

ISLANDMAGEE GAS STORAGE FACILITY

Shadow Habitats Regulations Assessment Report



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1 INTRODUCTION

1.1 Purpose of this Report

This report has been prepared by RPS on behalf of Islandmagee Energy Limited and examines firstly whether or not the proposed Islandmagee Gas Storage Facility (IGSF) is likely to have a significant effect on any European site, and secondly, if any likely significant effects that could not be excluded at the screening stage of Habitats Regulations Assessment (HRA) would adversely affect the integrity of any European site, taking into account measures intended to avoid or reduce the harmful effects of the proposed development on European sites.

The competent marine licensing authority is the Marine & Fisheries Division of the Department of Agriculture, Environment and Rural Affairs (DAERA MFD). That competent authority has been furnished with this report in response to a request from DAERA MFD to update certain aspects of the previously submitted environmental information in 2014.

This shadow HRA (or sHRA) report has been prepared to assist the marine licensing authority in its role as a competent authority under Regulation 43 of the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended), which transposes certain aspects of Article 6(3) of Habitats Directive 92/43/EEC.

1.2 Appropriate Assessment

1.2.1 The Habitats Directive

A key protection mechanism in the Habitats Directive is the requirement to subject plans and projects to Appropriate Assessment (AA) in line with the requirements of Article 6(3) of the Habitats Directive, which requires that–

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

Thus, Article 6(3) defines a step-wise procedure for considering plans and projects:

- a) The first part of this procedure consists of a preliminary 'screening' stage to determine whether, firstly, the plan or project is directly connected with or necessary to the management of the site, and secondly, whether it is likely to have a significant effect on the site; it is governed by the first sentence of Article 6(3).

- b) The second part of the procedure, governed by the second sentence of Article 6(3), relates to the appropriate assessment and the decision of the competent national authorities.

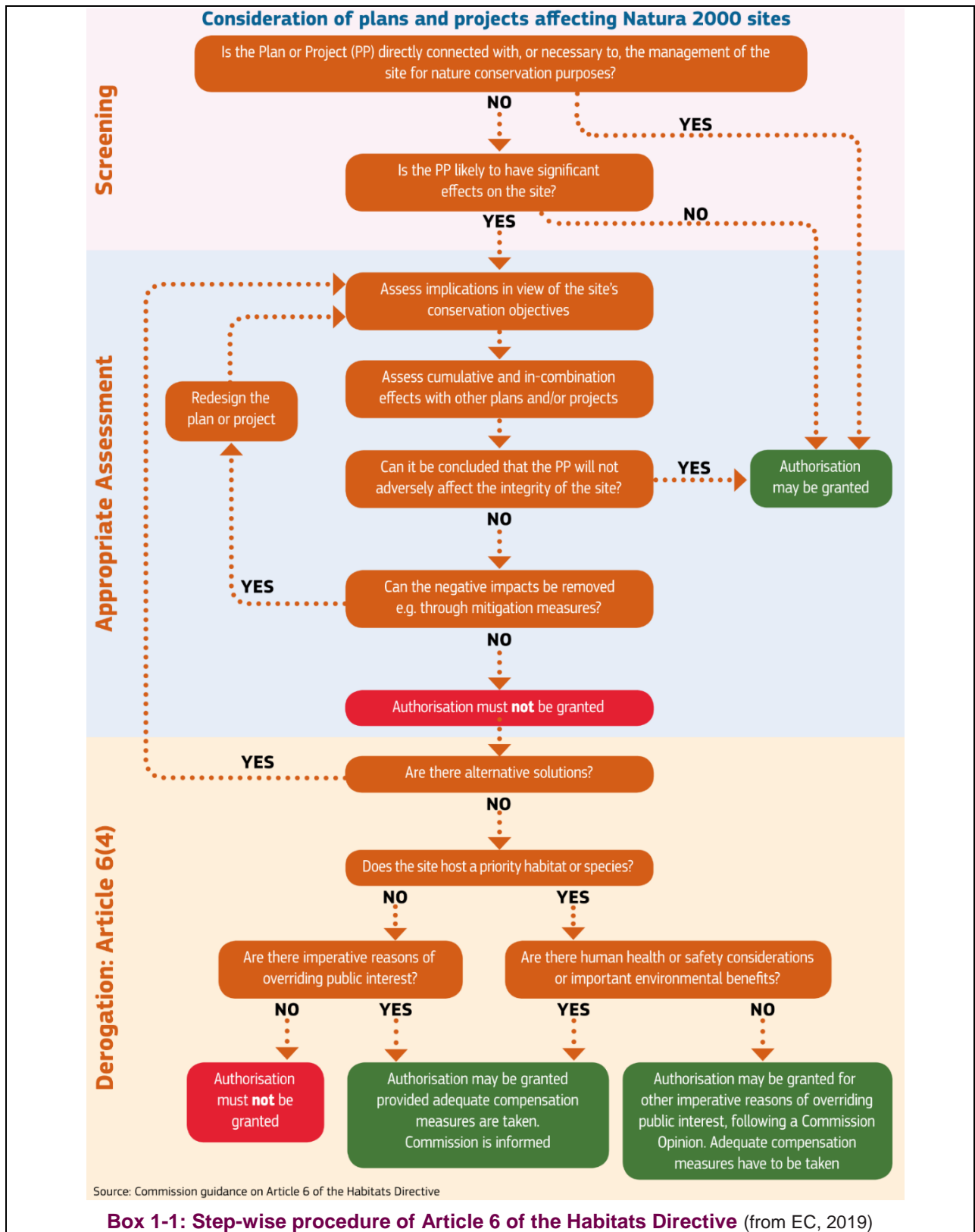
1.2.2 The Appropriate Assessment Process

According to European Commission guidance documents ‘*Assessment of plans and projects significantly affecting Natura 2000 sites*’ ([EC, 2001](#)) and the ‘*Managing Natura 2000 sites: The Provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC*’ ([EC, 2019](#)), the obligations arising under Article 6 establish a step-wise procedure as follows, and as illustrated in Box 1. The first part of this procedure consists of a pre-assessment stage (‘screening’) to determine whether, firstly, the plan or project is directly connected with or necessary to the management of the site, and secondly, whether it is likely to have a significant effect on the site; as governed by Article 6(3), first sentence. The second part of the procedure, governed by Article 6(3), second sentence, relates to the appropriate assessment and the decision of the competent national authorities.

A third part of the procedure (governed by Article 6(4)) comes into play if, despite a negative assessment, it is proposed not to reject a plan or project but to give it further consideration. In this case Article 6(4) allows for derogations from Article 6(3) under certain conditions.

The applicability of the procedure, and the extent to which it applies, depend on several factors, and in the sequence of steps, each step is influenced by the previous step. The order in which the steps are followed is therefore essential for the correct application of Article 6(3).

Each step determines whether a further step in the process is required. If, for example, the conclusion at the end of Stage 1 is that significant effects on European sites can be excluded, there is no requirement to proceed further.



1.3 Structure of this Document

1.3.1 Methodology and Guidance

Section 2 of the document sets out the methodology followed and guidance documents used in conducting a screening appraisal for appropriate assessment and subsequent appraisal for appropriate assessment of the implications of the proposed development on European sites.

1.3.2 Proposed Development

Section 3 of the report describes the proposed development, the general methodology sequence and activities to be undertaken, and the manner in which the development, if permitted, will be used during the operational phase.

1.3.3 Stage 1 Screening Appraisal

Section 4 of the report contains a preliminary examination and analysis to understand whether or not the proposed development is likely to have a significant effect on any European site. This is the screening appraisal for appropriate assessment. It has been undertaken in view of best scientific knowledge, in light of the Conservation Objectives of the sites concerned and considers the proposed development individually and in combination with other plans and projects. **In accordance with EC guidance and settled case law of the CJEU, measures intended to avoid or reduce the harmful effects of the proposed development on European sites have not been taken into account in the screening stage appraisal.**

1.3.4 Stage 2 Appraisal for Appropriate Assessment

Section 5 of the report contains a more detailed examination and analysis of the implications of the proposed development on the Conservation Objectives of those European sites where the possibility of Likely Significant Effects (LSEs) could not be excluded at the screening stage in the absence of further evaluation and analysis, including mitigation measures.

1.4 Directly Connected with or Necessary to the Management of the Site

The proposed development will create a new high pressure natural gas storage facility beneath Larne Lough. A gas plant will be constructed to inject gas into the caverns and to dry gas for export to the gas network. On this basis, the proposed development is not directly connected with or necessary to the management of any site as a European Site (referring to the first test contained in the first sentence of Article 6(3) of the Habitats Directive), and as such the proposed development is subject to appropriate assessment.

2 METHODOLOGY

2.1 Guidance on Appropriate Assessment

Northern Ireland Environment Agency (NIEA) is an Executive Agency of the Department of Agriculture, Environment and Rural Affairs (DAERA). It has published guidance notes on Habitat Regulations Assessment for Competent Authorities (EHS, 2002).

In addition to the guidelines published by the Department, the European Commission has published a number of documents which provide a significant body of guidance on the requirements of Appropriate Assessment, most notably including, '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, 2001), which sets out the principles of how to approach decision making during the process.

These guidelines have been followed in the preparation of this report. The following list identifies these and other pertinent guidance documents:

- Communication from the Commission on the Precautionary Principle., Office for Official Publications of the European Communities, Luxembourg (EC, 2000);
- Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC. Office for Official Publications of the European Communities, Brussels (EC, 2001);
- Habitats Regulations Guidance Notes for Competent Authorities. Environment and Heritage Service. Belfast (EHS, 2002) [*not available online*];
- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. Publications Office of the European Union, Luxembourg (EC, 2007);
- The Appropriate Assessment of Plans in Northern Ireland. RSPB, Belfast (RSPB, 2008);
- Estuaries and Coastal Zones within the Context of the Birds and Habitats Directives - Technical Supporting Document on their Dual Roles as Natura 2000 Sites and as Waterways and Locations for Ports. Publications Office of the European Union, Luxembourg (EC, 2009);
- Interpretation Manual of European Union Habitats. Version EUR 28. Publications Office of the European Union, Luxembourg (EC, 2013);
- Guidance on Energy Transmission Infrastructure and EU nature legislation. Publications Office of the European Union, Luxembourg (EC, 2018);

- European Commission Notice "Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC", Office for Official Publications of the European Communities, Luxembourg ([EC, 2018](#));
- Institute of Air Quality Management 'A guide to the assessment of air quality impacts on designated nature conservation sites (Version 1.0)' (IAQM, 2019); and
- European Commission Notice C (2018) 7621 'Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC', Office for Official Publications of the European Communities, Luxembourg (EC, 2019).

2.2 Likely Significant Effects

The Commission's 2018 Notice (EC, 2019) advises that the appropriate assessment procedure under Article 6(3) is triggered not by the certainty but by the likelihood of significant effects, arising from plans or projects regardless of their location inside or outside a European site. Such likelihood exists if significant effects on the site cannot be excluded. The significance of effects should be determined in relation to the specific features and environmental conditions of the site concerned by the plan or project, taking particular account of the site's conservation objectives and ecological characteristics.

The requirement that the effect in question be 'significant' exists in order to lay down a *de minimis* threshold. Plans or projects that have no appreciable effect on a European site are thereby excluded.

A significant effect is triggered when:

- there is a probability or a risk of a plan or project having a significant effect on a European site;
- the plan is likely to undermine the site's conservation objectives; and
- a significant effect cannot be excluded on the basis of objective information.

2.3 Mitigation Measures at Screening Stage

In determining the likelihood of significant impacts, and hence the need for an appropriate assessment, mitigation measures (i.e. measures that are intended to avoid or reduce harmful effects) and best practice measures cannot be taken into account. Accordingly, mitigation measures have not been taken into account in the screening stage appraisal.

2.4 Conservation Objectives

The conservation objectives for each European site are to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the site has been selected.

The favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing;

- 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.

The favourable conservation status (or condition, at a site level) 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 habitats;
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

2.5 In-combination Effects

Article 6(3) of the Habitats Directive requires that in-combination effects with other plans or projects are also considered. As set out in the Commission's 2018 Notice ([EC, 2019](#)), significance will vary depending on factors such as magnitude of impact, type, extent, duration, intensity, timing, probability, cumulative effects and the vulnerability of the habitats and species concerned.

In that context, plans or projects which are completed, approved but uncompleted, or proposed have been considered. EC ([2019](#)) specifically advises that "as regards other proposed plans or projects, on grounds of legal certainty it would seem appropriate to restrict the in-combination provision to those which have been actually proposed, i.e. for which an application for approval or consent has been introduced".

3 THE PROPOSED DEVELOPMENT

3.1 Overview

The Islandmagee Gas Storage Facility (IGSF) when constructed will create a new high pressure natural gas storage facility beneath Larne Lough. A total working gas storage capacity of over 400 million standard cubic meters will be created in up to 7 salt caverns, formed at a depth of approximately 1350m below sea level in the Permian Salt Layer. The project facilities will mainly be located adjacent to the southern boundary of the existing power station at Ballylumford, situated at the northern end of the Islandmagee peninsula (Figure 8-2).

The seven storage caverns, will be created by a technique called 'leaching' or 'solution mining'. The caverns will be created by directionally drilling underneath Larne Lough from a terrestrial site close to Ballylumford in Islandmagee and extracting the salt using a process called 'leaching' or 'solution mining'. The leaching process dissolves the salt, under controlled conditions, and creates a cavity within the salt layer in which gas can be stored. The salt will be dissolved using seawater drawn from an intake point on the eastern shore of Islandmagee. The waste product, a concentrated brine, will be discharged back into the sea on the eastern side of Islandmagee.

The possibility of re-using the salt extracted from the caverns was investigated under the original EIS. It was, however, determined that for this particular project the most appropriate means of dealing with the waste brine was to pump it across Islandmagee and return it to the sea by managed dispersal through an outfall discharging at a point around 450 metres offshore in a water depth of approximately 27 metres (Chart Datum) where it will rapidly disperse.

The location and length of the seawater intake and brine outfall pipelines have been carefully designed and modelled to take advantage of the natural dilution and dispersion characteristics of the tidal currents offshore from Islandmagee. The brine will be forced through an outfall diffuser, comprising two ports, at high pressure to maximise mixing and dilution. The rate of brine discharged will vary over the construction period, being relatively low initially before rising to a peak production rate, and then reducing again as cavern construction nears completion.

A gas plant will be constructed to inject gas into the caverns and to dry gas for export to the gas network.

The main above ground elements of the gas storage scheme are briefly described below. Construction work on these facilities will be phased, with the wells and leaching infrastructure being built first, followed by construction of the main gas plant facility.

1. **Wellpad** – a flat pad approximately 110m by 45m which will initially supports the drilling rig to create the wells and subsequently will contain the well heads in underground cellars was constructed in August 2013.

2. **Sea Water and Brine Pumping Facilities (Leaching Plant)** – a building housing the pumping equipment and brine tanks which will pump sea water into the wells and pump the waste brine back to the sea via an outfall during the construction phase.
3. **Main Gas Plant Facility** – the main operational facility which will house compression, heating/cooling, dehydration and metering equipment required for the day to day operation of the gas storage facility.
4. **Sea Water Intake Pumping Station** – an intake sump and pumping equipment located on the eastern shore of Islandmagee, at a site known as Castle Robin Bay or Bell's Port, which will draw in the “fresh” sea water and pump it to the Leaching Plant.

