available subtidal area of this type and the number of birds using the site of the proposed development is relatively few, this impact is not likely to be significant, but is indeterminate.	
In Combination Effects	Permanent loss of 35.51 ha marine habitat (11A+11B of table 3.13) Temporary loss of 51.78 ha subtidal and intertidal habitat (11C of table 3.13)	
Proposed Mitigation	No mitigation for loss of foraging and roosting habitat within the current SPA boundary is possible.	
Level of Residual Impact	The permanent loss of 21.00 ha (5B of table 3.13) of subtidal habitat and disturbance within an area of 51.78 ha (11C of table 3.13) of subtidal and intertidal habitat equates to a residual negative impact on one of the targets and attributes of this special conservation interest of the Inner Galway Bay SPA. This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered to be significant as similar suitable habitat is present in the surrounding area and usage of the site by the species was recorded but not extensive. However, a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate.	

Table 3.11 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
	Ringed Plover (*Charadrius hiaticula*) [A137]	
	Attribute: Population trend **Target:** Long term population trend stable or increasing	The *ca* 5.93 ha (6B of table 3.13) of intertidal habitat that will be lost has been assessed as unsuitable for this species (apparently too muddy a substrate to be suitable). The species was not recorded in the intertidal area during survey work.
	Attribute: Distribution **Target:** No significant decrease in the range, timing or intensity of use of areas by Ringed Plover, other than that occurring from natural patterns of variation	It is considered that the range of this species within the SPA will not be affected.
Impacts during Construction Phase	This species was not recorded using the intertidal zone of the site during one year of survey work (in 2011/2012), a fact that is all the more significant given its known high site fidelity at non-breeding sites. Thus, the potential for disturbance impacts during the construction phase is not considered significant.	
Impacts during Operational Phase	Survey work at the site of the proposed development, coupled with habitat type and the known high site fidelity of Ringed Plover, indicate that this site is not of significance for this species within the SPA. Therefore, no significant impacts are anticipated. Flocks of Ringed Plover were observed flying over water through the study area during the bird surveys. Birds were also observed feeding on sediment near Nimmo's Pier and small numbers feed at Ballyloughaun beach. The possibility that Ringed Plover might be deterred from commuting between these areas, or might have to fly further to do so because of an unwillingness to overfly the new harbour construction was considered. Ringed Plover in inner Galway Bay quickly habituated to the Mutton Island causeway after its construction and can be seen readily overflying it. Ringed Plover also readily overfly large piers at both high and low tides. The probability of a negative impact on Ringed Plover due to habitat fragmentation or increased commuting distances is considered to be very low (and likely to be short-term before habituation occurs), but it cannot be completely ruled out.	
In Combination Effects	Permanent loss of 14.51 ha intertidal habitat (6A+6B of table 3.13) Permanent loss of 7.97 ha terrestrial habitat (4A of table 3.13)	
Proposed Mitigation	None proposed.	
Level of Residual Impact	No significant residual impact is expected.	

Table 3.11contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
Annex I species	**Golden Plover (*Pluvialis apricaria*) [A140]**	
	Attribute: Population trend **Target:** Long term population trend stable or increasing	The loss of *ca* 5.93 ha (6B of table 3.13) of intertidal habitat is unlikely to influence the population trend (especially since Golden Plover was not recorded at the site of the proposed development), although this impact is indeterminate.
	Attribute: Distribution **Target:** No significant decrease in the range, timing or intensity of use of areas by Golden Plover, other than that occurring from natural patterns of variation	The range decrease caused by the loss of *ca* 5.93 ha of intertidal habitat will probably be zero/insignificant, but this is indeterminate.
Impacts during Construction Phase	This species was not recorded using the intertidal zone of the site during one year of survey work (in 2011/2012). Thus, the potential for disturbance impacts during the construction phase is not considered significant.	
Impacts during Operational Phase	Survey work at the site of the proposed development, coupled with habitat type, indicate that this site is not of significance for this species within the SPA. Therefore, no significant impacts are anticipated.	
In Combination Effects	Permanent loss of 14.51 ha intertidal habitat (6A+6B of table 3.13) Permanent loss of 7.97 ha terrestrial habitat (4A of table 3.13)	
Proposed Mitigation	None proposed.	
Level of Residual Impact	No significant residual impact is expected.	

Table 3.11 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
	Lapwing (*Vanellus vanellus*) [A142]	
	Attribute: Population trend **Target:** Long term population trend stable or increasing	The loss of *ca* 5.93 ha (6B of table 3.13) of intertidal habitat is unlikely to influence the population trend (especially since Lapwing was not recorded at the site of the proposed development), although this impact is indeterminate.
	Attribute: Distribution **Target:** No significant decrease in the range, timing or intensity of use of areas by Lapwing, other than that occurring from natural patterns of variation	The range decrease caused by the loss of *ca* 5.93 ha of intertidal habitat will probably be zero/insignificant, but this is indeterminate.
Impacts during Construction Phase	This species was not recorded using the intertidal zone of the site during one year of survey work (in 2011/2012). Thus, the potential for disturbance impacts during the construction phase is not considered significant.	
Impacts during Operational Phase	There will be the permanent loss of 5.93 ha of intertidal habitat (some potential for roosting) caused by the construction of the proposed harbour and land reclamation area. Survey work at the site of the proposed development, coupled with habitat type, indicate that this site is not of significance for this species within the SPA. Consequently, this impact is not adjudged to be likely or significant.	
In Combination Effects	Permanent loss of 14.51 ha intertidal habitat (6A+6B of table 3.13) Permanent loss of 7.97 ha terrestrial habitat (4A of table 3.13)	
Proposed Mitigation	None proposed.	
Level of Residual Impact	No significant residual impact is expected.	

Table 3.11 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
	Dunlin (*Calidris alpina alpina*) [A149]	
	Attribute: Population trend **Target:** Long term population trend stable or increasing	The loss of *ca 5*.93 ha (6B of table 3.13) of intertidal habitat is unlikely to influence the population trend (especially since Dunlin was not recorded at the site of the proposed development), although this impact is indeterminate.
	Attribute: Distribution **Target:** No significant decrease in the range, timing or intensity of use of areas by Dunlin, other than that occurring from natural patterns of variation	The range decrease caused by the loss of *ca* 5.93 ha of intertidal habitat will probably be zero/insignificant, but this is indeterminate.
Impacts during Construction Phase	This species was not recorded using the intertidal zone of the site during one year of survey work (in 2011/2012). Thus, the potential for disturbance impacts during the construction phase is not considered significant.	
Impacts during Operational Phase	Survey work at the site of the proposed development, coupled with habitat type, indicate that this site is not of significance for this species within the SPA. Therefore, no significant impacts are anticipated.	
In Combination Effects	Permanent loss of 14.51 ha intertidal habitat (6A+6B of table 3.13) Permanent loss of 7.97 ha terrestrial habitat (4A of table 3.13)	
Proposed Mitigation	None proposed.	
Level of Residual Impact	No significant residual impact is expected.	