These facilities will be connected by sub-surface **Sea Water Intake** and **Brine Outfall pipelines**. The well pad and main gas plant facility will also be connected with a sub-surface **Gas Transfer Pipeline**.

The Leaching Plant, Intake Pumping Station and Sea Water and Brine Pipelines are intended for use during the initial construction of the storage caverns, once the caverns are fully constructed the plant will be decommissioned in accordance with the decommissioning plan that is currently being developed in consultation with the Crown Estate. If future maintenance of the caverns is required during the lifetime of the project this will be subject to new applications.

3.2 Phasing

The facility will be developed in two phases:

3.2.1 Phase 1

- Leaching facilities and connecting pipelines for the seawater supply and brine transfer to the Irish Sea.
- Wellsite for drilling of two caverns, and location of the leaching wellheads
- Gas surface facilities for transfer of gas between the network and the caverns, and vice versa, including connecting pipelines
- Wellsite for the location of the gas wellheads
- Leaching of the two caverns.

3.2.2 Phase 2

- Development of five additional caverns.
- Expansion of the gas surface facilities to provide additional withdrawal / injection capacity.

3.3 Elements of the Proposed Development

The proposed development works comprise the following main construction elements, full details of which were included on the planning application drawings and illustrated in Figure 8-2.

3.3.1 Gas Plant Facility

- Ground works and piling to create level platform to incorporate:
 - Main facility office and operational control building (footprint of approximately 360m²)
 - Compression plant
 - Dehydration plant
 - Metering equipment
 - Access road and new facility entrance from main B90 Ballylumford Road
 - Hardstanding area for car parking.

The overall estimated post construction footprint of the main gas plant facility including the access road is approximately 16,700m².

3.3.2 Sea Water and Brine Pumping Facilities (Leaching Plant)

- Removal of c.17,000m³ of outcropping bedrock
- Construction of Pump House containing:
 - 2 No. 2MW variable speed Leaching Pumps
 - 2 No. 2MW variable speed Brine Discharge Pumps
- Electrical substation (containing transformers for leaching plant electricity supply)
- Brine tanks (holding tanks for monitoring and temperature control of brine, prior to discharge)

The overall estimated post construction footprint of the Leaching Plant area (including hardstanding and access) is approximately 6,110m².

3.3.3 Wellpad

- In August 2013 an area measuring 110 by 45 m was re-profiled to provide a flat pad area to host drilling rig during early construction phase
- Seven wells each capped with a wellhead, contained in cellars below ground level
- Enhancement and extension of existing access lane from main B90 Ballylumford Road

The estimated post construction footprint of the wellpad will be approximately 4,800m².

3.3.4 Sea Water Intake Pumping Station

Excavated shaft into the bedrock on the upper foreshore at Castle Robin Bay/Bell's Port, which will be covered by a pump house and will contain the pumps for the seawater intake. An intake pipeline extending below the seabed from the intake sump will be constructed using micro-tunnelling techniques. The overall estimated footprint of the sea water intake pumping station is 175m².

3.3.5 Connecting Pipelines

The facilities will be connected together by sub-surface pipelines as follows:

1. Seawater Intake Pipeline

The seawater intake pipeline will run between the Seawater Intake Pumping Station and the Wellpad via the Leaching Plant.

2. Brine Outfall Pipeline

The brine outfall pipeline will run between the Wellpad and the Outfall Discharge Point via the Brine Leaching Plant.

3. The seawater in-take head

The seawater in-take head will be located in approximately 10m water depth. A 450mm High-Density Polyethylene (HDPE) pipeline will be installed from the intake head to the onshore sump by way of a tunnel and shaft. The 450mm pipeline will be installed through the tunnel following tunnel completion. The shaft will act as a sump and water will be abstracted and pumped across the island from the pump house located at the shaft location.

The principle construction operations within the sublittoral zone (The North Channel SAC and East Coast (NI) Marine proposed SPA) are as follows:

- a. Reception pit excavation – excavation in seabed prior to backfilling with granular material to allow the tunnelling machine to be advanced into and later recovered.
- b. Tunnel Construction by pipe jacking
- c. Tunnelling machine recovery
- d. Intake head connection
- e. Demobilisation and reinstatement

A 3m x 3m x 2m foundation will be positioned within the seabed. The foundation will be set into a pre-excavated hole within sedimentary seabed deposits such that the top of the foundation will be exposed at existing seabed level. Reception pit excavation works are also required to expose the end of the micro-tunnel for the intake. Once the micro-tunnel end is exposed, and the foundation installed in the seabed, the flanged ends of both pipes can be surveyed to establish position, orientation, and arrangement prior to fabricating tie-in spool. Once the fabricated tie-in spool is diver installed the Intake head foundation and tie-in spool can be back-filled. Anti-scour gabions will be installed above foundation on the seabed. To provide

protection to the Intake head connection flange and to minimise the likelihood of seabed disturbance during storm events, rock rip-rap protection is proposed for the seabed immediately adjacent to the intake head up to 2.5m beyond the intake screens. The intake head feature is 1.5m wide and sits approximately 3.5m above the seabed.

3.3.6 Brine Outfall

Brine arising from the solution mining at the wellsite for the formation of the storage caverns will be transferred by pipeline from the wellsite across Islandmagee to the proposed discharge point on the east side of Islandmagee, where a 400mm HDPE pipeline is required to discharge the brine direct to the Irish Sea. The topography at the discharge location is such that a trenchless technique is required for the transition from onshore to the offshore discharge location. The trenchless technique most suited to meet the requirements of the project is HDD (see 2019 Updated Marine Environmental Conditions Report for further details). HDD has been undertaken on many projects worldwide for the installation of pipelines from land to sea. The brine outfall diffuser will be located in a depth of 27m, approximately 450m offshore. The diffuser arrangement consists of two diffuser ports and pipe sections over 40m in length (See Figure 8-3).

The principle construction operations within the sublittoral zone (The North Channel SAC and East Coast (NI) Marine pSPA) are as follows:

- Pilot hole drilling
- Reaming / hole opening
- Pipeline installation
- Demobilisation and Reinstatement

To provide protection to the Brine outfall diffuser structure, the outfall pipe will be overlaid with concrete block mattresses complete with profiled edge blocks to enhance edge lift stability and provide inherent protection against over-trawling/snagging. Mattresses will be laid double height immediately adjacent to the diffuser heads to provide protection against over trawling/snagging. The concrete mattresses are 3m wide and span approximately 40m along the brine diffuser pipe.

The approximate total footprint of the brine outfall pipe and associated concrete protection mattresses is 120m² of seabed habitat (based on 40m of pipe x 3m wide concrete mattress).

4 STAGE 1 SCREENING APPRAISAL

4.1 European Sites

This screening appraisal considers European sites designated under European Council Directives 92/43/EEC and 2009/147/EC. The proposed development must be screened against those European sites for which a pathway of effect can be reasonably established between a receptor and the source of an effect.

All European designated sites with qualifying interest features that could potentially be impacted by the project were identified using the following approach:

- Step 1: All European sites were identified using the MAGIC interactive map¹, the Joint Nature Conservation Committee's (JNCC's) website, the Department of Agriculture, Environment and Rural Affairs' (DAERA) website, and the European Site European Nature Information System (EUNIS) database;
- Step 2: Information was compiled on the relevant qualifying feature for each of these sites by examining JNCC, DAERA and EUNIS databases; and
- Step 3: Using the above information and expert judgement, sites were included in the initial screening assessment if:
 - A European designated site directly overlaps with the project
 - Sites and associated features were located within the potential Zone of Impact (Zoi) for impacts associated with the project, based on expert judgement;
 - Qualifying features of a European Site were either recorded as present during recent and historic site-specific surveys within the project area, or identified during the desktop study as having the potential to occur within the project area; and
 - On a precautionary basis where a terrestrial European Site is located within 15km of the project.

The project is located within the North Channel Special Area of Conservation (SAC) and the proposed East Coast (Northern Ireland) Marine SPA.

Using the latest guidance from the Sea Mammal Research Unit (SMRU, 2017), sites which have been designated for their populations of pinnipeds (i.e. grey and / or common seal) and harbour porpoise within the following radii have also been considered:

- 100km for grey seal and harbour porpoise

¹ <http://magic.defra.gov.uk/>

- 50km for common seal

As such, five sites supporting populations of highly mobile marine mammals which have the potential to be impacted by the proposed works have been considered as part of this screening exercise.

One European site designated for Northern Gannet has been considered (Ailsa Craig SPA). This site is located 56.89 km from the brine outfall discharge point. Gannets can travel long distances on foraging trips. The mean foraging range is 140 km, with a maximum foraging distance of 600 km recorded (Natural England, 2012a).

Table 1 provides descriptive details of designated sites and features of natural heritage importance located within the site of the project; within immediate proximity to the site of the proposed project; or outside the site of the proposed project but connected to it through an identifiable impact pathway. The boundary of each of these designated sites in relation the proposed project is illustrated in Figure 8-2 Designated Sites.

A list of identified international and nationally designated sites, distance from project and qualifying features that have the potential to be impacted by the project is provided in Table 1

4.2 Establishing an Impact Pathway

The possibility of significant effects is considered in this report using the source-pathway-receptor model.

'Source' is defined as the individual elements of the proposed works that have the potential to affect the identified ecological feature (or receptor).

'Pathway' is defined as the means or route by which a source can affect the ecological feature.

An 'Ecological feature' is defined as qualifying features the SPA or SAC for which conservation objectives have been set for the European sites under consideration (refer to Table 1).

Each element can exist independently however an effect is created when there is a linkage between the source, pathway and receptor.

Table 1: European sites considered, their Qualifying Interests and relative distances from the proposed development

European site	Distance from site	Selection feature	Conservation objectives
Proposed East Coast (NI) Marine SPA [UK9020320]	The site lies within the pSPA boundary	<ul style="list-style-type: none"> - Great Crested Grebe - Red-throated Diver - Sandwich Tern - Common Tern - Arctic Tern - Manx Shearwater - Eider Duck 	<ul style="list-style-type: none"> • To maintain or enhance the population of the qualifying species • To maintain or enhance the range of habitats utilised by the qualifying species • To ensure that the integrity of the site is maintained; • To ensure there is no significant disturbance of the species and <p>To ensure that the following are maintained in the long term:</p> <ul style="list-style-type: none"> • Population of the species as a viable component of the site • Distribution of the species within site • Distribution and extent of habitats supporting the species • Structure, function and supporting processes of habitats supporting the species
North Channel SAC [UK0030399]	The site lies within the SAC boundary	<ul style="list-style-type: none"> - Harbour porpoise 	<p>To ensure for harbour porpoise that, subject to natural change, the following attributes are maintained or restored in the long term:</p> <ul style="list-style-type: none"> - 1. The species is a viable component of the site. - 2. There is no significant disturbance of the species. - 3. The supporting habitats and processes relevant to harbour porpoises and their prey are maintained.
Larne Lough SPA [UK9020042] (including subsumed Swan Island SPA)	<p>39 m W from well pad and 3.2 km from brine outfall discharge point (as the crow flies).</p> <p>5 km from the seawater intake brine outfall discharge point across open water</p>	<ul style="list-style-type: none"> - Sandwich Tern - Roseate Tern - Common Tern - Light-bellied Brent Goose 	<ul style="list-style-type: none"> • To maintain or enhance the population of the qualifying species • Fledging success sufficient to maintain or enhance population • To maintain or enhance the range of habitats utilised by the qualifying species • To ensure that the integrity of the site is maintained; • To ensure there is no significant disturbance of the species and <p>To ensure that the following are maintained in the long term:</p> <ul style="list-style-type: none"> • Population of the species as a viable component of the site • Distribution of the species within site • Distribution and extent of habitats supporting the species

European site	Distance from site	Selection feature	Conservation objectives
	(closest distance near coast)		<ul style="list-style-type: none"> Structure, function and supporting processes of habitats supporting the species.
Larne Lough Ramsar site [UK12013]	<p>39 m W from well pad and 3.2 km from brine outfall discharge point (as the crow flies).</p> <p>5 km from the seawater intake brine outfall discharge point across open water (closest distance near coast)</p>	<ul style="list-style-type: none"> Roseate Tern Common Tern Light-bellied Brent Goose 	<ul style="list-style-type: none">
The Maidens SAC [UK0030384]	1.01/1.71 km NE from brine outfall location (as the crow flies) across open water.	<ul style="list-style-type: none"> Sandbanks which are slightly covered by sea water all the time Reefs Grey seal 	<ul style="list-style-type: none"> Maintain and enhance, as appropriate the extent of the reefs Allow the natural processes which determine the development, structure, function and distribution of the habitats associated with the reefs, to operate appropriately. Maintain the extent and volume of sandbanks which are slightly covered by seawater all the time, subject to natural processes. Allow the natural processes which determine the development, structure and extent of sandbanks which are slightly covered by sea water all the time, to operate appropriately Maintain and enhance, as appropriate, the viability, distribution and diversity of typical species within this habitat. Maintain (and if feasible enhance) population numbers and distribution of Grey Seal. Maintain and enhance, as appropriate, physical features used by Grey Seals within the site
Antrim Hills SPA [UK9020301]	10 km W of the gas plant facility (as crow the flies)	<ul style="list-style-type: none"> Hen Harrier Merlin 	<ul style="list-style-type: none"> To maintain or enhance the population of the qualifying species Fledging success sufficient to maintain or enhance population To maintain or enhance the range of habitats utilised by the qualifying species

European site	Distance from site	Selection feature	Conservation objectives
			<ul style="list-style-type: none"> - To ensure that the integrity of the site is maintained; - To ensure there is no significant disturbance of the species and To ensure that the following are maintained in the long term: <ul style="list-style-type: none"> • Population of the species as a viable component of the site • Distribution of the species within site • Distribution and extent of habitats supporting the species Structure, function and supporting processes of habitats supporting the species
Belfast Lough SPA [UK9020101]	12.3 km S / 19.3 km S from brine outfall discharge point across open water (as the crow flies)	<ul style="list-style-type: none"> - Redshank - Common Tern - Arctic Tern - Bar-tailed Godwit - Black-tailed Godwit 	<ul style="list-style-type: none"> - To maintain or enhance the population of the qualifying species; - To maintain or enhance the range of habitats utilised by the qualifying species - To ensure that the integrity of the site is maintained; - To ensure there is no significant disturbance of the species and - To ensure that the following are maintained in the long term: <ul style="list-style-type: none"> - Population of the species as a viable component of the site - Distribution of the species within site - Distribution and extent of habitats supporting the species Structure, function and supporting processes of habitats supporting the species
Belfast Lough Ramsar Site [UK12002]	12.3 km S / 19.3 km S from brine outfall discharge point across open water (as the crow flies)	<ul style="list-style-type: none"> - Redshank 	
Belfast Lough Open Water SPA [UK9020290]	12.5 km S / 19.0 km S from brine outfall discharge point across open water (as the crow flies)	<ul style="list-style-type: none"> - Great Crested Grebe 	<ul style="list-style-type: none"> - To maintain or enhance the population of the qualifying species; - To maintain or enhance the range of habitats utilised by the qualifying species - To ensure that the integrity of the site is maintained; - To ensure there is no significant disturbance of the species and - To ensure that the following are maintained in the long term: <ul style="list-style-type: none"> - Population of the species as a viable component of the site - Distribution of the species within site - Distribution and extent of habitats supporting the species Structure, function and supporting processes of habitats supporting the species
Outer Ards SPA [UK9020271]	20.90 km S / 21.18 km S from brine	<ul style="list-style-type: none"> - Arctic tern (<i>Sterna paradisaea</i>) breeding population Golden Plover 	<ul style="list-style-type: none"> - To maintain each feature in favourable condition according to the following feature objectives:

European site	Distance from site	Selection feature	Conservation objectives
	outfall discharge point across open water (as the crow flies)	<ul style="list-style-type: none"> - Light-bellied Brent goose - Ringed Plover - Turnstone 	<ul style="list-style-type: none"> - To maintain or enhance the population of the qualifying species; - To maintain or enhance the range of habitats utilised by the qualifying species - To ensure that the integrity of the site is maintained; - To ensure there is no significant disturbance of the species and <p>To ensure that the following are maintained in the long term:</p> <ul style="list-style-type: none"> • Population of the species as a viable component of the site • Distribution of the species within site - Distribution and extent of habitats supporting the species
Strangford Lough SAC [UK0016618]	<p>31.28 km S from brine outfall discharge point (as the crow flies);</p> <p>65km S via open water (closest seal swimming distance near coast)</p>	<ul style="list-style-type: none"> • Coastal lagoons • Large shallow inlets and bays • Annual vegetation of drift lines • Atlantic salt meadows • Mudflats and sandflats not covered by seawater at low tide • Perennial vegetation of stony banks • Common seal • Reefs - <i>Salicornia</i> and other annuals colonising mud and sand 	<p>To maintain (or restore where appropriate) the:</p> <ul style="list-style-type: none"> • Large shallow inlet and bay • Coastal lagoons • Mudflats and sandflats not covered by sea water at low tide • Reefs • Annual vegetation of drift lines • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) • Perennial vegetation of stony banks • <i>Salicornia</i> and other annuals colonising mud and sand • Harbour (Common) Seal <i>Phoca vitulina</i> <p>- to favourable condition.</p>
Strangford Lough SPA [UK9020111]	<p>31.28 km S from brine outfall discharge point (as the crow flies);</p> <p>65km S via open water (closest seal swimming distance near coast)</p>	<ul style="list-style-type: none"> • Sandwich Tern • Common Tern • Arctic Tern • Golden Plover • Bar-tailed Godwit • Light-bellied Brent Goose • Shelduck • Knot • Redshank • Great Crested Grebe • Cormorant • Greylag Goose • Wigeon 	<ul style="list-style-type: none"> - To maintain or enhance the population of the qualifying species; - To maintain or enhance the range of habitats utilised by the qualifying species - To ensure that the integrity of the site is maintained; - To ensure there is no significant disturbance of the species and - To ensure that the following are maintained in the long term: <ul style="list-style-type: none"> - Population of the species as a viable component of the site - Distribution of the species within site - Distribution and extent of habitats supporting the species <p>Structure, function and supporting processes of habitats supporting the species</p>

European site	Distance from site	Selection feature	Conservation objectives
		<ul style="list-style-type: none"> • Gadwall • Teal • Mallard • Pintail • Shoveler • Goldeneye • Red-breasted Merganser • Coot • Oystercatcher • Ringed Plover • Grey Plover • Lapwing • Dunlin • Curlew • Turnstone 	
Copeland Island SPA [UK9020291]	31.28 km S (as the crow flies across open water) from the brine outfall discharge point.	<ul style="list-style-type: none"> • <i>Arctic tern (Sterna paradisaea)</i> breeding population • <i>Manx Shearwater (Puffinus puffinus)</i> breeding population <p><i>Non-qualifying species of interest</i></p> <ul style="list-style-type: none"> • <i>Eider (Somateria mollissima)</i> breeding population • <i>Common Gull (Larus canus)</i> breeding population 	<p>To maintain each feature in favourable condition according to the following feature objectives:</p> <ul style="list-style-type: none"> • To maintain or enhance the population of the qualifying species; • To maintain or enhance the range of habitats utilised by the qualifying species; • To ensure that the integrity of the site is maintained; • To ensure there is no significant disturbance of the species; and <p>To ensure that the following are maintained in the long term:</p> <ul style="list-style-type: none"> • Population of the species as a viable component of the site; • Distribution of the species within site; • Distribution and extent of habitats supporting the species; <p>Structure, function and supporting processes of habitats supporting the species.</p> <p>For Manx shearwater component objectives include:</p> <ul style="list-style-type: none"> • To ensure no significant decrease in population against national trends;

European site	Distance from site	Selection feature	Conservation objectives
			<ul style="list-style-type: none"> To ensure fledging success is sufficient to maintain or enhance the population. <p>For Arctic tern component objectives include:</p> <ul style="list-style-type: none"> To ensure no significant decrease in population against national trends; To ensure fledging success is sufficient to maintain or enhance the population. <p>For habitat extent the following component objectives are listed:</p> <ul style="list-style-type: none"> To maintain or enhance the area of natural or semi-natural habitats used or potentially used by feature bird species, (breeding areas: 201.2ha) subject to natural processes. Maintain the extent of main habitat components subject to natural processes
Ailsa Craig SPA [UK9003091]	56.89 km NE (as the crow flies) from the brine discharge outfall point.	<ul style="list-style-type: none"> Gannet (<i>Morus bassanus</i>), breeding population Guillemot (<i>Uria aalge</i>), breeding population Herring Gull (<i>Larus argentatus</i>), breeding population Kittiwake (<i>Rissa tridactyla</i>), breeding population Lesser black-backed gull (<i>Larus fuscus</i>), breeding population <p>Seabird assemblage, breeding</p>	<ul style="list-style-type: none"> To avoid deterioration of the habitats of the qualifying species (listed left) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species that the following are maintained in the long term: <ul style="list-style-type: none"> Population of the species as a viable component of the site Distribution of the species within site Distribution and extent of habitats supporting the species Structure, function and supporting processes of habitats supporting the species No significant disturbance of the species
Skerries and Causeway SAC [UK0030383]	<p>64.12km NW from the brine outfall discharge point (as the crow flies);</p> <p>70 km NW via open water (closest porpoise swimming distance near coast)</p>	<ul style="list-style-type: none"> Sandbanks which are slightly covered by sea water all the time Reefs Submerged or partially submerged sea caves Harbour porpoise 	<p>To maintain (or restore where appropriate) the:</p> <ul style="list-style-type: none"> Reefs Sandbanks which are slightly covered by sea water all the time, and Submerged and partially submerged sea caves Harbour porpoise (<i>Phocoena phocoena</i>) to favourable condition.

European site	Distance from site	Selection feature	Conservation objectives
Treshnish Isles SAC [UK0030289]	95 km N from the brine outfall discharge point (as the crow flies) across open water	<ul style="list-style-type: none"> - Reefs - Grey seal 	<p>To avoid deterioration of the qualifying habitat (reefs) thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and</p> <p>To ensure for the qualifying habitat that the following are maintained in the long term:</p> <ul style="list-style-type: none"> • Extent of the habitat on site • Distribution of the habitat within site • Structure and function of the habitat • Processes supporting the habitat • Distribution of typical species of the habitat • Viability of typical species as components of the habitat • No significant disturbance of typical species of the habitat <p>To avoid deterioration of the habitats of the qualifying species (grey seal) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and</p> <p>To ensure for the qualifying species that the following are maintained in the long term:</p> <ul style="list-style-type: none"> • Population of the species as a viable component of the site • Distribution of the species within site • Distribution and extent of habitats supporting the species • Structure, function and supporting processes of habitats supporting the species • No significant disturbance of the species

Given the nature of the proposals, which principally involve works affecting the marine environment with little potential for wider scale impacts upon terrestrial sites which do not lie within the vicinity of the IGSF site and are not connected to the site of the proposed development by a downstream hydrological connection, it is considered that there is no possibility of the proposed project giving rise to a likely significant effect upon qualifying features of sites further away from and not hydrologically connected to the IGSF site. As such, the Antrim Hills SPA, which lies 10km from the IGSF site, is discounted from further consideration within this assessment.

As shown in Table 1, Strangford Lough SAC is designated for its population of common seal. Whilst the distance between the IGSF site and Strangford Lough SAC is within the 50km radius considered as part of this screening process, this is a straight-line distance (as the crow flies) which largely comprises intervening terrestrial lands. The swimming distance (open water) between the site and Strangford Lough SAC is more than 65km. As this distance is greater than the 50km foraging distance for common seal, as set out by SMRU, the possibility of likely significant effects on the common seal population of Strangford Lough SAC is therefore discounted from further consideration as part of this screening appraisal.

Ailsa Craig SPA, Belfast Lough SPA, Belfast Lough Open Water SPA, Belfast Lough Ramsar Site, Copeland Islands SPA, Outer Ards SPA and Strangford Lough SPA all have ornithological feature species with foraging ranges which could potentially overlap with the IGSF site. During the early autumn, Brent geese migrating to Strangford Lough are known to travel down the East Antrim coast, usually over the sea. The majority use the outer Islandmagee coast but some flocks cut through Larne Lough (S Foster unpublished dissertation). Late August, September and October would be period that applies. I don't think the conclusion should change but there would a project link here to Strangford Lough.

Whilst it is acknowledged that individuals from the breeding populations of these sites could be present within the area of the proposed development; the spatially limited effects of the brine plume, distance from the IGSF and its outfall to the designated sites, the extensive foraging areas of feature species and the low number of seabirds recorded foraging within the IGSF site would indicate that there is not likely to be a significant effect upon the populations of feature species of Ailsa Craig SPA, Belfast Lough SPA, Belfast Lough Open Water SPA, Belfast Lough Ramsar Site, Copeland Islands SPA, Outer Ards SPA or Strangford Lough SPA as a result of the proposed project. As such these are discounted from any further assessment within this screening appraisal.

Whilst it is acknowledged that individual harbour porpoises from the Skerries and Causeway SAC population may be present within the area of the proposed development, this SAC lies over 70 km from the IGSF site via open water (swimming distance). Similarly, while individual grey seals from the Treshnish Isles SAC population have potential to be present within the area of proposed development, the designated site is over 95 km from the IGSF site via open water. As such while individuals originating from populations of highly mobile Annex II species, such as harbour porpoise or grey seal may be periodically present within the IGSF site and thus have potential to be affected by the proposed development, it is extremely unlikely that the habitats that could be affected by the proposed development represent those which are essential to the favourable maintenance of the populations of these species as supported within their respective SAC

boundaries and furthermore any short term disturbance effects are likely to lead to insignificant and temporary displacement during the construction phase.

As these species are known to forage for food across an extensive area it is considered that the proposals do not have potential to give rise to a likely significant effect upon the populations of Annex II species associated with either the Skerries and Causeway SAC or the Treshnish Isles SAC as such these are discounted from any further assessment within this appraisal.

The proposed development will not have a likely significantly affect these European sites.

4.3 Construction Phase

4.3.1 Collision Risk

4.3.1.1 Larne Lough SPA and Strangford Lough SPA

The use of tall machinery and plant associated with the construction and operational phases of the proposed development, including a drill rig and cranes, in addition to the installation of a permanent 40m high vent stack have potential to result in significant effects upon Light-bellied Brent Geese populations associated with Larne Lough SPA and Strangford Lough SPA, which is known to pass through Larne Lough en-route to Strangford during early autumn migration.

The potential for significant construction phase effects associated with bird collision to arise is considered to be minimal due, in part to the temporary nature of the construction phase which will involve the use of a drill rig and cranes for a period of 36 months, in addition to the small Brent Goose populations recorded in the locality of the scheme (WeBS Peak Count 26; RPS Peak count 6). As noted in RPS (2010), Brent Geese are significantly less abundant in the outer Lough (within the scheme area) compared to the inner Lough (where intertidal mudflats are located). However, it is acknowledged that, due to the requirement for the species to engage in long distance foraging and migration, a low risk of collision to a small number of individual's remains during construction phase due to the use of a drill rig and cranes.

The installation of a 40m vent stack has potential to increase the risk of bird collisions on a permanent basis again however it is considered that the nature of this structure, in addition to its location with a part of the SPA which is not heavily utilized by the species, will not give rise to an increased risk of collision by Light-bellied Brent Geese.

While in general it is considered that the risk of a LSE arising as a result of collisions associated with the proposed development is low, a *de minimis* threshold for such effects cannot be readily determined and as such, in the absence of mitigation LSE's cannot be ruled out. **Such effects are therefore assessed further with the Stage Two Appropriate Assessment.**

4.3.1.2 North Channel SAC and The Maidens SAC

Potential collisions between support vessels and feature marine mammal species, harbour porpoise and grey seal are possible, during the construction and operational phase, given their known presence in the area and the nature of the proposals. Therefore, in the absence of mitigation, LSE's cannot be ruled out. **Such effects are therefore further assessed within the Stage Two Appropriate Assessment.**

4.3.1.3 Proposed East Coast (Northern Ireland) Marine SPA

The use of tall machinery and plant in associated with the construction and operational phases of the proposed development, including a drill rig and cranes, in addition to the installation of a permanent 40m high vent stack have potential to result in significant effects upon wintering and breeding bird populations associated with this pSPA.

The potential for significant construction phase effects associated with bird collision to arise is considered to be minimal due, in part to the temporary nature of the construction phase which will involve the use of a drill rig and cranes for a period of 36 months only, in addition to the location of the proposed works, which will be undertaken within Larne Lough and as such will have little potential to result in significant effects upon truly marine species such as Manx shearwater *Puffinus puffinus*. However it is acknowledged that, there remains potential for collision associated with other qualifying species during the construction phase.

The installation of a 40m vent stack has potential to increase the risk of bird collisions on a permanent basis again however it is considered that the nature of this structure, in addition to its location within the SPA, will not give rise to an increased risk of collision by bird species utilizing the SPA.

While in general it is considered that the risk of a LSE arising as a result of collisions associated with the proposed development is low, a *de minimis* threshold for such effects cannot be readily determined and as such, in the absence of mitigation LSE's cannot be ruled out.

Such effects are therefore assessed further with the Stage Two Appropriate Assessment.

4.3.2 Direct Habitat Loss

The seawater intake and brine outfall construction footprint will result in the permanent loss of approximately 126m² of benthic habitat within the northern extent of the North Channel SAC and East Coast (NI) Marine pSPA (based on brine outfall pipe and seawater intake construction dimensions). Neither site is designated for the presence of Annex I habitat features.

The seabed in this area consists of coarser gravels and sands, and this is reflected in the fauna identified in the area. The dominant fauna present in this group include the barnacle *Balanus creanatus* which encrusts on pebbles and larger substrate components, polychaetes *Sabellaria spinulosa*, *Lepidonotus squamatus* and *Lumbrineris aniara* agg., the mollusc *Modiolula phaseolina*, the sipunculid *Nephasoma*

(*Nephasoma*) *minutum*, and the tunicates *Dendrodoa grossularia* and *Ascidacea* spp. Also present in the group are the echinoderms *Amphipholis squamata*.

4.3.2.1 North Channel SAC

The North Channel SAC is solely designated for harbour porpoise and is identified as an important winter area for this species. The SAC site supports an estimated 1.2% of the Celtic and Irish Seas Management Unit (MU) population (DAERA and JNCC, 2017) and covers large marine area of approximately 1,600 km².