Table 3.11 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
Annex I species	**Bar-tailed Godwit (*Limosa lapponica*) [A157]**	
	Attribute: Population trend **Target:** Long term population trend stable or increasing	The *ca* 5.93 ha (6B of table 3.13) of intertidal habitat that will be lost has been assessed as unsuitable for this species (apparently too muddy a substrate to be suitable). The species was not recorded in the intertidal area during survey work.
	Attribute: Distribution **Target:** No significant decrease in the range, timing or intensity of use of areas by Bar-tailed Godwit, other than that occurring from natural patterns of variation	It is considered that the range of this species within the SPA will not be affected.
Impacts during Construction Phase	This species was not recorded using the intertidal zone of the site during one year of survey work (in 2011/2012). Thus, the potential for disturbance impacts during the construction phase is not considered significant.	
Impacts during Operational Phase	Survey work at the site of the proposed development, coupled with habitat type (the correct type of feeding substrate for this species is not available, even at low tide), indicates that this site is not of significance for this species within the SPA. Flocks of Bar-tailed Godwit were observed flying over water through the study area during the bird surveys. Birds were also observed feeding on sediment near Nimmo's Pier and small numbers feed at both Renmore Beach and Ballyloughaun beach. The possibility that Bar-tailed Godwit might be deterred from commuting between these areas, or might have to fly further to do so because of an unwillingness to overfly the new harbour construction was considered. Bar-tailed Godwit in inner Galway Bay quickly habituated to the Mutton Island causeway after its construction and can be seen readily overflying it. Godwits also readily overfly large piers at both high and low tides. The probability of a negative impact on Bar-tailed Godwit due to habitat fragmentation or increased commuting distances is considered to be very low (and likely to be short-term before habituation occurs), but it cannot be completely ruled out.	
In Combination Effects	Permanent loss of 14.51 ha intertidal habitat (6A+6B of table 3.13) Permanent loss of 7.97 ha terrestrial habitat (4A of table 3.13)	
Proposed Mitigation	None proposed.	
Level of Residual Impact	No significant residual impact is expected.	

Table 3.11 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
	Curlew (*Numenius arquata*) [A160]	
	Attribute: Population trend **Target:** Long term population trend stable or increasing	The loss of *ca* 5.93 ha (6B of table 3.13) of intertidal habitat is unlikely to influence the population trend, although this impact is indeterminate.
	Attribute: Distribution **Target:** No significant decrease in the range, timing or intensity of use of areas by Curlew, other than that occurring from natural patterns of variation	The range decrease caused by the loss of *ca* 5.93 ha of intertidal habitat will probably be insignificant, but this is indeterminate.
Impacts during Construction Phase	Expected impacts during the construction phase include various forms of disturbance. These include direct disturbance to foraging and roosting birds and disturbance to prey species. These impacts would be short-term, but would be followed by a permanent loss of habitat. The area affected is 5.93 ha of inter-tidal habitat, the supra-tidal habitat that will be lost being unsuitable for this species. Since the area that will be lost is small in relation to the overall available intertidal area of this type (which is virtually ubiquitous within the SPA, as is the Curlew itself), these impacts are not likely to be significant, but are indeterminate.	
Impacts during Operational Phase	There will be the permanent loss of 5.93 ha of inter-tidal habitat (foraging and roosting) caused by the construction of the proposed harbour and land reclamation area. Since the area affected is small in relation to the overall available intertidal area and the number of birds using the site of the proposed development is few, this impact is not likely to be significant, but is indeterminate.	
In Combination Effects	Permanent loss of 5.93 ha intertidal habitat5.93 ha (6B of table 3.13) Permanent loss of 7.97 ha terrestrial habitat5.93 ha (4A of table 3.13)	
Proposed Mitigation	No mitigation for loss of foraging and roosting habitat within the current SPA boundary is possible.	
Level of Residual Impact	The permanent loss of 5.93 ha of intertidal habitat and disturbance within an area of 51.78 ha (11C of table 3.13) of subtidal and intertidal habitat equates to a residual negative impact on one of the targets and attributes of this special conservation interest of the Inner Galway Bay SPA. This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered to be significant as similar suitable habitat is present in the surrounding area and usage of the site by the species was recorded but not extensive. However, a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate.	

Table 3.11 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
	Redshank (*Tringa totanus*) [A162]	
	Attribute: Population trend **Target:** Long term population trend stable or increasing	The loss of *ca* 5.93 ha (6B of table 3.13) of intertidal habitat is unlikely to influence the population trend, although this impact is indeterminate.
	Attribute: Distribution **Target:** No significant decrease in the range, timing or intensity of use of areas by Redshank, other than that occurring from natural patterns of variation	The range decrease caused by the loss of *ca* 5.93 ha of intertidal habitat will probably be insignificant, but this is indeterminate.
Impacts during Construction Phase	Expected impacts during the construction phase include various forms of disturbance. These include direct disturbance to foraging and roosting birds and disturbance to prey species. These impacts would be short-term, but would be followed by a permanent loss of habitat. The area affected is 5.93 ha of inter-tidal habitat, the supra-tidal habitat that will be lost being unsuitable for this species. Since the area that will be lost is small in relation to the overall available intertidal area of this type (which is virtually ubiquitous within the SPA, as is the Redshank itself), these impacts are not likely to be significant, but are indeterminate.	
Impacts during Operational Phase	There will be the permanent loss of 5.93 ha of inter-tidal habitat (foraging and roosting) caused by the construction of the proposed harbour and land reclamation area. Since the area affected is small in relation to the overall available intertidal area and the number of birds using the site of the proposed development is few, this impact is not likely to be significant, but is indeterminate.	
In Combination Effects	Permanent loss of 5.93 ha intertidal habitat5.93 ha (6B of table 3.13) Permanent loss of 7.97 ha terrestrial habitat5.93 ha (4A of table 3.13)	
Proposed Mitigation	No mitigation for loss of foraging and roosting habitat within the current SPA boundary is possible.	
Level of Residual Impact	The permanent loss of 5.93 ha of intertidal habitat and disturbance within an area of 51.78 ha (11C of table 3.13) of subtidal and intertidal habitat equates to a residual negative impact on one of the targets and attributes of this special conservation interest of the Inner Galway Bay SPA. This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered to be significant as similar suitable habitat is present in the surrounding area and usage of the site by the species was recorded but not extensive. However, a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate.	