Three MUs are appropriate for harbour porpoise. The MUs are defined as:

1. North Sea (NS) (comprising ICES area IV, VIId and part of Division IIIa [Skagerrak and northern Kattegat]). Noting that the northern and western boundary with Division VIa is arbitrary (but the shelf is relatively narrow here) and that there will be an interchange of animals here with the 'West Scotland' MU. The eastern boundary has been defined by the ASCOBANS North Sea Conservation Plan for the species. The northern peak of the EEZ is to be treated as part of the NS MU and has been included in abundance estimates (see below).
2. West Scotland (WS) (comprising ICES area VIa and b). Noting that the boundary with the North Sea MU is arbitrary and that there will be an interchange of animals here and also with the Irish Sea and Celtic Sea MUs. It should also be noted that harbour porpoise are generally rare in waters >200m depth.
3. Celtic and Irish Seas (CIS) (comprising ICES area VI and VII, except VIId).

Often associated with near-shore headlands and strong tidal currents, porpoise are commonly observed within shallow bays, estuaries and narrow tidal channels (O'Brien, 2016; Pierpoint, 2008; Baines and Earl, 1999). Inshore waters may be important as nursery habitats during summer months. Harbour porpoise need to feed frequently in order to maintain their body temperature and other energy needs. For this reason, porpoise may be highly susceptible to changes in the abundance of prey species or disturbance from foraging areas. Harbour porpoise exhibit diet flexibility, but mainly feed on small shoaling species from demersal or pelagic habitats, including fish, cephalopods and crustaceans (Santos and Pierce, 2003; Aarfjord, 1995).

During marine mammal surveys conducted between 1992 and 2019, 584 confirmed sightings of harbour porpoise were recorded within the study area:

- 101 of those sightings were of individual animals
- 156 sightings were of two animals, and
- the remaining group sightings (416 sightings) ranged from 3 to 70 individuals.

For further information on this, please refer to Appendix C: Marine Mammal Survey Data in the Marine Update Environmental Conditions Report. The majority of sightings occurred within 4 km of the shore, or around the Maidens rocks area. High concentrations of sightings also occurred around Islandmagee, Ballystrudder and Whitehead.

The total harbour porpoise abundance for Block E of the SCANS III abundance estimates covering the study area was calculated as 8,320 (95% Confidence Interval (CI) = 4,643 – 14,354) (Hammond, 2017). The IAMMWG has identified three Management Units (MU) as appropriate for harbour porpoise, of which the study area falls within the Celtic and Irish Seas (CIS) MU which extends from the north west coast of France, to the north west coast of the Republic of Ireland and east from the South west coast of Scotland, including the entirety of Irish waters (see Figure 8-5). The total harbour porpoise abundance for the CIS MU was estimated as 104,695 animals (95% Confidence Interval (CI) = 56,774 to 193,065) (IAMMWG, 2015).

The conservation objectives of the North Channel SAC state that the supporting habitats and processes relevant to harbour porpoises and their prey are to be maintained.

As mentioned above, harbour porpoise are known to forage off Islandmagee, however the species are highly mobile with a wide foraging range and an ability to feed on a range of prey sources as such it is considered unlikely that the area of benthic habitat to be lost (approximately 0.0079% of the SAC) as a result of the proposed development is of significant value for foraging individuals of the species, in the context of the available habitat in the wider area. As such, the area of seabed to be removed to accommodate the construction footprint of the proposed development within this European site is negligible and therefore it is considered that no LSE will arise to this site as a result of habitat loss associated with the proposed development.

After decommissioning, there is potential for the pipeline structure and associated concrete protection mattresses to benefit marine life generally by acting as an artificial reef structure, but there will be no direct benefit for the qualifying species of the SAC.

4.3.2.2 Proposed East Coast Marine SPA

The proposed East Coast (NI) Marine SPA is designated for its populations of seabirds and water birds. These bird species are not known to significantly rely on benthic habitat for foraging, and instead largely feed on fish species which are present within the water column and are not therefore reliant on an uninterrupted expanse of seafloor habitat within their wintering range or breeding territories.

It is also noted that the proposed SPA is to cover an area of some 96,668 ha and within the context of this large area, seabed losses associated with the proposals are deemed unlikely to be significant in light of the conservation objectives for the site as all qualifying species are highly mobile, in the case of wintering bird

populations and foraging breeding birds. In terms of breeding birds, all nesting habitat comprise terrestrial habitat on islands within the pSPA.

The area of seabed which will be removed to accommodate the construction footprint of the proposed development within these European sites (approximately 0.013% of SPA) is negligible and as such the permanent loss of 126m² of benthic habitat will not result in likely significant effects.

After decommissioning, there is potential for the concrete protection mattresses to benefit marine life by acting as an artificial reef structure, but there will be no direct benefit for the qualifying species of the pSPA.

4.3.3 Disturbance and Displacement

4.3.3.1 Aerial Noise and Visual Disturbance

4.3.3.1.1 Larne Lough SPA and East Coast (NI) Marine pSPA

The project boundary lies within East Coast (NI) Marine pSPA at the location of the intake and discharge pipes. Larne Lough SPA (and the subsumed Swan Island SPA) is the next closest designated site to the well pad (being 39m away from the well pad). All construction on land will be completed within the first four years.

Breeding Sandwich Tern, Roseate Tern, Common Tern and over-wintering Light-bellied Brent Goose are the feature species of Larne Lough SPA. Swan Island, a small island (previously an SPA in its own right) within Larne Lough SPA is notable for supporting nationally important breeding populations of Roseate Tern, Sandwich Tern, and Common Tern. The feature species of the East Coast (NI) Marine pSPA are breeding populations of Manx Shearwater, Sandwich Tern, Arctic Tern, Roseate Tern and Common Tern and over-wintering populations of Red Throated Diver, Eider, and Great Crested Grebe.

Given the distance between the site of the proposed development and the breeding locations of the feature species for the designated sites (1.25km at the closest point), there is no possibility of significant effects upon achieving the conservation objectives of these European sites designated for their breeding seabirds, as a consequence of disturbance and displacement caused by the proposed development.

As documented in earlier reports associated with draft Marine Licence ML 28-12 and associated Planning Permission F/2010/0092/F, recorded data have shown that the shorelines adjacent to the site are not utilised by significant numbers of wintering waterfowl including light-bellied Brent geese. It is considered therefore that populations of wintering birds, including Brent goose are unlikely to be subject to significant levels of disturbance associated with the construction phase of the proposed development. There is therefore no possibility of likely significant effects upon these European sites designated for their breeding and wintering birds, as a consequence of disturbance caused by the proposed development.

4.3.3.2 The Maidens SAC

The Maidens SAC is located 1.01km from the intake pipeline and 1.71 km from the discharge pipeline on the east coast of Islandmagee. Grey seals are a secondary qualifying feature of The Maidens SAC. The coast of the UK supports 38% of the World's grey seal population (SCOS, 2017). Seals are highly mobile and feed mainly at the benthos in shelf seas (Thompson, 2012; Chen *et al.*, 2016). Compared with other times of the year, grey seal in the UK spend longer hauled out during their annual moult (between December and April) and during their breeding season (between August and December) (SCOS, 2017).

They are generalist feeders, foraging mainly on the sea bed at depths of up to 100 m although they are probably capable of feeding at all the depths found across the UK continental shelf. They take a wide variety of prey including sandeels, gadoids (cod, whiting, haddock, ling), and flatfish (plaice, sole, flounder, dab). Amongst these, sandeels are typically the predominant prey species. Diet varies seasonally and from region to region. Food requirements depend on the size of the seal and fat content (oiliness) of the prey, but an average consumption estimate of an adult is 4 to 7 kg per seal per day depending on the prey species.

During surveys conducted between 2000 and 2018, 50 sightings of grey seal were identified within the study area. All sightings within the study area occurred during July and August, when grey seal were sighted at the Maidens rocks (8 km from the project). No sightings occurred during winter and spring months when grey seals would likely be hauled out during moulting and breeding seasons. This data implies that the study area is not an important breeding area for grey seals.

Aerial surveys carried out by DAERA/SMRU in August of 2018 (Morris and Duck, 2019) (and previously in 2011 and 2002) confirm that the Maidens Rocks and the southern end of Larne Lough (9 km from the project) are used by grey seals for hauling out (see Figure 8-6).

The Maidens SAC is 1km from the nearest construction operation, however, known grey seal haul-out sites are approximately 7-10km away, outside the zone of influence, and therefore there is no possibility of significant impacts on Grey seal via construction related aerial noise or visual disturbance.

4.3.3.3 Underwater Noise

The underwater noise impacts arising in the construction and operation of the seawater intake and the brine outfall will be associated with seabed and sub-sea construction which generate non-impulsive noise. No blasting or pile driving (activities which give rise to impulsive noise) are planned.

The main source of noise during the construction phase will come from the construction of the seawater intake and the brine outfall pipes on the seabed. The construction of these assets requires the use of heavy machinery. Tunnelling, excavation and directional drilling on/below the seabed will represent worst-case noise events during construction. Any other construction activities will be of short duration and have a lower impact in terms of underwater noise.

The construction of the seawater intake and brine outfall pipes will be undertaken over an estimated 6-month period. The nature of the construction activities (i.e. tunnelling, excavation and directional drilling

on/below the seabed) indicates that the type of noise generated will be non-impulsive noise. The noise will be confined to a geographically-small area i.e. the immediate vicinity of the construction activities. The propagation of construction noise in the water was estimated using a noise model, the results of which were used to estimate the likelihood of significant effects on nearby marine mammals. Drilling and tunnelling are only part of the construction activity associated with the intake and outfall and will operate at full noise output for less than half of the overall construction time (3 months).

Tunnel boring machines with rotating cutter heads produces low frequency sounds (below 1000 Hz). Maximum energy tends to occur around 10 Hz with diminishing energy at increasing frequencies (Richardson et al., 1995). Underwater noise from the micro tunnel boring machine will be located below the seabed and not contribute significantly to underwater noise levels. RPS has data from a 600mm HDD project which when scaled up to 1.5m indicates a peak level of 130 dB re 1 μ Pa and 111 dB re 1 μ Pa²s SEL at the seabed, which is in the range of background noise levels and lower than noise levels from the ferries entering and leaving Larne.

Table 2 outlines the various construction tasks associated with potential underwater noise effects. The worst-case underwater noise emission will be when the reception pit is being excavated. There is limited data on underwater noise from mechanical excavating operations. Reine *et al* (2014) provide a source level for rock excavation at 164.2 to 179.4 dB re 1 μ Pa @ 1m. For the purpose of the seawater intake we have used the higher of these levels in the RPS noise model. The excavation of the pit and recovery of the tunnel boring machine are estimated to take 18 days and worst-case noise levels will be limited to a fraction of this time.

Table 2: Construction Tasks with Potential Underwater Noise Impacts

Construction Activity	Extent/Duration	RMS Noise Levels dB re: 1μPa @ 1m (unweighted)
Construction of gas storage caverns (pumps based on land)	7 caverns over a period of 4years	No significant noise
Construction of seawater intake (Micro-tunnel boring and excavation)	6 months	179 (excavator ripping rock)
Construction of brine outfall (Horizontal Directional Drilling)	6 months	120 (HDD at seabed)
Operation phase (small vessel traffic for site inspections and sampling)	Ongoing occasional	150-155

In terms of the potential effects of construction noise, the magnitude of the effect and the sensitivity of the receptors determines the overall impact. Table 3 summarises the sensitivities of marine mammal species with regard to noise thresholds. A permanent threshold shift (PTS) occurs when a permanent auditory injury results in loss of hearing. PTS can result in very significant to profound negative impacts on marine species. A temporary threshold shift (TTS) describes a temporary but recoverable loss of hearing due to exposure to high energy sounds for a short duration or lower energy sounds for a longer duration. The impact of TTS

is significant but recoverable. Determining the likelihood of noise sensitive species being exposed to such noise levels helps to categorise the significance of effects on each species. The international guidance on underwater noise threshold levels for marine mammals is published in Southall *et al* (2019) and provides (inter alia) the following thresholds:

Table 3: TTS- and PTS-onset thresholds for marine mammals exposed to non-impulsive noise

Marine mammal hearing group	TTS onset: SEL (weighted) dB re 1 $\mu\text{Pa}^2\text{s}$	PTS onset: SEL (weighted) dB re 1 $\mu\text{Pa}^2\text{s}$
Low Frequency Cetaceans (baleen whales)	179	199
High Frequency Cetaceans (most dolphin species)	178	198
Very High Frequency Cetaceans (Harbour Porpoise)	153	173
Phocid Carnivores (seal species)	181	201
Other Carnivores (otters)	199	219

Marine Mammal Auditory Injury

Drilling is considered a continuous, non-impulsive noise source and according to NMFS (2018) the onset of auditory injury in marine mammals, defined as a Permanent Threshold Shift (PTS) occurs at different received noise levels, dependent on the hearing ability of the marine mammals.

As shown in Table 2 (above) in the worst-case scenario, the underwater noise generated during the construction of the seawater intake does not have the potential to exceed the PTS or TTS threshold limit for grey seals (see Table 3), and therefore it is not anticipated that the construction related underwater noise will cause any auditory injury to grey seals. However, the construction related underwater noise does have the potential to exceed the harbour porpoise TTS threshold limit and slightly exceed the PTS threshold limit (see Table 3), and therefore, could potentially cause auditory injury.

Marine Mammal Disturbance

Behavioural responses to noise are highly variable and are dependent on a variety of animal dependent and environmental factors. Animal dependent factors include past experience, individual hearing sensitivity, activity patterns, motivational and behavioural state at the time of exposure. Demographic factors such as age, sex and presence of dependent offspring can also have an influence. Environmental factors include the habitat characteristics, presence of food, predators, proximity to shoreline or other features. Influenced by these factors, responses can be highly variable, from small changes in behaviour such as longer intervals between surfacing (Richardson, 1995a) or a cessation in vocalisation (Watkins, 1986) to more dramatic escape responses (Götz and Janik, 2016). This variability makes it extremely difficult to predict the likelihood of responses to underwater noise from drilling. Even where empirical data exist on responses

of animals in one particular environment, the context related variability makes it difficult to extrapolate from one study to a new situation.

Marine mammals, particularly cetaceans, are capable of detecting and generating sound (Au *et al.*, 1974; Bailey *et al.*, 2010) and are dependent on sound for many aspects of their lives, i.e. prey-identification; predator avoidance; communication and navigation. Increases in anthropogenic noise may consequently pose a risk within the marine environment (Parsons *et al.*, 2008; Bailey *et al.*, 2010).

It is now recognised that some of the more ubiquitous noise sources, such as ships, can either individually or cumulatively mask communication signals of, and pose a threat to marine mammals (Clark *et al.*, 2009; Ellison *et al.*, 2011; Chen *et al.*, 2017; Simpson *et al.*, 2016, Rolland *et al.*, 2012). The overall increase in oceanic background noise can alter acoustic habitats over large regions in ways which may be detrimental to marine animals that rely on sound for basic life functions (Ellison *et al.*, 2011). It is also now emerging that non-injurious effects can accumulate at the population level (Williams *et al.*, 2015).