Table 3.11 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
	Turnstone (*Arenaria interpres*) [A169]	
	Attribute: Population trend **Target:** Long term population trend stable or increasing	The loss of *ca* 5.93 ha (6B of table 3.13) of intertidal habitat is unlikely to influence the population trend, although this impact is indeterminate.
	Attribute: Distribution **Target:** No significant decrease in the range, timing or intensity of use of areas by Turnstone, other than that occurring from natural patterns of variation.	The range decrease caused by the loss of *ca* 5.93 ha of intertidal habitat will probably be insignificant, but this is indeterminate.
Impacts during Construction Phase	Expected impacts during the construction phase include various forms of disturbance. These include direct disturbance to foraging and roosting birds and disturbance to prey species. These impacts would be short-term, but would be followed by a permanent loss of habitat. The area affected is 5.93 ha of inter-tidal habitat, the supra-tidal habitat that will be lost being unsuitable for this species. Since the area that will be lost is small in relation to the overall available intertidal area of this type (which is virtually ubiquitous within the SPA, as is the Turnstone itself), these impacts are not likely to be significant, but are indeterminate.	
Impacts during Operational Phase	There will be the permanent loss of 5.93 ha of inter-tidal habitat (foraging and roosting) caused by the construction of the proposed harbour and land reclamation area. Since the area affected is small in relation to the overall available intertidal area of this type and the number of birds using the site of the proposed development is relatively few, this impact is not likely to be significant, but is indeterminate.	
In Combination Effects	Permanent loss of 5.93 ha intertidal habitat (6B of table 3.13) Permanent loss of 7.97 ha terrestrial habitat (4A of table 3.13)	
Proposed Mitigation	No mitigation for loss of foraging and roosting habitat within the current SPA boundary is possible.	
Level of Residual Impact	The permanent loss of 5.93 ha of intertidal habitat and disturbance within an area of 51.78 ha (11C of table 3.13) of subtidal and intertidal habitat equates to a residual negative impact on one of the targets and attributes of this special conservation interest of the Inner Galway Bay SPA. This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered to be significant as similar suitable habitat is present in the surrounding area and usage of the site by the species was recorded but not extensive. However, a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate.	

Table 3.11 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
	Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	
	Attribute: Population trend **Target:** Long term population trend stable or increasing	The loss of *ca* 5.93 ha (6B of table 3.13) of intertidal and *ca* 21.00 ha (5B of table 3.13) of subtidal habitat are unlikely to influence the population trend, although this impact is indeterminate.
	Attribute: Distribution **Target:** No significant decrease in the range, timing or intensity of use of areas by Black-headed Gull, other than that occurring from natural patterns of variation.	The range decrease caused by the loss of *ca* 5.93 ha of intertidal and *ca* 21.00 ha of subtidal habitat will probably be insignificant, but this is indeterminate.
Impacts during Construction Phase	Expected impacts during the construction phase include various forms of disturbance. These include direct disturbance to foraging and roosting birds and disturbance to prey species. These impacts would be short-term, but would be followed by a permanent loss of habitat. The areas affected are 71.44 ha (5B+5C of table 3.13) of subtidal habitat and 5.93 ha of inter-tidal habitat, the supra-tidal habitat that will be lost being unsuitable for this species. Since the area that will be lost is small in relation to the overall available area of these habitat types and given the wide range of habitats that can be utilised by this species, these impacts are not likely to be significant, but are indeterminate.	
Impacts during Operational Phase	There will be the permanent loss of 21.00 ha of subtidal habitat and 5.93 ha of intertidal habitat (foraging and roosting) caused by the construction of the proposed harbour and land reclamation area. Since the area affected is small in relation to the overall available areas of these habitat types and the number of birds using the site of the proposed development is relatively few, this impact is not likely to be significant, but is indeterminate.	
In Combination Effects	Permanent loss of 35.51 ha marine habitat (11A+11B of table 3.13) Permanent loss of 7.97 ha terrestrial habitat (4A of table 3.13)	
Proposed Mitigation	No mitigation for loss of foraging and roosting habitat within the current SPA boundary is possible.	
Level of Residual Impact	The permanent loss of 5.93 ha of intertidal habitat, 21.00 ha of subtidal habitat and disturbance within an area of 51.78 ha of subtidal and intertidal habitat equates to a residual negative impact on one of the targets and attributes of this special conservation interest of the Inner Galway Bay SPA. This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered to be significant as similar suitable habitat is present in the surrounding area and usage of the site by the species was recorded but not extensive. However, a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate.	

Table 3.11 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
	Common Gull (*Larus canus*) [A182]	
	Attribute: Population trend **Target:** Long term population trend stable or increasing	The loss of *ca* 5.93 ha (6B of table 3.13) of intertidal and *ca* 21.00 ha (5B of table 3.13) of subtidal habitat are unlikely to influence the population trend, although this impact is indeterminate.
	Attribute: Distribution **Target:** No significant decrease in the range, timing or intensity of use of areas by Common Gull, other than that occurring from natural patterns of variation.	The range decrease caused by the loss of *ca* 5.93 ha (6B of table 3.13) of intertidal and *ca* 21.00 ha (5B of table 3.13) of subtidal habitat will probably be insignificant, but this is indeterminate.
Impacts during Construction Phase	Expected impacts during the construction phase include various forms of disturbance. These include direct disturbance to foraging and roosting birds and disturbance to prey species. These impacts would be short-term, but would be followed by a permanent loss of habitat. The areas affected are 71.44 ha (5B+5C of table 3.13) of subtidal habitat and 5.93 ha of inter-tidal habitat, the supra-tidal habitat that will be lost being unsuitable for this species. Since the area that will be lost is small in relation to the overall available area of these habitat types, these impacts are not likely to be significant, but are indeterminate.	
Impacts during Operational Phase	There will be the permanent loss of 21.00 ha (5B of table 3.13) of subtidal habitat and 5.93 ha of inter-tidal habitat (foraging and roosting) caused by the construction of the proposed harbour and land reclamation area. Since the area affected is small in relation to the overall available areas of these habitat types and the number of birds using the site of the proposed development is few, this impact is not likely to be significant, but is indeterminate.	
In Combination Effects	Permanent loss of 35.51 ha marine habitat (11A+11B of table 3.13) Permanent loss of 7.97 ha terrestrial habitat (4A of table 7.7.12)	
Proposed Mitigation	No mitigation for loss of foraging and roosting habitat within the current SPA boundary is possible.	
Level of Residual Impact	The permanent loss of 5.93 ha of intertidal habitat, 26.93 ha (11B of table 3.13) of subtidal habitat and disturbance within an area of 71.44 ha (5B+5C of table 3.13) of subtidal habitat equates to a residual negative impact on one of the targets and attributes of this special conservation interest of the Inner Galway Bay SPA. This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered to be significant as similar suitable habitat is present in the surrounding area and usage of the site by the species was recorded but not extensive. However, a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate.	

Table 3.11 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
Annex I species	**Sandwich Tern (*Sterna sandvicensis*) [A191]**	
	Attribute: Breeding population abundance: apparently occupied nests (AONs) **Target:** No significant decline	No significant decline is predicted as a result of the proposed development.
	Attribute: Productivity rate **Target:** No significant decline	No significant decline is predicted.
	Attribute: Distribution: breeding colonies **Target:** No significant decline	No negative effects on the current breeding colony in Corranroo Bay are expected.
	Attribute: Prey biomass available **Target:** No significant decline	No significant decline is predicted.
	Attribute: Barriers to connectivity **Target:** No significant increase	This species regularly flies over land and over built areas in port sites. The proposed port development will not constitute a barrier between remaining marine areas of the SPA for the species.
	Attribute: Disturbance at breeding site **Target:** Human activities should occur at levels that do not adversely affect the breeding Sandwich Tern population.	Activities connected with the construction and operation of the proposed development are not expected to cause disturbance at the known current breeding sites.
Impacts during Construction Phase	Expected impacts during the construction phase include various forms of disturbance. These include direct disturbance to foraging birds and disturbance to prey species. These impacts would be short-term, but would be followed by a permanent loss of habitat. The areas affected are 71.44 ha (5B+5C of table 3.13) of subtidal habitat within the construction footprint. Since the area that will be lost is small in relation to the overall available area of shallow subtidal habitat in the SPA, these impacts are not likely to be significant, but are indeterminate.	
Impacts during Operational Phase	There will be the permanent loss of 21.00 ha (5B of table 3.13) of subtidal foraging habitat caused by the construction of the proposed harbour and land reclamation area. Since the area affected is small in relation to the overall available areas of this habitat type and the numbers of birds using the site of the proposed development are relatively few, this impact is not likely to be significant, but is indeterminate. No direct negative impacts on the breeding colony in Corranroo Bay are expected.	
In Combination Effects	Permanent loss of 35.51 ha marine habitat (11A+11B of table 3.13) Permanent loss of 7.97 ha terrestrial habitat (4A of table 3.13)	
Proposed Mitigation	No mitigation for loss of foraging habitat within the current SPA boundary is possible.	
Level of Residual Impact	The permanent loss of 21.00 ha (5B of table 3.13) of subtidal habitat and disturbance within an area of 71.44 ha (5B+5C of table 3.13) of subtidal habitat equates to a residual negative impact on one of the targets and attributes of this special conservation interest of the Inner Galway Bay SPA. This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered to be significant as similar suitable habitat is present in the surrounding area and usage of the site by the species was recorded but not extensive. However, a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate.	

Table 3.11 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
SCI Species		
Annex I species	**Common Tern (*Sterna hirundo*) [A193]**	
	Attribute: Breeding population abundance: apparently occupied nests (AONs) **Target:** No significant decline	No significant decline is predicted as a result of the proposed development.
	Attribute: Productivity rate **Target:** No significant decline	No significant decline is predicted.
	Attribute: Distribution: breeding colonies **Target:** No significant decline	No negative effects on the current breeding colonies on Rabbit Island and in Corranroo Bay are expected.
	Attribute: Prey biomass available **Target:** No significant decline	No significant decline is predicted.
	Attribute: Barriers to connectivity **Target:** No significant increase	This species regularly flies over land and over built areas in port sites. The proposed port development will not constitute a barrier between remaining marine areas of the SPA for the species.
	Attribute: Disturbance at breeding site **Target:** Human activities should occur at levels that do not adversely affect the breeding Common Tern population.	Activities connected with the construction and operation of the proposed development are not expected to cause disturbance at the known current breeding sites.
Impacts during Construction Phase	Expected impacts during the construction phase include various forms of disturbance. These include direct disturbance to foraging birds and disturbance to prey species. These impacts would be short-term, but would be followed by a permanent loss of habitat. The areas affected are 71.44 ha (5B+5C of table 3.13) of subtidal habitat within the construction footprint. Since the area that will be lost is small in relation to the overall available area of shallow subtidal habitat in the SPA, these impacts are not likely to be significant, but are indeterminate.	
Impacts during Operational Phase	There will be the permanent loss of 21.00 ha (5B of table 3.13) of subtidal foraging habitat caused by the construction of the proposed harbour and land reclamation area. Since the area affected is small in relation to the overall available areas of this habitat type and the numbers of birds using the site of the proposed development are relatively few, this impact is not likely to be significant, but is indeterminate. No direct negative impacts on the breeding colonies on Rabbit Island and in Corranroo Bay are expected.	
In Combination Effects	Permanent loss of 35.51 ha marine habitat (11A+11B of table 3.13) Permanent loss of 7.97 ha terrestrial habitat (4A of table 3.13)	
Proposed Mitigation	No mitigation for loss of foraging habitat within the current SPA boundary is possible.	
Level of Residual Impact	The permanent loss of 21.00 ha of subtidal habitat and disturbance within an area of 71.44 ha (5B+5C of table 3.13) of subtidal habitat equates to a residual negative impact on one of the targets and attributes of this special conservation interest of the Inner Galway Bay SPA. This is considered to be a negative impact on one of the conservation objectives of the Natura 2000 site. The level of residual impact is not considered to be significant as similar suitable habitat is present in the surrounding area and usage of the site by the species was recorded but not extensive. However, a measure of the level of impact is difficult to assess in the context of the overall Natura 2000 site and is therefore considered indeterminate.	

Table 3.11 contd/. Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interests of SPA

Attributes and targets to provide for favourable conservation condition of relevant Special Conservation Interests of SPA		
	Attributes and targets	**Comment on Potential Impact on Attribute/Target**
Qualifying Interest Habitat	**Wetlands [A999]**	
	Attribute: Habitat Area **Target:** The permanent area occupied by the wetland habitat should be stable or not significantly less than the area of 13,267 ha, other than that occurring from natural patterns of variation.	Comment: Loss of 5.93 (6B of table 3.13) of wetland (intertidal) habitat i.e. 0.05% which is not significant.