Little information is available on likely responses of marine mammals to drilling noise. More information however is available on responses to vessel noise, which may be used as a proxy. The likely behavioural response of marine mammals to continuous non-impulsive noise is avoidance, however some species are known to be attracted to vessel noise (as likely however to be in response to vessel movement as to noise output). Harbour porpoise are particularly sensitive to high frequency noise and are more likely to avoid vessels (Heinanen and Skov, 2015). Other behavioural responses to continuous noise include increased swimming speed, avoidance, increased group cohesion and longer dive duration (Miller *et al.*, 2008). Sensitivity to vessel noise is most likely related to the marine mammal activity at the time of disturbance (ICW, 2006, Senior *et al.*, 2008). For example, resting dolphins are likely to avoid vessels, foraging dolphins will ignore them and socialising dolphins may approach vessels (Richardson *et al.*, 1995).

Harbour porpoise are small cetaceans which makes them vulnerable to heat loss and requires them to maintain a relatively high metabolic rate. This makes them potentially vulnerable to disturbance if they are unable to obtain sufficient levels of prey intake.

The worst-case underwater noise emissions will occur when the reception pit is being excavated which is expected to occur over a short period of time, approximately 18 days therefore any disturbance is likely to be temporary, and harbour porpoise have wide ranges and alternative foraging habitat available to them. However, although this would be a temporary, recoverable impact, this would still be considered disturbance by means of temporary exclusion from a portion of their habitat within the SAC. Likely significant effects (LSEs) cannot be excluded in the absence of mitigation.

Unlike cetaceans, seals store energy in a thick layer of blubber, which means that they are more tolerant of periods of fasting when hauled out and resting between foraging trips, and when hauled out during the breeding and moulting periods. Therefore, they are unlikely to be particularly sensitive to short-term displacement from foraging grounds during periods of noise activity. Juvenile seals may be more sensitive

to displacement from foraging grounds due to a smaller body size and higher energetic needs. Unlike for harbour porpoise, the underwater noise generated during the construction of the seawater intake (Micro-tunnel boring and excavation) does not have the potential to exceed the TTS Threshold Limit (see Table 3) for grey seal. On this basis, it is not anticipated that the underwater noise generated during construction will cause any likely significant effects upon grey seal, a feature species of The Maidens SAC.

As a result of the potential for underwater noise impacts, in the absence of mitigation, there is a possibility of significant effects upon achieving the conservation objectives of The North Channel SAC, designated for Harbour Porpoise, as a consequence of disturbance and displacement resulting from underwater noise caused by the proposed development.

Therefore, it is necessary for these possible effects to be assessed further within the Stage Two Appropriate Assessment.

4.3.4 Water Quality and Habitat Deterioration

4.3.4.1 Pollution

The well pad is located adjacent to Larne Lough SPA. The discharge point is located within East Coast (NI) Marine pSPA and North Channel SAC.

At construction stage there is a possibility of suspended sediments/or contaminants escaping into Larne Lough SPA, East Coast (NI) Marine pSPA and North Channel SAC which could have an impact on maintaining the favourable conservation condition of habitats and Annex II species within these designated sites. The potential consequence of worst-case large scale pollution is direct fatalities/injuries to seabirds, pinnipeds and cetaceans or indirect disturbance via pollution-induced food depletion. The possibility of likely significant water quality and habitat deterioration effects cannot be discounted for Larne Lough SPA, East Coast (NI) Marine pSPA or North Channel SAC in the absence of mitigation measures.

Therefore, it is necessary for such effects to be assessed within a Stage Two Appropriate Assessment.

4.3.4.2 Elevated salinity level impacts upon seabird and marine mammal prey species

The brine discharge process will last approximately 4 years and will cease after seven caverns have been formed.

Aquatic organisms that obtain their oxygen from the water (e.g. fish, shellfish) rather than the air are adapted to the normal salinity of their environment, taking saline into their bodies to obtain oxygen. Therefore, any change to ambient salinity has the potential to affect the organism's ability to achieve vital biological processes (Aziz *et al*, 2002). In addition, salinity is a major driver in the control of reproduction,

larval dispersal and recruitment, and therefore has the ability to affect larval stages and plankton (Anger 1991; Anger 1996; Spivak and Cuesta 2009). It is thought that adult stages of all fish species have the ability to tolerate a vast range of salinity alteration and have the ability to move away from high saline conditions. In the case of sessile and sedentary organisms, burrowing or closing shell valves acts as a short term defence mechanism (Smyth, 2011).

The relevant feature species (seabirds) of Larne Lough SPA, proposed East Coast SPA, North Channel SAC (harbour porpoise) and The Maidens SAC (grey seal) feed predominately on mobile marine prey species, in particular fish. Section 4.3.4.2.1 below shows how fish tolerate varying salinity levels.

4.3.4.2.1 Overview of Osmoregulation in Fish

Bony fish (teleosts) are osmoregulators i.e. they control the ionic concentration of their internal body fluids within fairly narrow limits despite a potentially much wider range of external ion concentrations. In full seawater with an osmotic concentration of ~1000mosM/kg adult fish tend to maintain their osmotic concentration around 300-350 mOsmoles, which is equivalent to an external osmotic concentration of estuarine salinity of 11 or 12psu. Larvae on the other hand, while also osmoregulating, tend to be less efficient in general than adults, with wider internal osmotic concentrations depending on their stage of development. Their smaller size and therefore greater surface area to volume ratio is an important reason for this difference. Marine fish are said to be hypo-osmotic regulators in full seawater or outer estuarine conditions, while freshwater fish and those marine fish, which can penetrate into inner estuaries are said to be hyperosmotic regulators because their internal osmotic concentration is higher than that of the external medium.

In the marine environment the tendency will be for salts to diffuse from the external environment into the fish because of the higher external salt concentration and for water to move by osmosis in the other direction across the gills (in particular) or the skin. To counteract this marine fish (adults as well as larvae) drink water to replace lost water and also actively excrete salts that have come in via diffusion, in drinking and in food. The main site of salt excretion in the adult is via the gills and to a lesser extent the kidneys and the gut. The specific cells involved, ionocytes, in particular MCR's (mitochondrial rich cells) also known as chloride cells, which are present in high concentrations in the gills are adapted for ion excretion. In the larvae, ion-excreting cells tend to be spread around the body and only become concentrated in the gills as these begin to develop. In elasmobranches (sharks, skates and rays), the blood salt content is similar to that of marine teleosts, however the osmotic concentration is much higher, in fact just higher than seawater making them hyperosmotic to seawater. This is achieved mainly by retaining high concentrations of urea (a by-product of protein metabolism) in the blood and to a lesser extent Trimethylamine Oxide an organic compound. This situation means that sharks do not need to drink to maintain water balance because their blood is almost isosmotic with seawater but instead excrete salts, which diffuse in or are ingested with their food. The main site of salt excretion is the rectal gland but the gills and the kidneys are also involved.

Fish, which can penetrate into estuaries and therefore tolerate a range of salinities, are termed euryhaline while marine fish which cannot enter estuaries or are confined to the outer areas are said to be stenohaline. Many of the important commercial species in and around the Irish Sea (cod, herring, sprat, plaice, sole) are euryhaline to some extent. Others such as bass and flounder are strongly euryhaline. Fewer elasmobranchs are euryhaline species, although species such as the common dogfish *Scyliorhinus canicula* are moderately euryhaline. It is true of most euryhaline organisms (animal and plant) that their salinity tolerance tends to be extended at both ends of the salinity spectrum i.e. at upper as well as lower salinities. Osmoregulation, i.e. the mechanism by which fish control their ionic and osmotic balance has to develop at a very early stage, i.e. in the egg embryo and larvae if the species is to survive. Furthermore, salinity is also known to affect the success rate of fertilisation of fish eggs by sperm. These effects are present in all fish but will vary depending on the specific biology of each. For example Baltic herring (*Clupea harengus membras*) and Pacific herring *C. pallasii* have optimum fertilization success at 8psu and 16psu respectively because both either live permanently in conditions of reduced salinity (Baltic herring) or spawn in such areas (Pacific herring). Atlantic herring (*C. harengus*) in contrast has a higher and broader range of salinity over which successful fertilisation takes place (~20-50psu), reflecting the broader range of salinities in which it spawns (Holliday and Blaxter, 1960). It is clear therefore that the optimum salinity for a given species will vary depending on its general biology and even within a given species may vary depending on its stage of development.

Detailed assessment of the osmoregulatory capacity and salinity tolerance of fish species is limited to a fairly small number of species, including euryhaline, anadromous, catadromous and marine species (e.g. flounder, bass, salmon, eel, cod etc.). Moreover, the maximum salinity at which these species are tested is usually full seawater, i.e. anything from 32psu to 35 psu depending on the study, unless specialised species which occur in naturally hypersaline environments are researched. A small number of studies have extended the testing range a bit above normal seawater salinities even when examining species which don't naturally occur in hypersaline environments and these can throw light on how fish may react at the higher salinities predicted around the Islandmagee outfall.

However, the mechanisms that fish use to osmoregulate at 22psu and 34 psu for example, will be the same used to osmoregulate at 36, 37 or 38psu also. Several fish species have been shown to osmoregulate in a wider range of salinities than they would normally encounter in nature, for example yolk-sac larvae of Atlantic herring (*C. harengus*) were seen to osmoregulate in salinities from 11psu to 48psu, while yolk sac larvae of plaice (*Pleuronectes platessa*) osmoregulated in the range 5psu to 65psu with the efficiency of regulation improving in older metamorphosed larvae (Holliday and Blaxter, 1960; Holliday and Jones 1967 quoted in Varsamos *et al.*, (2005).

It is anticipated that sedentary or slower moving invertebrates living on the seabed in the area surrounding the discharge point, which are more spatially restricted, will be adversely impacted upon. Most of these species, do not constitute a significant part of the feature seabird species or feature marine mammal species diet, however, without mitigation (including design mitigation) there is insufficient certainty to

conclude that the elevated salinity levels will not have an adverse impact upon SPA and SAC feature species prey.

In the absence of measures to mitigate for the impacts of increased ambient salinity measures on SPA and SAC feature species prey, there would be uncertainty as whether or not there could be a likely significant impact upon these feature species.

As a result of the potential for adverse impacts upon seabird and marine mammal prey, in the absence of mitigation (including design mitigation), there is a possibility of significant effects upon achieving the conservation objectives of The North Channel SAC, Maidens SAC, Larne Lough SPA and proposed East Coast SPA, as a consequence of brine induced impacts on seabird and marine mammal prey species caused by the proposed development.

Therefore, it is necessary for such effects to be further assessed at Stage Two Appropriate Assessment.

4.3.5 Reception Pit Excavation (sediment plumes)

Seabed disturbance can result increased turbidity and creation of sediment plumes (Todd *et al* 2014). Sediment plumes have the ability to extend the impact of excavation over larger areas that would otherwise remain unaffected physically (Hitchcock and Bell, 2004). Research Impacts of suspended solids on marine mammals has shown that effects are short lived generally, lasting a maximum of four to five tidal cycles (Hitchcock and Bell, 2004), and are confined mainly to an area of a few hundred metres from the point of discharge (Newell *et al.*, 1998; Hitchcock and Bell, 2004).

Any silt plume associated with the creation of the reception pit is expected to have a temporary but a localised impact on the foraging behaviour of the Harbour Porpoises and grey seal due to the reduced visibility in the vicinity of the reception pit. It should be noted that the noise created during the creation of the reception pit in the surrounding water would be likely to induce avoidance behaviour in individuals of this species prior to individuals encountering the discharge plume itself. As discussed above in respect of habitat loss, the area in which excavation activity is to take place is comparatively small when considered in the context of the area of marine waters which support suitable foraging opportunities for the relevant marine mammal species in the wider area, including waters which lie within the SACs themselves.

Porpoises feed mainly on small shoaling fish, such as herring, but may also feed upon prey taken at or close to the seabed. As Harbour Porpoises use a series of high frequency clicks for echo-location during navigation and hunting, they are less susceptible to the impacts of suspended sediment plumes during foraging and are routinely found in inshore areas of high natural turbidity (e.g. southern North Sea, Liverpool Bay in the Irish Sea).

It is considered that temporary increase in suspended sediments will not cause any likely significant effects upon the feature species of The North Channel SAC (harbour porpoise) or The Maidens SAC (grey seal).

4.3.6 Seawater Abstraction

Seawater is to be abstracted from coastal waters within the North Channel SAC and East Coast (NI) Marine pSPA during the construction phase. The seawater abstraction will last approximately 4 years during the leaching phase of the project. Seawater abstraction will cease after caverns are formed. Abstraction is not required beyond the construction phase.

Abstraction may entrain sea life within the intake infrastructure. LSE's due to resource requirements cannot be excluded for the construction phase in the absence of mitigation and **therefore, it is necessary to conduct a Stage Two Appropriate Assessment.**

4.4 Operational Phase

During the creation of the caverns, water pumps will continuously circulate water and brine. These pumps will be housed in a building designed to meet noise standard for a permanent installation, despite the equipment being only for temporary use during construction.

There are no underwater noise impacts due to the operation of the seawater intake. Any noise from pumps located onshore will be significantly attenuated in the connecting pipelines. It is anticipated that the operational noise from the seawater intake will be no greater than baseline levels and below those arising from ferry traffic (for further information refer to Section 6 of the Marine Environmental Conditions Report).

Similarly, there are no projected underwater noise impacts due to the operation of the brine outfall diffuser. Any noise from pumps located onshore will be significantly attenuated in the pipeline and the diffuser. It is anticipated that the operational noise from the brine outfall will be close to baseline levels and below those arising from ferry traffic.

The operational phase of the project will require occasional physical inspections of the underwater pipelines and water quality sampling, including the servicing of monitoring buoys. Shipping traffic arising from these activities will be limited and will not exceed underwater noise levels arising from fishing activities, e.g. trawling or pot hauling.

During the gas operations phase the main noise-emitting sources will be limited to the compressors within the main gas plant site. These will be housed within a building designed to meet noise standards which will not disturb sleep. Given the distance between the site of the proposed development and the breeding locations of the feature bird species of the designated sites (1.25km at the closest point), there is no possibility of significant effects upon achieving the conservation objectives of these European sites designated for their breeding seabirds, as a consequence of disturbance and displacement caused by the proposed development.

As documented in reports associated with the proposed development recorded data have shown that the shorelines adjacent to the site are not utilised by significant numbers of wintering waterfowl including light-bellied Brent geese. It is considered therefore that populations of wintering birds, including Brent goose are unlikely to be subject to significant levels of disturbance associated with the operational phase of the

proposed development. There is therefore no possibility of likely significant effects upon these European sites designated for their breeding and wintering birds, as a consequence of disturbance caused by the proposed development.

4.5 Decommissioning Phase

Upon completion of IGSF cavern creation phase, the drill spread will be de-rigged and demobilised from site. Offshore, upon completion of all works the support vessel will be demobilised to its home port.

At the end of the brine leaching phase, the seawater pumping station will be removed and the subsurface equipment decommissioned in accordance with conditions of the Draft Marine Licence (ML 28-12);

- All materials (excluding rock armouring) shall be removed from the seabed, unless the Licencing Authority decides otherwise based on best practice at the time of decommissioning.
- No materials or waste are deposited on the seabed other than rock armouring. This will remain in situ, being levelled to reduce potential snagging risk as feasible, unless the Licencing Authority decides otherwise based on best practice at the time of decommissioning of the marine structures.
- The pipeline will remain buried.