Table 3.12 - Attributes and Targets to provide for Favourable Conservation Condition of Relevant Qualifying Interest Habitat of SPA

This assessment was carried out taking consideration of the information contained in "*Conservation Objectives: Inner Galway Bay SPA 004031*" (Version 1, NPWS, 01 May 2013).

A summary of the impact areas of the new development and the Galway Harbour Enterprise Park on Annex II Habitats, cSACs, QIs and SCI Species is presented in Table 3.13.

Summary Table of Impacts on Annex II Habitats, cSAC QIs and SCI Species							
Habitat Type		Galway Harbour Enterprise Park	New Development				
			Construction Stage			Operations	
			Permanent Loss	Temporary Loss	Permanent Gain	Temporary Loss	Permanent Gain
****		A	B	C	D	E	F
1	Stony Banks	0.28 ha	0.35ha *	None	None	None	None
2	Salt Marsh (incl Transitional)	7.39 ha	None*	None	None	None	None
3	Scirpus Maritimus	0.30 ha	None	None	None	None	None
4	Terrestrial	7.97 ha	None	None	None	None	None
5	Subtidal	None	21.0 ha	50.44 ha**	None	50.44 ha***	None
6	Intertidal	8.58 ha	5.93 ha	1.34 ha**	1.69 ha	1.34 ha***	None
7	Otter	5.52 ha	4.21 ha	2.04 ha	16.04 ha	None	None
8	Seal	8.58 ha	26.93 ha	51.78 ha**	None	51.78 ha***	None
9	Salmon	8.58 ha	26.93 ha	51.78 ha**	None	51.78 ha***	None
10	Lamprey	8.58 ha	26.93 ha	51.78 ha**	None	51.78 ha***	None
11	All SCI species	8.58 ha	26.93 ha	51.78 ha**	None	51.78 ha***	Possible

Table 3.13 – Summary Table of Impacts on Annex II Habitats, cSACs, QIs & SCI Species

Notes:
** Even though there is no direct loss of area of these 2 habitats, it is uncertain as to what the long term effect of the development will be on them. For this reason, the impact is considered indeterminate.*
*** This denotes temporary loss of seabed during capital dredging of approach channels and turning circle*
**** This denotes temporary loss of seabed during maintenance dredging of approach channels and turning circle (which is estimated to be every 10 years).*
*****Cell references applied to identify source of areas of impact noted in tables 3.1-3.12*

3.7 CONCLUSION

As a result of the findings of this NIS, the proposed Galway Harbour Extension was found to have the potential to either directly or indirectly impact four Natura sites *i.e.* Galway Bay cSAC and SPA and Lough Corrib cSAC and SPA. It is not possible to determine exactly what the impact of these habitat losses will have on the Galway Bay Complex cSAC and Inner Galway Bay SPA. However, based on the precautionary principle, such indeterminate impacts have to be considered as significant.

Legacy Issues
The historic development of the site and surrounding area has had an effect on the Natura 2000 sites – Galway Bay Complex cSAC and Inner Galway Bay SPA.

While it is considered unlikely that the effects were significant and while there were areas of the Galway Harbour Board lands that had been developed prior to designation which were not part of any EU Natura site, on the basis of the precautionary principal, these effects are considered to be indeterminate in terms of loss of Annex I cSAC habitats *i.e.* loss of *ca* 8.58 ha(11A table 3.13) of fucoid-dominated intertidal reef complex and *ca* 7.69 ha (2A + 3A table 3.13) of Atlantic Salt and Mediterranean Salt Meadows. The loss of these areas for feeding and foraging purposes also affected Otter and the Harbour seal which are Qualifying Interest cSAC species (see Table 3.14).

Regarding the SPA, the loss of these areas of intertidal and salt marsh habitat affected all SCI bird species for which the site was designated.

Galway Bay cSAC
With regard to the impact of the proposed development on the cSAC, it will reduce the fucoid-dominated intertidal reef complex by 5.93 ha (6B table 3.13) and will result in the loss of *ca* 21.00 ha of subtidal habitat (5B table 3.13) giving a total of 26.93 ha of marine feeding habitat for Otter, Common Seal (Annex Habitat and Species of the cSAC) and all bird species (SCIs of the SPA). Two fish species, Atlantic salmon and Sea Lamprey, which are Qualifying Interests for Lough Corrib cSAC, pass through parts of Galway Bay cSAC when migrating to and from the lake but it is not thought that the proposed Galway Harbour extension will significantly affect either of these. Additionally, four SCI species for Lough Corrib SPA *i.e.* Common Scoter, Common Gull, Common Tern and Black Headed Gull may also pass through or use the development site. The specific links between usage of the Inner Galway Bay SPA and Lough Corrib SPA by these species are not known *i.e.* it is not possible to say that the individuals identified would use both Natura 2000 sites or whether completely separate populations exist. However, applying the precautionary principle means that the impact is indeterminate.

The proposed development will also require capital and maintenance dredging of 46.48 ha of feeding habitat. This is a temporary slight negative impact; however, applying the precautionary principle means that the impact is indeterminate.

0.28 ha (1A table 3.13) of perennial vegetation stony banks and annual vegetation of drift lines has been lost historically and a further 0.35 ha (1B of table 3.13) may be impacted (as a result of the new development**.** This remaining perennial vegetation of stony banks and annual vegetation of drift lines at the back of Renmore Beach will not be significantly impacted as neither tidal range nor erosion/deposition conditions will change. It will be somewhat more sheltered but it is not thought that this will significantly alter the vegetation; however, applying the precautionary principle means that the impact is indeterminate

Galway Bay SPA
The intertidal area that will be lost is not an area that is of particular importance for birds in that it is a short stretch of coastline where the habitat consists of fucoid-covered reef and which does not support high densities of waterbirds (in contrast to areas of mud banks, muddy sand, salt meadows and, to a lesser extent, sandy shore).. This habitat is very well represented in the SPA *i.e.* in Lough Atalia, from Rinmore Point to Ballyloughan and virtually all of Oranmore Bay and the area around Tawin. The subtidal area that will be lost is of a similar quality to most other shallow inshore areas within the SPA/SAC in respect of foraging habitat for diving birds like divers, Cormorant and Red-breasted Merganser. While it is considered that the effect of this loss was not significant, on the basis of the precautionary principal, the effect is considered to be indeterminate (see Table 3.14).

The extension of the harbour into Galway Bay SPA could be seen as acting as a barrier to bird movements along that section of Inner Galway Bay and thereby having a negative impact on the site. While this potential impact is indeterminate, it seems highly unlikely that waders, geese and ducks would be deterred from flying to feeding /roosting sites because of the presence of the new structure. However, there may be an effect caused by human and traffic activity close to the proposed development at Renmore Beach where some wader species *e.g.* Oystercatcher, Bar Tailed Godwit feed. It should be noted that numbers of individuals of these species at this site were less than ten of each.

Of the 20 SCI species for which the Inner Galway Bay SPA was designated, thirteen were recorded foraging or resting/roosting within the development site study area during the survey work. These thirteen species were: Great Northern Diver, Cormorant, Grey Heron, Light-bellied Brent Goose, Red-breasted Merganser, Turnstone, Sandwich Tern, Common Tern, Wigeon, Curlew, Redshank, Black-headed Gull and Common Gull. Of these thirteen species, eight are from a total of ten SCI selection species for the SPA, while five are additional SCI species.

The level of impact of the loss of wetland and subtidal SPA habitat due to the proposed Galway Harbour Extension on the 20 SCI bird species is uncertain. Based on the precautionary principle the impact is therefore, deemed to be significant.

The figures for the maximum numbers of birds recorded in the marine area at the site reveal that most species are not present at the site in numbers that are significant in terms of the SPA as a whole. The maximum recorded numbers Great Northern Diver do equal a greater proportion of 2011 – 2012 SPA I-WeBS maxima *i.e.* 5.5%.

The habitat above high water within the site of the proposed development is not suitable for wintering waterfowl. Seven of the Inner Galway Bay SPA SCI species were not recorded using the study area during the survey work. It is considered possible that four of these species (Teal, Shoveler, Lapwing and Dunlin) have minor potential to use the site in small numbers, while it is considered unlikely that three (Ringed Plover, Golden Plover and Bar-tailed Godwit) would use the site due to the nature of the habitats that are present.

In the proposal for the Galway Harbour Extension, while there is not deemed to be any significant or adverse affect on the integrity of the designated sites, there is the irreversible and permanent area-take of 26.93 ha (11B table 3.13) arising from the footprint of the development. This has an impact of loss of areas for both Qualifying Interest species of the cSAC and SPA that use the site and the loss of Qualifying Interest habitats of the cSAC that occur in there. The same issue arises in terms of loss for the legacy issues where the Galway Harbour Enterprise Park was developed.

Lough Atalia and Renmore Lough
Lough Atalia and Renmore Lough fall under the definition of “coastal lagoons” [1150] under the EU Habitats Directive and are categorised as a priority habitat, described as being in danger of disappearing and therefore requiring protection. The conservation objectives recently published by NPWS describe the conservation status of Lough Atalia and Renmore Lough as of no conservation value as coastal lagoons. Although not in the direct footprint of the proposed development, the lagoons may be impacted during the construction and operational phase of the

Galway Harbour Extension development. Mathematical modelling studies indicated that during the construction phase, sediments suspended during dredging operations could be carried into and settle in the lough on flooding tides. The potential for this impact has been mitigated by only allowing dredging operations close to the mouth of Lough Atalia during periods of ebb tide.

Modelling studies also indicated that the proposed Harbour Extension will alter the dispersion of River Corrib water in the estuary of the river. This has the potential to change the salinity regime in Lough Atalia. Although the predictions are that the range in salinity will not change *e.g.* 0 – 30 psu, the median salinity will reduce by 1.29 psu from the present value. The cumulative annual frequency of zero salinity at the southern part of Lough Atalia will increase from 7 to 18 hours over an average year. The impact of the additional temporary, seasonal and spatially restricted decreases in salinity to 0 psu within parts of the ecosystems will not affect their status or their ecological functioning.

Given the high range in natural fluctuation recorded and predicted in Lough Atalia, it is considered that this change in the median salinity will have no effect on the ecological functioning of this habitat.

The following table 3.14 shows annexed habitats and species for the cSAC.

Annex Habitat	Impact of Proposed Development	Impact of Legacy Issue	Total Level of Impact	Mitigation Proposed
Mudflats and sandflats not covered by seawater at low tide and Reefs	Permanent loss of *5.93* ha of these habitats (6B table 3.13)	Infilling of 8.58 (6A table 3.13) ha of intertidal habitat	Permanent loss of *14.51* ha (6A + 6B table 3.13)	None
Coastal lagoons	Possibility of suspended sediments entering Lough Atalia during dredging of footprint nearby. No change predicted on the range of salinity in the lagoons. Reduction of 1.29 psu of the median salinity. The mathematical model predicts that the current cumulative annual 7 hours of zero psu may extend to 18 hours over the period of a year.	None	No change predicted on the range of salinity in the lagoons. Reduction of 1.29 psu of the median salinity. The mathematical model predicts that the current cumulative annual 7 hours of zero psu may extend to 18 hours over the period of a year.	Dredger only to operate on ebb tides close to mouth of Lough Atalia.
Perennial vegetation of stony banks and gravel shores	Minor but indeterminate negative impact on 0.35 ha of habitat which is adjacent to the site but will not be developed	Loss of 0.28 ha (1A table 3.13)	Loss of 0.28 ha and indeterminate impact on 0.35 ha of habitat adjacent	None
Atlantic salt and Mediterranean salt meadows	None	Permanent loss of 7.69 ha (2A + 3A table 3.13)	Permanent loss of 7.69 ha	None

Table 3.14 - Annexed habitats and species for the cSAC

Annex Habitat	Impact of Proposed Development	Impact of Legacy Issue	Total Level of Impact	Mitigation Proposed
Species				
Otter (*Lutra lutra*)	Loss of *26.93 (11B table 3.13)* ha of feeding habitat. Minor but negative impact.	Infilling of *ca* 8.58 ha (11A table 3.13) of intertidal habitat and Loss of 5.52ha (7A) terrestrial habitat	Loss of *ca* 35.51 ha (11A+11B table 3.13) of feeding habitat	None
Harbour Seal (*Phoca vitulina*)	Loss of *26.93* ha of shallow subtidal habitat. Minor but indeterminate negative impact.	Infilling of *ca* 8 .58 ha of intertidal habitat	Loss of *ca* 35.51 ha of shallow subtidal and intertidal habitat	None
Salmon (*Salmo salar*)	Development will not affect access to river channels from the bay. Current Conservation Limit for the Corrib system (1SW & MSW) is being exceeded. It is not expected that this will be affected by the proposed development. Development will not affect migrating smolt abundance. Loss of *26.93* ha of shallow subtidal habitat. Minor but indeterminate negative impact.	Infilling of *ca* 8.58 ha of intertidal habitat	Loss of 35.51 ha of shallow subtidal and intertidal habitat	Timing of works to avoid sensitive periods for salmon.
Sea Lamprey (*Petromyzon marinus*)	Changes in the vicinity of the eastern side of the River Corrib should not affect river accessibility for this species. Loss of 26.93 ha of shallow subtidal habitat. Minor but indeterminate negative impact.	Infilling of *ca* 8.58 ha of intertidal habitat.	Loss of *35.51* ha of shallow subtidal and intertidal habitat.	Timing of works to avoid sensitive periods.