As with the construction and operational phase, there is no possibility of likely significant effects upon these European sites designated for their breeding and wintering birds, as a consequence of disturbance caused by the proposed development during the decommissioning phase. The physical works required to remove subsurface equipment (and level the rock armouring if decided it is best practice by the Licencing Authority) will require a vessel and machinery. These works will generate temporary underwater noise which has potential to cause disturbance to the feature marine mammal species of the North Channel SAC, Harbour Porpoise. As discussed in Section 4.3.3.3 above, unlike for harbour porpoise, the underwater noise generated during the construction of the seawater intake does not have the potential to exceed the TTS Threshold Limit (see Table 3) for grey seal. On this basis, it is not anticipated that that the underwater noise generated during decommissioning will cause any likely significant affects upon grey seal, a feature species of The Maidens SAC. **Therefore, it is necessary for decommissioning noise effects on the North Channel SAC to be further assessed at Stage Two Appropriate Assessment.**

4.6 Summary of the Screening Appraisal

Having considered the possibility of likely significant effects of the proposed development on the European sites noted in Table 1, the possibility of likely significant effects cannot be excluded for the following European sites:

- Larne Lough SPA
- East Coast (NI) Marine pSPA
- North Channel SAC
- Maidens SAC

4.7 Next Steps

A screening exercise was completed in compliance with the relevant European Commission and national guidelines to determine whether or not LSEs on any European site could be discounted as a result of the construction or operation of the proposed development.

From the findings of the Screening exercise, the possibility of LSEs upon four European sites cannot be discounted in the absence of further evaluation and analysis or the application of mitigation measures. This conclusion was reached without having to consider the proposed development in combination with any other plan or project.

- The possibility of likely significant **Water Quality and Habitat Deterioration** effects cannot be discounted for Larne Lough SPA, East Coast (NI) Marine pSPA, North Channel SAC and Maidens SAC without further evaluation.
- The possibility of likely significant **Underwater Noise and Disturbance** effects cannot be discounted for the North Channel SAC without further evaluation.
- The possibility of likely significant **Sea Water Abstraction** effects cannot be discounted for Larne Lough SPA, East Coast (NI) Marine pSPA, North Channel SAC and Maidens SAC without further evaluation.
- The possibility of likely significant **Collision Impact** effects cannot be discounted for Larne Lough SPA, proposed East Coast (NI) Marine SPA and Maidens SAC without further evaluation.

Having regard to the methodology employed and the findings of the screening stage exercise, it is concluded that an appropriate assessment of the implications of the proposed development on Larne Lough SPA, East Coast (NI) Marine pSPA, North Channel SAC and Maidens SAC is required, in view of their conservation objectives and in combination with any other relevant plans or projects.

The focus of the remainder of this report shall be on the likely significant effects of the proposed development under four impact themes as listed above, that cannot be discounted without further evaluation, and quite likely the application of mitigation measures.

5 STAGE 2 APPRAISAL

This scientific examination and analysis of the implications of the works at Islandmagee considers Likely Significant Effects (LSEs) not previously screened out on four European sites namely Larne Lough SPA, proposed East Coast (NI) Marine pSPA, North Channel SAC and the Maidens SAC, in view of their conservation objectives.

The most up-to-date Conservation Objectives and details in relation to the Qualifying Interests for the four European sites considered are set out in Table 1 of this report.

In assessing the risks at this second (appropriate assessment) stage, further evaluation and analysis must be undertaken to characterise the impacts that may occur, and to apply measures to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects to determine whether or not Adverse Effects on the Integrity of a Site (AEIS) will occur.

The possibility of LSEs upon these four European sites was considered in the screening exercise documented in Section 4 under 4 impact themes:

- Water quality and habitat deterioration (including increased salinity around discharge point on seabird and marine mammal prey species)
- Seawater abstraction
- Collision
- Underwater noise and disturbance

5.1 European Sites Screened In for Further Assessment

5.1.1 Larne Lough SPA

As previously noted in Section 4.2, site specific conservation objectives (published 01/04/2015) for Larne Lough SPA have been used in this sHRA report. The screening for appropriate assessment concluded that LSEs cannot be discounted without further evaluation and analysis as a consequence of:

- Water Quality and Habitat Deterioration (including increased salinity around discharge point on seabird prey species)
- Seawater abstraction prey reduction (See section 5.1.5)
- Collision risk

The conservation objectives for this site are to maintain each feature in favourable condition. This is achieved by meeting the component [Conservation Objectives](#) for each feature -

- To maintain or enhance the population of the qualifying species fledging success sufficient to maintain or enhance population
- To maintain or enhance the range of habitats utilised by the qualifying species

- To ensure that the integrity of the site is maintained;
- To ensure there is no significant disturbance of the species and
- To ensure that the following are maintained in the long term:
 - Population of the species as a viable component of the site
 - Distribution of the species within site
 - Distribution and extent of habitats supporting the species
 - Structure, function and supporting processes of habitats supporting the species.

Achieving these component objectives requires the water quality of the Lough not to deteriorate significantly. Section 11 of Conservation Objectives for the site lists the main threats, pressures and activities impacting on the site or site features. Impacts via disturbance are listed as a threat to the site through recreational and commercial boating activity and recreation pressure generally. Alteration of habitat quality through diminution of water quality is listed as a threat to the site in respect of both inter-tidal habitat, open water and breeding habitat.

Surveys conducted by RPS for this project in 2008-2009; 2011-2012; 2015 and 2019 and the other projects in the Islandmagee area (CAES- November 2011, October 2012, July-December 2013, and May-August 2015) as well as by JNCC, found the area around the discharge point is not an important foraging area for the feature species. In addition, the range over which the species are known to forage for food is extensive, consequently risks from displacement are not considered to represent a major threat to the integrity of the site.

Notwithstanding this, in the absence of mitigation to prevent suspended sediments or contaminants entering Larne Lough SPA, disturbance during construction and the potential for collision related effects, there is insufficient certainty to conclude that the construction or operation of the proposed development will not result in an adverse impact upon the integrity or ecological structure and functioning of Larne Lough SPA. Further analysis of the potential effects must be undertaken, and mitigation prescribed.

As a result of the potential for adverse impacts upon seabird prey, in the absence of mitigation, there is a possibility of significant effects upon achieving the conservation objectives of Larne Lough SPA as a consequence of brine induced impacts and entrainment as a result of the seawater abstraction process on seabird prey species caused by the proposed development.

5.1.2 East Coast (NI) Marine pSPA

The East Coast pSPA will subsume a number of existing Special Protection Areas along the east coast of County Antrim and County Down including Belfast Lough Open Water SPA and Larne Lough SPA. The site boundary will include coastal and near shore waters from Ringfad in the north near Carnlough, County Antrim, the marine area of Larne Lough, the marine area of Belfast Lough, waters around the Copeland Islands, and waters offshore of the Ards Peninsula to Cloghan Head, near Ardglass, County Down in the

south. It will include a diverse range of seabed habitats, from extensive coastal fringing reefs of various types to finer silt in Belfast Lough.

The site boundary adjoins or will subsume five sites already designated as SPAs along the east coast of Northern Ireland. These sites are Larne Lough SPA (Site Code UK9020042), Belfast Lough SPA (Site Code UK9020101), Outer Ards SPA (Site Code UK9020271), Copeland Islands SPA (Site Code UK9020291), and Strangford Lough SPA (Site Code UK9020111). These SPAs have been designated as they provide habitat for significant populations of regularly occurring bird species as recognised in European legislation.

The proposed East Coast (Northern Ireland) Marine SPA recognises the contribution made by this wider coastal and marine area to meet the foraging requirements of breeding Terns in adjoining colonies, in the areas already designated as SPAs, for Manx Shearwater, which breed on the Copeland Islands, but use a much larger marine area around the islands for their 'rafting' requirements, and for a significant non-breeding population of Red-throated Diver on Belfast Lough together with non-breeding populations of Great Crested Grebe and Eider Duck.

The conservation objectives for this site are to maintain each feature in favourable condition. This is achieved by meeting the component [Conservation Objectives](#) for each feature:

- To maintain or enhance the population of the qualifying species
- To maintain or enhance the range of habitats utilised by the qualifying species
- To ensure that the integrity of the site is maintained;
- To ensure there is no significant disturbance of the species and
- To ensure that the following are maintained in the long term:
 - Population of the species as a viable component of the site
 - Distribution of the species within site
 - Distribution and extent of habitats supporting the species
 - Structure, function and supporting processes of habitats supporting the species

Achieving these component objectives requires the water quality of the Lough not to deteriorate significantly. Section 11 of Conservation Objectives lists the main threats, pressures and activities impacting on the site or site features. Listed impacts include disturbance through shipping in addition to alteration of habitat quality through diminution of water quality.

In the absence of mitigation to prevent suspended sediments or contaminants entering Larne Lough and the North Channel or the potential for collisions during the construction or operational phases, there is insufficient certainty to conclude that the construction of the proposed development would not result in an adverse impact upon the integrity or ecological structure and functioning of the East Coast pSPA. Mitigation must be prescribed.

5.1.3 North Channel SAC

The conservation objectives for this site are to ensure for harbour porpoise that, subject to natural change, the following attributes are maintained or restored in the long term:

- The species is a viable component of the site.
- There is no significant disturbance of the species.
- The supporting habitats and processes relevant to harbour porpoises and their prey are maintained.

Activities which harbour porpoise are considered sensitive within the North Channel SAC are listed in section 6, table 2 of the [Conservation Objectives](#). Sensitive activities listed on the list which relevant to the IMGSP are; Discharge/run-off from landfill, terrestrial/offshore industries, and shipping and Oil/Gas drilling.

In the absence of further analysis or mitigation to prevent suspended sediments or contaminants entering the North Channel, pollution may cause a decrease in prey availability as a result of increased salinity arising through release of highly saline water. Also, as a result of underwater noise disturbance caused by the construction and decommissioning phase, there is insufficient certainty to conclude that the construction of the proposed development would not result in an adverse impact upon the integrity or ecological structure and functioning of the North Channel SAC.

5.1.4 The Maidens SAC

The Maidens SAC comprises a group of rocky reefs to the north-east of Larne and include two reefs large enough to be classed as islands, West Maiden and East Maiden, in addition to four further smaller reefs. The primary qualifying feature of the site is the supported Annex I reef habitat, with a further qualifying feature being the supported extent of the Annex I habitat sandbanks which are slightly covered by sea water all the time, however of relevance to this assessment is the qualifying population of grey seal, for which the site is used for both pupping and breeding.

The conservation objectives for the site are to maintain (or restore where appropriate) the qualifying features to favourable condition.

This includes the need to:

- maintain and enhance the extent of the Annex I habitats;
- allow the natural processes which determine the development, structure, function and distribution of the Annex I habitats to operate appropriately;
- maintain and enhance, as appropriate, the viability, distribution and diversity of typical species within the Annex I habitat;
- maintain (and if feasible enhance) the population and distribution of grey seal; and
- maintain and enhance, as appropriate, physical features of value for grey seal within the site.

Within the threats, pressures and activities likely to adversely impact upon the SAC, as identified within the conservation objectives, disturbance is listed in respect of marine traffic, scientific research, geological surveys and military exercises (including underwater noise) and wildlife watching trips.

In the absence of further analysis, or the application of mitigation measures, it is considered that the proposed development has some potential to result in a negative impact upon the supported population of grey seals which utilise this SAC through the potential disturbance of the species via collision risk associated with vessel movements during the construction phase, sedimentation of the water column during proposed reception pit excavation works and the affects upon available prey species as a result of the release of brine during the construction phase.

5.2 Underwater Noise Disturbance

The construction of the seawater intake/brine outfall will last for approximately 6 months, however, as previously stated the worst-case underwater noise emission will occur when the reception pit is being excavated. The excavation of the pit and recovery of the tunnel boring machine are estimated to take 18 days and worst-case noise levels will be limited to a fraction of this time.

Noise modelling was carried out on the worst-case noise level sources at the seawater intake and the brine outfall locations. As can be seen in Table 2 (see section 4.3.3.2) the underwater source levels are quite low intensity and barely exceed the injury thresholds set out in Table 3 (see section 4.3.3.2). This means that the impact radius will be quite small in extent. An illustration of this is reproduced below and is taken from Figure 6.5 of the Marine Environmental Conditions Report.

Table 4: Underwater Noise Modelling Threshold Zones

Species	Criteria		PTS Impact Zone Surface
	PTS onset (metres)	TTS onset (metres)	Disturbance (metres)
Low Frequency Cetaceans (baleen whales)	-	-	60
High Frequency Cetaceans (most dolphin species)	-	-	60
Very High Frequency Cetaceans (Harbour Porpoise)	-	16	60
Phocid Carnivores (seal species)	-	-	-
Other Carnivores (otters)	-	-	-
Fish Eggs and Larvae	-	-	-
Mortality PTS in adult Fish	-	-	-

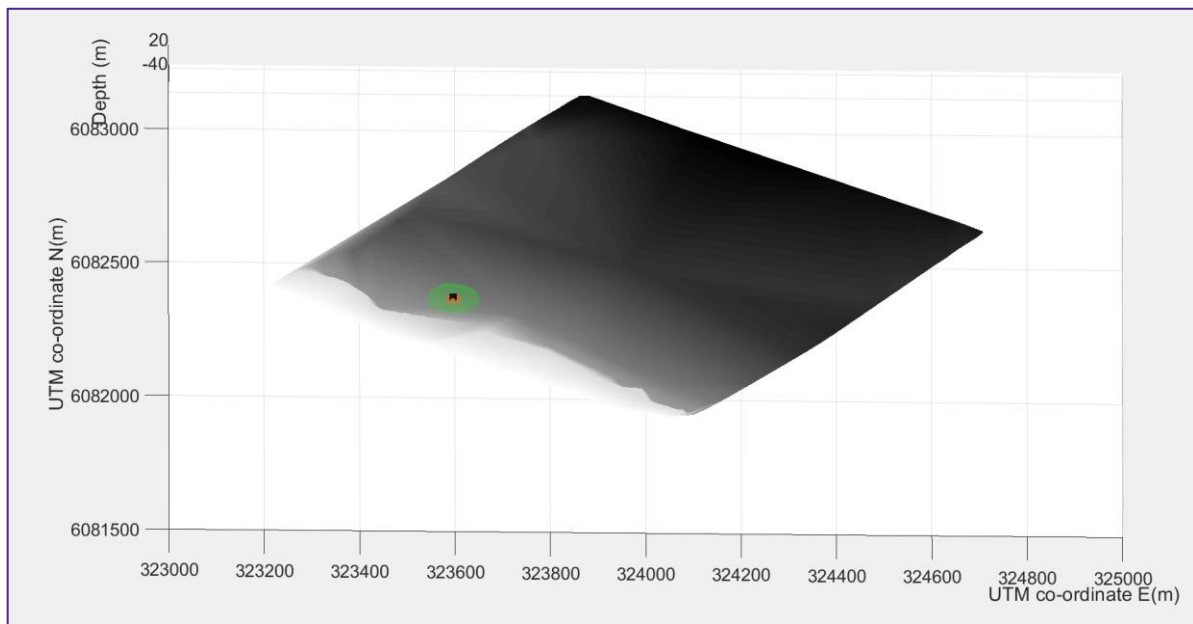


Figure 5-1 Underwater noise levels – Maximum extent of disturbance during pit excavation

The modelling results are presented in Figure 5-1 which shows the extent of the disturbance (green) and temporary injury (amber) zones for Harbour Porpoise. The impact zone is shown to scale with a 12m x 12m jack up barge at the excavation site. The disturbance zone extends to 60m and the temporary injury zone is limited to 16m from the noise source. It is clear that the disturbance temporary injury zone is quite small and will have limited environmental impact. This impact will have a maximum duration of 18 days.