Table 3.14 cont'd. Annexed habitats and species for the cSAC

SPA Special Conservation Interest Species	Impact of Proposed Development	Impact of Legacy Issue	Total Impact	Mitigation Proposed
Great Northern Diver	Permanent loss of 26.93 ha (11B table 3.13) (marine habitat (foraging and roosting) Temporary disturbance of a further 51.78 ha due to dredging & working area within a subtidal and intertidal habitat. Probably minor, but indeterminate negative impact.	Permanent loss of 8.58 ha (11A table 3.13) marine habitat	Permanent loss of 35.51 ha marine habitat (11A + 11B table 3.13) Temporary disturbance of a further 51.78 ha (11C table 3.13) due to dredging & working area within a subtidal and intertidal habitat.	None
Cormorant	Permanent loss of 26.93 ha marine habitat (foraging); permanent loss of 5.93 ha (6B table 3.13) intertidal habitat (roosting) Temporary disturbance of a further 51.78 ha due to dredging & working area within a subtidal and intertidal habitat. Probably minor, but indeterminate negative impact.	Permanent loss of 8.58 ha marine habitat	Permanent loss of 35.51 ha marine habitat and 5.93 ha intertidal habitat. Temporary disturbance of a further 51.78 ha due to dredging & working area within a subtidal and intertidal habitat.	None
Grey Heron	Permanent loss of 5.93 ha intertidal habitat (foraging) Probably minor, but indeterminate negative impact.	Permanent loss of 7.97 ha terrestrial habitat.	Permanent loss of 5.93 ha intertidal habitat Permanent loss of 7.97 ha (4A table 3.13) terrestrial habitat (13.90 ha total).	None

Table 3.15 - Special conservation interest species summary table

SPA Special Conservation Interest Species	Impact of Proposed Development	Impact of Legacy Issue	Total Impact	Mitigation Proposed
Light-bellied Brent Goose	Permanent loss of 21.00 ha subtidal marine habitat and of 5.93 ha intertidal habitat (foraging and roosting). Temporary disturbance of a further 51.78 ha due to dredging & working area within a subtidal and intertidal habitat. Probably minor, but indeterminate negative impact.	Permanent loss of 8.58 ha marine habitat Permanent loss of 7.97 ha terrestrial habitat.	Permanent loss of 35.51 ha marine habitat Permanent loss of 5.93 ha intertidal habitat and 7.97 ha terrestrial habitat (13.90 ha total).	None
Wigeon	Permanent loss of 26.93 ha marine habitat including 5.93 ha intertidal habitat (foraging and roosting). Temporary disturbance of a further 51.78 ha due to dredging & working area within a subtidal and intertidal habitat. Probably minor, but indeterminate negative impact.	Permanent loss of 8.58 ha marine habitat Permanent loss of 7.97 ha terrestrial habitat.	Permanent loss of 35.51 ha marine habitat Permanent loss of 5.93 ha intertidal habitat (included above) and 7.97 ha terrestrial habitat (13.90 ha total).	None
Teal	Permanent loss of 5.93 ha intertidal habitat. Minor but indeterminate negative impact. Teal was not recorded during site surveys; impacts during construction and operation are not considered significant.	Permanent loss of 7.97 ha terrestrial habitat	Permanent loss of 5.93 ha intertidal habitat and 7.97 ha terrestrial habitat (13.90 ha total).	None

Table 3.15 cont'd. Special conservation interest species summary table

SPA Special Conservation Interest Species	Impact of Proposed Development	Impact of Legacy Issue	Total Impact	Mitigation Proposed
Shoveler	Permanent loss of 5.93 ha intertidal habitat Shoveler was not recorded during site surveys; impacts during construction and operation are not considered significant.	Permanent loss of 7.97 ha terrestrial habitat.	Permanent loss of 5.93 ha intertidal habitat and 7.97 ha terrestrial habitat (13.90 ha total).	None
Red-breasted Merganser	Permanent loss of 26.93 ha marine habitat (foraging and roosting). Temporary disturbance of a further 51.78 ha due to dredging & working area within a subtidal and intertidal habitat. Probably minor, but indeterminate negative impact.	Permanent loss of 8.58 ha marine habitat	Permanent loss of 35.51 ha marine habitat Temporary disturbance of a further 51.78 ha due to dredging & working area within a subtidal and intertidal habitat.	None
Ringed Plover	Intertidal habitat to be lost is not considered a suitable substrate for this species. Ringed Plover was not recorded during site surveys; impacts during construction and operation are not considered significant.	Permanent loss of 7.97 ha terrestrial habitat, which may or may not have been suitable for this species.	Permanent loss of 7.97 ha terrestrial habitat, which may or may not have been suitable for this species.	None
Golden Plover	Permanent loss of 5.93 ha intertidal habitat. Golden Plover was not recorded during site surveys; impacts during construction and operation are not considered significant.	Permanent loss of 7.97 ha terrestrial habitat.	Permanent loss of 5.93 ha intertidal habitat and 7.97 ha terrestrial habitat (13.90 ha total).	None

Table 3.15 cont'd. Special conservation interest species summary table

SPA Special Conservation Interest Species	Impact of Proposed Development	Impact of Legacy Issue	Total Impact	Mitigation Proposed
Lapwing	Permanent loss of 5.93 ha intertidal habitat. Lapwing was not recorded during site surveys; impacts during construction and operation are not considered significant.	Permanent loss of 7.97 ha terrestrial habitat.	Permanent loss of 5.93 ha intertidal habitat and 7.97 ha terrestrial habitat (13.90 ha total).	None
Dunlin	Permanent loss of 5.93 ha intertidal habitat. Dunlin was not recorded during site surveys; impacts during construction and operation are not considered significant.	Permanent loss of 7.97 ha terrestrial habitat.	Permanent loss of 5.93 ha intertidal habitat and 7.97 ha terrestrial habitat (13.90 ha total).	None
Bar-tailed Godwit	Intertidal habitat to be lost is not considered a suitable substrate for this species. Bar-tailed Godwit was not recorded during site surveys; impacts during construction and operation are not considered significant.	Permanent loss of 7.97 ha terrestrial habitat, which may or may not have been suitable for this species.	Permanent loss of 7.97 ha terrestrial habitat, which may or may not have been suitable for this species.	None
Curlew	Permanent loss of 5.93 ha intertidal habitat. Probably minor, but indeterminate negative impact.	Permanent loss of 7.97 ha terrestrial habitat.	Permanent loss of 5.93 ha intertidal habitat and 7.97 ha terrestrial habitat (13.90 ha total).	None
Redshank	Permanent loss of 5.93 ha intertidal habitat. Probably minor, but indeterminate negative impact.	Permanent loss of 7.97 ha terrestrial habitat.	Permanent loss of 5.93 ha intertidal habitat and 7.97 ha terrestrial habitat (13.90 ha total).	None