The sub-seabed drilling site is located at the northern extreme of the North Channel SAC. The SAC is approximately 1,600 km² in size, and therefore, there is a large expanse of marine habitat for any harbour porpoises that could potentially be displaced on a temporary basis.

However, this would still be considered disturbance by means of temporary exclusion from a portion of their habitat within the SAC. As there is potential for temporary displacement within proximity to the excavation works, mitigation measures must be prescribed.

Like with the construction and operational phase, there is no possibility of likely significant effects upon these European sites designated for their breeding and wintering birds, as a consequence of disturbance caused by the proposed development during the decommissioning phase. The physical works required to remove subsurface equipment will require a vessel and machinery. These works will generate temporary underwater noise which has potential to cause disturbance to the feature marine mammal species, Harbour Porpoise and Grey Seal. As there is potential for temporary displacement within proximity to the excavation works, mitigation measures must be prescribed.

5.3 Elevated salinity level impacts upon seabird and marine mammal prey species

In the absence of measures to mitigate for the impacts of increased ambient salinity measures on SPA and SAC feature species prey, there would be uncertainty as to whether or not there would be a likely significant impact upon these feature species. And therefore, the potential dispersion of brine in the Islandmagee area has been assessed using a range of appropriate computational modelling packages. This initial dilution study examines the dispersion of the brine discharged from the outfall diffuser jets in the immediate area of the outfall diffuser (model based on diffuser jets mitigation design measure which is discussed below). The baseline salinity data obtained from AFBI and NIEA at the initial project development stage indicated that background salinities in this part of the North Channel off Islandmagee can range between circa 30.5PSU and 34.8 PSU. The background salinity of the study area was taken as 34.2 PSU for the purposes of the brine dispersion modelling. The location of the proposed outfall was previously determined by studies that informed a planning application for the proposed project in 2010. As part of this process the position of the outfall (approximately 450m offshore) was previously demonstrated to be far enough offshore to provide effective dispersion and avoid the plume attaching to the shoreline whilst also minimising environmental impact during construction. The proposed discharge is located at 27 metres water depth.

As part of design mitigation, the outfall diffuser geometry proposed consists of two Tideflex diffuser ports pointing vertically upwards at 20m centres. The brine, even when discharged at a higher temperature than the receiving sea water, will be denser than the surrounding seawater, thus there will be a tendency for the brine plume to initially sink. However the eddying in the water column associated with the specially designed jet discharges will help to mix the brine and seawater as the tidal currents flow across the outfall area.

The rate of brine discharge will increase in stages as the number of caverns under construction increases with time and will range from 250m³/hour at initial start-up, to potentially 1,000m³/hour at the maximum possible cavern construction rate. The design of the leaching facilities is such that this will be achieved in a stepped process by uprating and commissioning additional pumps such that there will in effect be three potential discharge scenarios, 250m³/hour, 500m³/hour and 1,000m³/hour (see Appendix B: Brine Dispersion Modelling of the Marine Environmental Conditions Update Report). The initial dilution modelling results show that for a diffuser with 6" ports the salinity of the brine at first contact with the seabed will be between 50.5 PSU and 37.6 PSU depending on the discharge flow and number of active ports on the diffuser. The medium to far-field dispersion assessment confirmed that the discharge of up to 1,000m³/hour of saturated brine via the proposed IGSF outfall will have minimal impact on salinity levels beyond the immediate vicinity of the outfall. Maximum salinity increases (during neap tides) of more than 0.5 PSU are not anticipated to occur more than a few hundred metres from the diffuser and salinities in excess of 36 PSU are not predicted to occur more than 100m from the diffuser under normal operations. Salinity levels in excess of 40PSU are only predicted to extend for approximately 10-15m from the diffuser location (see Figure 5-2 Maximum Brine Plume Envelope, which also included a period of very small neap tides with tidal ranges approaching 1m). It is unlikely however that maximum flow will coincide with maximum salinity

increase as conservatively assumed for this study. In addition, concentration of non-salt compounds in the Islandmagee brine are lower than the relevant Environmental Quality Standards (EQS). Thus with the dilution and dispersion that will occur after discharge the non-salt components in the IGSF brine discharge do not pose a significant threat to marine water quality at Islandmagee (see Appendix B: Brine Dispersion Modelling of the Marine Environmental Conditions Update Report).

With the implementation of brine outfall design mitigation measures (brine outfall location, diffuser jets, ramp-up in discharge rate), and therefore subsequently, the relatively small extent of marine area impacted by elevated salinity levels, and the highly mobile nature a wide foraging range of the SPA and SAC feature species, there is no possibility of likely significant effects on The Maidens SAC (Grey Seal), North Channel SAC (Harbour porpoise), and East Coast pSPA (sea bird assemblage).

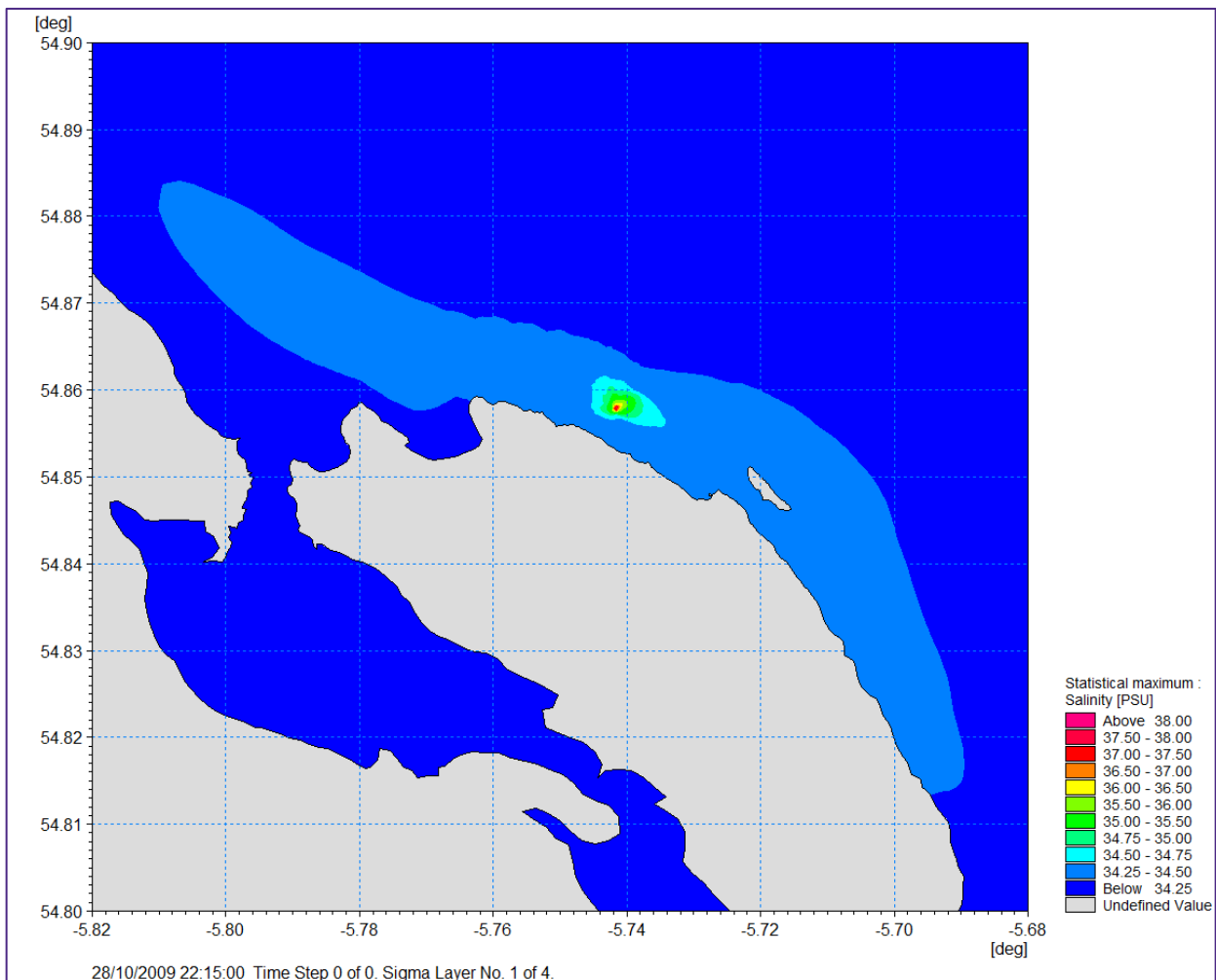


Figure 5-2 Maximum Salinity during a Spring-Neap Tidal Cycle (1,000m3/hour Discharge)

5.4 Seawater Abstraction Prey Reduction

The intake will be functional during the solution mining stage of the construction phase, expected to last approximately 4 years. In the absence of mitigation measures there is potential LSE's upon the European sites via seabird and marine mammal prey resource availability. Seawater intake facilities can remove local fish and marine invertebrates by entrainment. While it is considered that the likelihood of an appreciable adverse effect on the conservation status of any bird or marine mammal populations associated with the assessed Natura 2000 sites is very low, in the absence of mitigation it is not possible to robustly conclude that such effects would not lead to an adverse impact upon the integrity of the European sites, mitigation must therefore be prescribed.

Design mitigation measures include the intake structure is sized for a maximum flow rate of 1,000m³/hr at a velocity of 0.15m/s to maintain the intake structure as 'hydraulically invisible'. A mesh intake screen with mesh holes of a maximum diameter of 12 mm will be fitted to reduce the entrapment and impingement of marine biota and therefore larger, more actively moving juvenile and adult organisms will be prevented from entrainment but are susceptible to impingement (EPA, 2014). Entrainable organisms include those which are smaller than the above mesh size with limited to no swimming ability (Missimer and Maliva, 2018). However, the velocity of the intake, as stated above, is the equivalent speed of the lowest tidal velocity, and therefore it is expected that fish of this size will have the ability to swim against, or away from, this force (Missimer and Maliva, 2018). Those individual fish which are smaller than the diameter of the holes of the screen have the potential to be entrained. The numbers of entrained fish will likely be low, again, given the velocity of the water intake, the requirement for the fish to be within the vicinity of the intake, the total volume of water intake and the swimming ability of juvenile fish. Studies have shown that because entrance velocities in passive screen intakes are generally low, impingement is likely to be quite minor (EPRI, 2006).

Given that number of fish that will be entrained or impinged will likely be low and would require them to be within the close vicinity of the intake, there is no possibility of likely significant effects upon prey availability of The North Channel SAC, Maidens SAC and East Coast pSPA feature species.

5.5 In-combination with other plans and projects

Article 6(3) of the Habitats Directive requires that in-combination effects with other plans or projects are considered. On this basis, a range of other projects as listed in Table 5 were considered in terms of their potential to have an in-combination effects with Islandmagee Gas Storage Facility (IGSF).

The in-combination assessment process included a review of all planning applications within in the area surrounding Islandmagee between January 2017 and October 2019 and a review of the Marine Licence Public Register for all applications submitted to DAERA under the Marine and Coastal Access Act 2009. All identified project were assessed for likely cumulative effects in combination with the construction and operation with IGSF.

The most significant nearby project identified was the Gaelectric Energy Storage Scheme (CAES), however the Planning Application (LA02/2016/0006/F) and Marine Licence Application (ML49-13) for this project were withdrawn on the 23rd of July 2019. As the project has been withdrawn there are is no longer potential for any cumulative effects when considered in combination with the Islandmagee Gas Storage Project.

Other nearby projects included the Ballylumford Harbour Remedial Works, Ferris Bay Waste Water Treatment Works, Ballylumford Waste Water Treatment Works and the Coastal Erosion Defences at Blue Circle Island. The cumulative assessment concluded that due to the nature of these projects, these projects will not result in cumulative effects when considered in combination with the Islandmagee Gas Storage Project.

Table 5: Description of potential cumulative effect between the Islandmagee Gas Storage Project and existing and/or approved projects

Project / Applicant	Cumulative Interaction
<p>Ballylumford Harbour Remedial Works (LA02/2018/0166/F) Mid & East Antrim Council</p>	<p><u>Project Description</u> Planning permission is being sought for Ballylumford Harbour Remedial Works at Ballylumford Harbour Ferris Bay Road Islandmagee. Permission for the development was Granted by the Mid and East Antrim Council on the 06 Dec 2018. The application is located on the Islandmagee peninsula at 341974/402328.This application lies within 1Km of the Islandmagee Gas Storage Project.</p> <p><u>Potential in-combination effects on European Sites</u> The Planner's Report was reviewed, and no effects upon any European site were identified by the planning authority. The Planners report included a number of planning conditions to ensure there are no impacts on the site integrity of any European Designated site.</p> <p>A Habitats Regulation Assessment (HRA) submitted with this application on the 23rd of August 2018 was reviewed. The HRA referenced the CAES Larne scheme which has since been withdrawn but did not consider the effects of this development in combination with the Islandmagee Gas Storage Facility. Nevertheless, the HRA concluded that the provided the mitigation measures were employed the proposed development (Ballylumford Harbour Redevelopment) would have no adverse effects on the integrity of any European sites, either alone or in combination with other plans or projects.</p> <p>When both projects are considered together, there will be no cumulative effects.</p>
<p>Ferris Bay Waste Water Treatment Works (LA02/2018/1139/F) Northern Ireland Water</p>	<p><u>Project Description</u> Planning permission is being sought for Replacement wastewater treatment plant, new electricity kiosk, security fencing and associated works will be constructed within the existing site boundary owned by NI Water to meet NIW & NIEA's current and future requirements. No new buildings/access are planned and no structure will exceed 5m in height at the Ferris Waste Water Treatment Works 25m N E of 45 Ferris Bay Road BT40 3RT Islandmagee. N Permission for the development was Granted by the Mid and East Antrim Council on the 03 Jul 2019.</p> <p>The application is located on the Islandmagee peninsula at 342763/402700.This application lies within 1Km of the Islandmagee Gas Storage Project.</p> <p><u>Potential in-combination effects on European Sites</u> The Planner's Report was reviewed, and no effects upon any European site were identified by the planning authority. The Planners report included the following condition to protect water quality within the adjacent water course and to protect the site features and habitats within designated sites downstream: A suitable buffer of at least 10 metres must be maintained between the location of refuelling, storage of oil/fuel, concrete mixing</p>