Table 3.15 cont'd. Special conservation interest species summary table

SPA Special Conservation Interest Species	Impact of Proposed Development	Impact of Legacy Issue	Total Impact	Mitigation Proposed
Turnstone	Permanent loss of 5.93 ha intertidal habitat. Probably minor, but indeterminate negative impact.	Permanent loss of 7.97 ha terrestrial habitat.	Permanent loss of 5.93 ha intertidal habitat and 7.97 ha terrestrial habitat (13.90 ha total).	None
Black-headed Gull	Permanent loss of 21.00 ha subtidal habitat and 5.93 ha intertidal habitat (foraging and roosting). Temporary disturbance of a further 51.78 ha due to dredging & working area within a subtidal and intertidal habitat. Probably minor, but indeterminate negative impact.	Permanent loss of 8.58 ha marine habitat. Permanent loss of 7.97 ha terrestrial habitat.	Permanent loss of 35.51 ha marine habitat Permanent loss of 5.93 ha intertidal habitat (included above) and 7.97 ha terrestrial habitat (13.90 ha total).	None
Common Gull	Permanent loss of 21.00 ha subtidal habitat and 5.93 ha intertidal habitat (foraging and roosting). Temporary disturbance of a further 51.78 ha due to dredging & working area within a subtidal and intertidal habitat. Probably minor, but indeterminate negative impact.	Permanent loss of 8.58 ha marine habitat. Permanent loss of 7.97 ha terrestrial habitat.	Permanent loss of 35.51 ha marine habitat Permanent loss of 5.93 ha intertidal habitat (included above) and 7.97 ha terrestrial habitat (13.90 ha total).	None

Table 3.15 cont'd. Special conservation interest species summary table

SPA Special Conservation Interest Species	Impact of Proposed Development	Impact of Legacy Issue	Total Impact	Mitigation Proposed
Sandwich Tern	Permanent loss of 26.93 ha marine habitat (foraging and roosting). Temporary disturbance of a further 51.78 ha due to dredging & working area within a subtidal and intertidal habitat. Probably minor, but indeterminate negative impact.	Permanent loss of 8.58 ha marine habitat (foraging and roosting).	Permanent loss of 35.51 ha subtidal marine habitat	None
Common Tern	Permanent loss of 26.93 ha marine habitat (foraging and roosting). Temporary disturbance of a further 51.78 ha due to dredging & working area within a subtidal and intertidal habitat. Probably minor, but indeterminate negative impact.	Permanent loss of 8.58 ha marine habitat (foraging and roosting).	Permanent loss of 35.51 ha subtidal marine habitat	None

Table 3.15 cont'd. Special conservation interest species summary table

4 REFERENCES

Bailey, M. & J. Rochford. 2006. Otter Survey of Ireland 2004/2005. *Irish Wildlife Manuals*, No. 23. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

BirdLife International. 2013. BirdLife International Seabird Ecology and Foraging Range Database. http://seabird.wikispaces.com

DAHG. 2012. Notice of intention to Designate The Blackwater Bank SAC (Site code: 002953), The West Connacht Coast SAC (Site code: 002998), Hempton's Turbot Bank SAC (Site code: 002999), Rockabill to Dalkey Island SAC (Site code: 003000), Porcupine Bank Canyon SAC (Site code: 003001), Southeast Rockall Bank SAC (Site code: 003002) as Special Areas of Conservation.

Ingram, S.N., Englund, A. & E. Rogan. 2001. An extensive survey of bottlenose dolphins (*Tursiops truncatus*) on the west coast of Ireland. *Heritage Council Report no*. WLD/2001/42 17pp.

Hayden, T. & R. Harrington. 2000. *Exploring Irish mammals*. Duchas The Heritage Service. Department of Arts,Heritage, Gaeltacht and the Islands.

McKeown, E. 2010. Acoustic Based Cetacean Detection. Sea Change Report: Marine Research Sub-Programme (NDP 2007-2013 Series) Biospheric Engineering Ltd; 15pp.

NPWS. 2011a. Conservation objectives for Slieve Tooey/Tormore Island/Loughros Beg Bay SAC [000190]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

NPWS. 2011b. Conservation objectives for Inishbofin and Inishshark SAC [000278]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

NPWS. 2011c. Conservation objectives for Lough Corrib SAC [000297]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

NPWS. 2011d. Conservation objectives for Duvillaun Islands SAC [000495]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

NPWS. 2011e. Conservation objectives for Inishkea Islands SAC [000507]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

NPWS. 2011f. Conservation objectives for Maumturk Mountains SAC [002008]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

NPWS. 2011g. Conservation objectives for Connemara Bog Complex SAC [002034]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

NPWS. 2011h. Conservation objectives for Kilkieran Bay and Islands SAC [002111]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

NPWS. 2011i. Conservation objectives for Blasket Islands SAC [002172]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

NPWS. 2011j. Conservation objectives for Lough Corrib SPA [004042]. Generic Version 4.0. Department of Arts, Heritage & the Gaeltacht.

NPWS. 2011k. Roaringwater Bay and Islands SAC (site code: 101). Conservation objectives supporting documentmarine habitats

NPWS. 2012a. Conservation Objectives: Slyne Head Islands SAC 000328. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS. 2012b. Conservation Objectives: Lower River Shannon SAC 002165. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS. 2012c. Conservation Objectives: River Shannon and River Fergus Estuaries SPA 004077. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS. 2013a. Mapping associated with Site Specific Conservation Objectives Geodatabase May 2013.

NPWS. 2013a. Conservation Objectives: Galway Bay Complex SAC 000268. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS. 2013b. Conservation Objectives: Inner Galway Bay SPA 004031. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Thompson, D., Bexton, S., Brownlow, A., Wood, D., Patterson, T., Pye, K., Lonergan, M. & R. Milne, 2010. *Report on recent seal mortalities in UK waters caused by extensive lacerations*. Sea Mammal Research Unit, Scottish Oceans Institute, University of St. Andrews, Scotland. 20 pp.

Whilde, A. 1993. Threatened mammals, birds, amphibians and fish in Ireland. Irish Red Data Book 2: Vertebrates. HMSO, Belfast.

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