Project / Applicant	Cumulative Interaction
	<p>and washing areas, storage of machinery/material/spoil etc. and the adjacent watercourse.</p> <p>A Habitats Regulation Assessment (HRA) submitted with this application on the 7th of March 2019 was reviewed. The report did not predict any likely water quality, habitat deterioration or habitat loss effects; and it did not predict any underwater, aerial or visual disturbance effects.</p> <p>The HRA assessment considered the in combination effects of the Islandmagee Gas Storage Facility and also the CAES Larne Project which has since been withdrawn. The HRA noted that the brine discharge of 2 projects in the Larne Lough area involving excavations of chambers in deep (>1km) salt beds are still to be completed. It acknowledged that the brine discharge would be close to the Ferris Bay area but that the nature of the discharge was different to that of the current project (Ferris Bay Waste Water Treatment Works) and no in-combination impacts were anticipated.</p> <p>When both projects are considered together, there will be no cumulative effects.</p>
<p>Ballylumford Waste Water Treatment Works (LA02/2019/0027/F) Northern Ireland Water</p>	<p><u>Project Description</u> Planning permission is being sought for Replacement Rotating Biological Contactor (RBC) plant and associated ancillary works at Ballylumford Wastewater Treatments Works Loughview Bungalows Larne. 27m south of 24 Loughview Bungalows. Permission for the development was Granted by the Mid and East Antrim Council on the 27 Aug 2019. The application is located on the Islandmagee peninsula at 342084/402079. This application lies within 1Km of the Islandmagee Gas Storage Project.</p> <p><u>Potential in-combination effects on European Sites</u> The Planner's Report was reviewed, and no adverse effects upon the natural environment were identified by the planning authority.</p> <p>A Habitats Regulation Assessment (HRA) submitted with this application on the 4th of June 2019 was reviewed. The report did not predict any likely water quality, habitat deterioration or habitat loss effects; and it did not predict any underwater, aerial or visual disturbance effects.</p> <p>The HRA assessment considered the in combination effects of the Islandmagee Gas Storage Facility and also the CAES Larne Project which has since been withdrawn. The HRA noted that the brine discharge of 2 projects in the Larne Lough area involving excavations of chambers in deep (>1km) salt beds are still to be completed. It acknowledged that the brine discharge would be close to the Ballylumford area but that the nature of the discharge is different to that of the current project (Ballylumford Waste Water Treatment Works) and no in-combination impacts were anticipated.</p> <p>When both projects are considered together, there will be no cumulative effects.</p>
<p>Coastal Erosion Defences at Blue Circle Island LA02/2017/1125/F) RSPB</p>	<p><u>Project Description</u> Planning permission is being sought for Reconstruction and maintenance works to coastal erosion defences reinstatement of eroded land and erection of moveable bird hide at Blue Circle Island, Larne Lough, and Larne. Permission for the development was Granted by the Mid and East Antrim Council on the 08 May 2018. The application is located on the Islandmagee peninsula at 343248/399650. This application lies within 2Km of the Islandmagee Gas Storage Project.</p> <p><u>Potential in-combination effects on European Sites</u> The Planner's Report was reviewed, and no effects upon any European site were identified by the planning authority. A HRA submitted with this application on the 27th of October 2017 was reviewed. The report did not predict any likely water quality, habitat deterioration or habitat loss effects; and it did not predict any underwater, aerial or visual disturbance effects.</p>

Project / Applicant	Cumulative Interaction
	<p>The HRA assessment did not consider the in combination effects of any other projects on the basis that no plans or programmes (requested or approved planning applications) had been identified within the Larne Area Plan (2010) that could contribute to an in-combination effect with the proposed works (Coastal Erosion Defences at Blue Circle Island).</p> <p>When both projects are considered together, there will be no cumulative effects.</p>

There are no other significant projects at planning stage in the area. The underwater noise impact of ferry traffic from Larne and local boat traffic have been quantified in the baseline measurements. The cumulative impact of these existing underwater noise sources does not alter the impact of the proposed development.

5.6 Mitigation Measures

5.6.1 Pollution

The existing planning consent for the Islandmagee Gas Storage Facility (F/2010/0092/F) included a number of conditions and informatives relating to the prevention of pollution:

- There shall be no discharge of suspended solids or any other deleterious matter to watercourses.
- During construction, release of suspended solids to all surface waters will be controlled by interception (e.g. silt traps) and management of site run-off. Any surface water run-off must be treated to ensure that it is free from suspended solids, oil or any other polluting materials.
- During construction, silty water shall be treated using silt trays/settlement ponds and temporary interceptors and traps will be installed until such time as permanent facilities are constructed.
- All fuels, lubricants and hydraulic fluids will be kept in secure bunded areas away from watercourses. The bunded area will accommodate 110% of the total capacity of the containers within it. Containers will be properly secured to prevent unauthorized access and misuse.
- As part of the Environmental Management Plan (EMP) to be drawn up at detailed design stage, an effective spillage procedure will be put in place with all staff properly briefed. Any waste oils or hydraulic fluids will be collected, stored in appropriate containers and disposed of off-site in an appropriate manner.
- Fueling and lubrication will not be conducted within 15m of the nearest storage areas, machinery depots and site offices will not be located within 15m of the nearest watercourse.
- Foul drainage from the site offices and facilities will be properly treated and removed to a suitable treatment facility.
- Spill kits will be made available and all staff will be properly trained on correct use.
- Disposal of raw or uncured waste concrete will be controlled to ensure that watercourses or other sensitive areas will not be impacted.
- Petrol and oil interceptors will be used to prevent contaminants entering the Lough and tidal ponds.
- All or any areas proposed as disposal/storage/recovery sites will be subject to ecological assessment as part of any applications for planning permission, waste permits or waste licenses.

5.6.2 Elevated salinity

5.6.2.1 Brine outfall

(1) HDD will be used instead of traditional trenchless method. HDD will significantly minimise habitat loss, underwater noise and disturbance to the seafloor.

(2) The location of the brine outfall location was chosen to be at 27m depth to allow tidal currents to bring it further into the tidal current stream to enhance the ability for the brine to be dispersed.

(3) Brine outfall pipe will have high pressure dispersal nozzles fitted to add turbulence to the brine discharge and enhance the mixing and rapid dispersion of the brine.

(4) A gradual ramp-up in the discharge rate. Optimal mixing reduces the chances of organisms being exposed to excessively high salinity levels, even for a short period, thus minimising the near-field impacts. A gradual increase in ambient salinity will allow time for organisms that might otherwise succumb to osmotic shock, to acclimate to increased salinity.

(5) Brine dispersion will be monitored in real time. It is proposed to deploy three real-time monitoring buoys for the duration of brine discharge. Two of the buoys will be located at fixed positions, northwest and south east of the outfall discharge point along the axis of the main tidal flow. The third as a control site that will be sited following discussions with DAERA. A trigger level will be set for salinity at a pre-determined distance from the outfall. Exceedance of the trigger level would result in a temporary suspension of leaching.

(6) Trigger Levels - The Environmental Monitoring Programme (EMP) described in Section 9 of the Marine Environmental Conditions Report offers additional safeguards by setting trigger levels above which construction works may be temporarily halted to ensure the environmental impact of the brine discharge remains within acceptable limits. The real-time water quality monitoring system will be designed to automatically send text messages to the mobile phones of the Environmental Clerk of Works, Contractor and the Resident Engineer to alert them if a pre-determined alarm level has been breached. This early warning system will enable the responsible parties to quickly investigate the cause of the breach and to take appropriate action. In the event that salinity levels breach the predetermined threshold level for a period of 5 minutes or more, the process of discharge termination will be initiated and the discharge stopped within one hour, including the temporary cessation of the works where appropriate. The proposed alarm levels set to safeguard the marine environment in the vicinity of the brine outfall are presented in Table 6, and subject to agreement with DAERA MFD, these trigger settings will be implemented via the proposed monitoring system.

Table 6: Water Quality Monitoring Trigger Levels

Parameter	Alarm Level
Salinity	> 36 psu for 5 minutes
Dissolved Oxygen	< 6 mg/l for 5 minutes

5.6.2.2 Seawater intake

(1) The design of the abstraction system will minimise the level of impingement by fish and invertebrate organisms. The intake structure is sized for a maximum flow rate of 1,000m³/hr at a velocity of 0.15m/s to maintain the intake structure as 'hydraulically invisible'. In order to facilitate fish taking avoiding action, the total area of fine screens area will be many times greater than the combined cross-section area of the abstraction pipe. The screens will also be placed to ensure an even flow over their complete area which will minimise flow velocity at any point.

The seawater intake will consist of a passive intake screen placed on the seabed connected to a below seabed pipeline and will have a velocity limit designed to prevent entrainment of fish and other marine life, which will allow most fish species to swim out of the area as part of their natural avoidance behaviour and minimise the disturbance to the seabed and the intake of sea bed materials.

(2) Mesh screens with 12mm diameter mesh size will be used to further reduce the possibility of fish entrainment.

5.6.3 Disturbance and Displacement

Marine Mammal Observers (MMOs) will be employed during the construction phase of the seawater intake and brine outfall when there is potential to generate underwater noise. MMOs will also be employed during the decommissioning phase.

The MMOs will ensure that noise generating construction activity does not commence whilst a marine mammal (cetacean or seal) is in close vicinity to the works. The extent of an appropriate exclusion zone will be agreed with the Licensing Authority in advance of the construction works.

The contractor will only be allowed to commence works after the MMO has undertaken a 30 minute pre-watch, during daylight hours and suitable sea state, and has confirmed the absence of marine mammals from the exclusion zone.

5.6.4 Collision Impacts

Construction cranes and the drill rig will be lit at night for safety reasons. It is additionally proposed that the vent stack be lit to reduce risk of bird collisions. Lighting will preferably be green as this has been shown to disorientate migrating birds less than red light (Poot *et al.*, 2008). Alternatively, white strobes which flash once every 2-3 seconds have been shown to repel birds and produce far fewer collisions than do solid or blinking red lights to which birds may be attracted on foggy, misty nights (Manville, 2000, Poot *et al.*, 2008). Red-lights shall be avoided on tall structures where possible.

Support vessels will be in operation during the seawater intake and outfall construction. As stated above in section 5.6.3, MMOs will ensure that there are no marine mammals are present inside the exclusion zone during construction operations. This will prevent potential collisions between marine mammals and vessels.

6 CONCLUSION

This report contains a Habitats Directive appraisal of the proposed development as described in Section 3, having regard to relevant legislation outlined in Section 1 and the methodological guidance outlined in Section 2. A stage 1 screening appraisal was completed (Section 4) to determine whether or not LSEs on any European site could be excluded as a result of the construction or operation of the proposed development.

From the findings of the Screening exercise, the possibility of LSEs upon four European sites could not be discounted in the absence of further evaluation and analysis and quite likely the application of mitigation measures.

- The possibility of likely significant Water Quality and Habitat Deterioration effects could not be discounted for the Larne Lough SPA, East Coast (NI) Marine pSPA, North Channel SAC and Maidens SAC.
- The possibility of likely significant Underwater Noise and Disturbance effects could not be discounted for the North Channel SAC.
- The possibility of likely significant Seawater Abstraction effects could not be discounted for the Larne Lough SPA, East Coast (NI) Marine pSPA, North Channel SAC and Maidens SAC.
- The possibility of likely significant Collision Impact effects could not be discounted for the North Channel SAC, Maidens SAC, and Larne Lough SPA

A stage 2 appraisal of the implications of the proposed development on Larne Lough SPA, East Coast (NI) Marine pSPA, North Channel SAC and Maidens SAC was completed in Section 5 of this report, in view of their conservation objectives and in combination with other relevant projects.

Having conducted further investigation and analysis, adverse effects upon the integrity of the following European sites will not occur, with the application of measures prescribed in Section 5.6 intended to avoid or reduce certain harmful effects of the proposed development on the European sites concerned. No reasonable scientific doubt remains as to the absence of such effects.

Mitigation measures have been applied to reduce the risk of:

- Pollution incidents upon Annex I habitats and Annex II species that use them
- Disturbance to Annex II species
- Seawater abstraction effects on the prey items of qualifying species
- Collision impacts with qualifying species

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8 FIGURES

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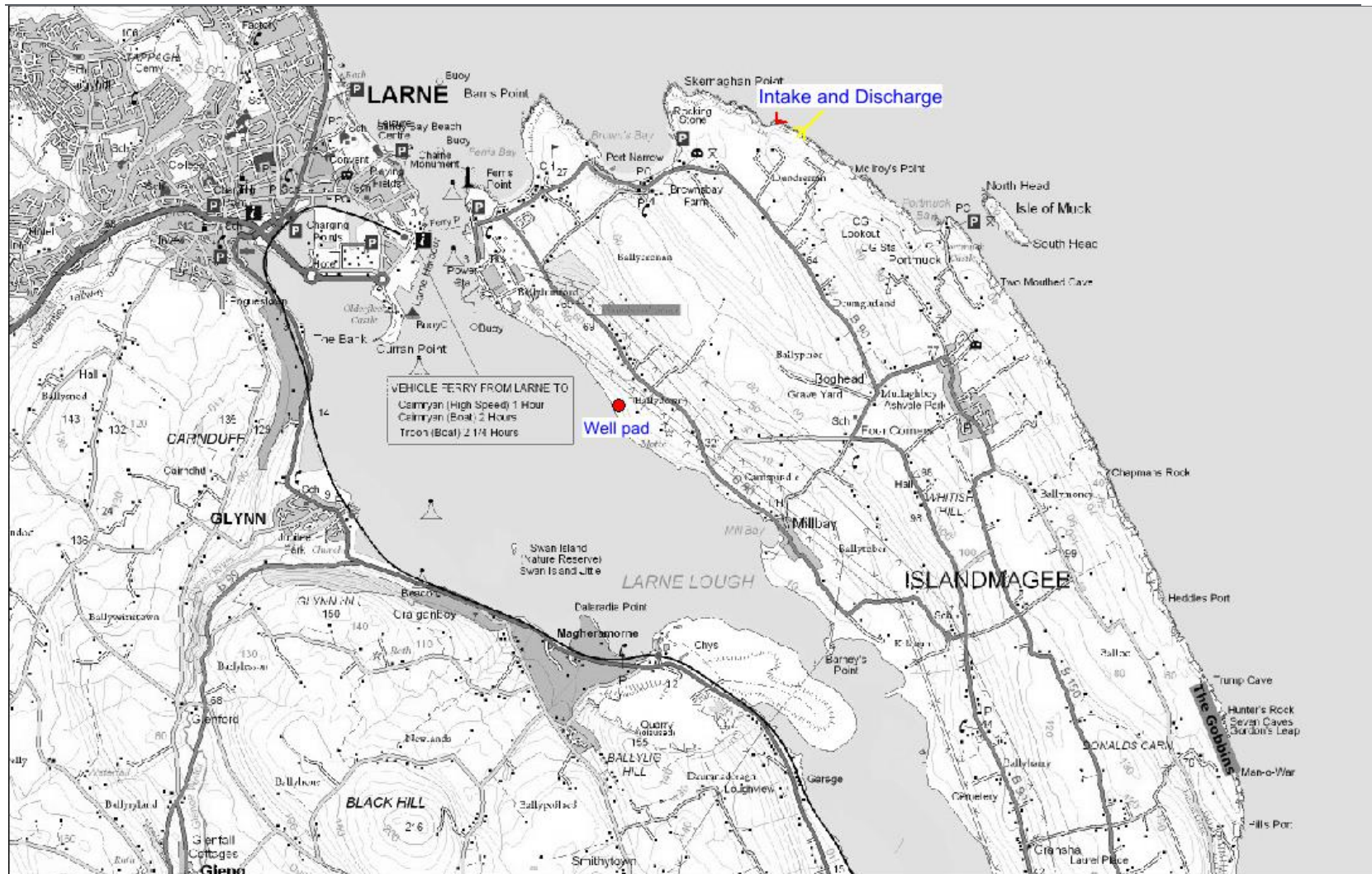


Figure 8-1 Site Location



Figure 8-2 Project Layout

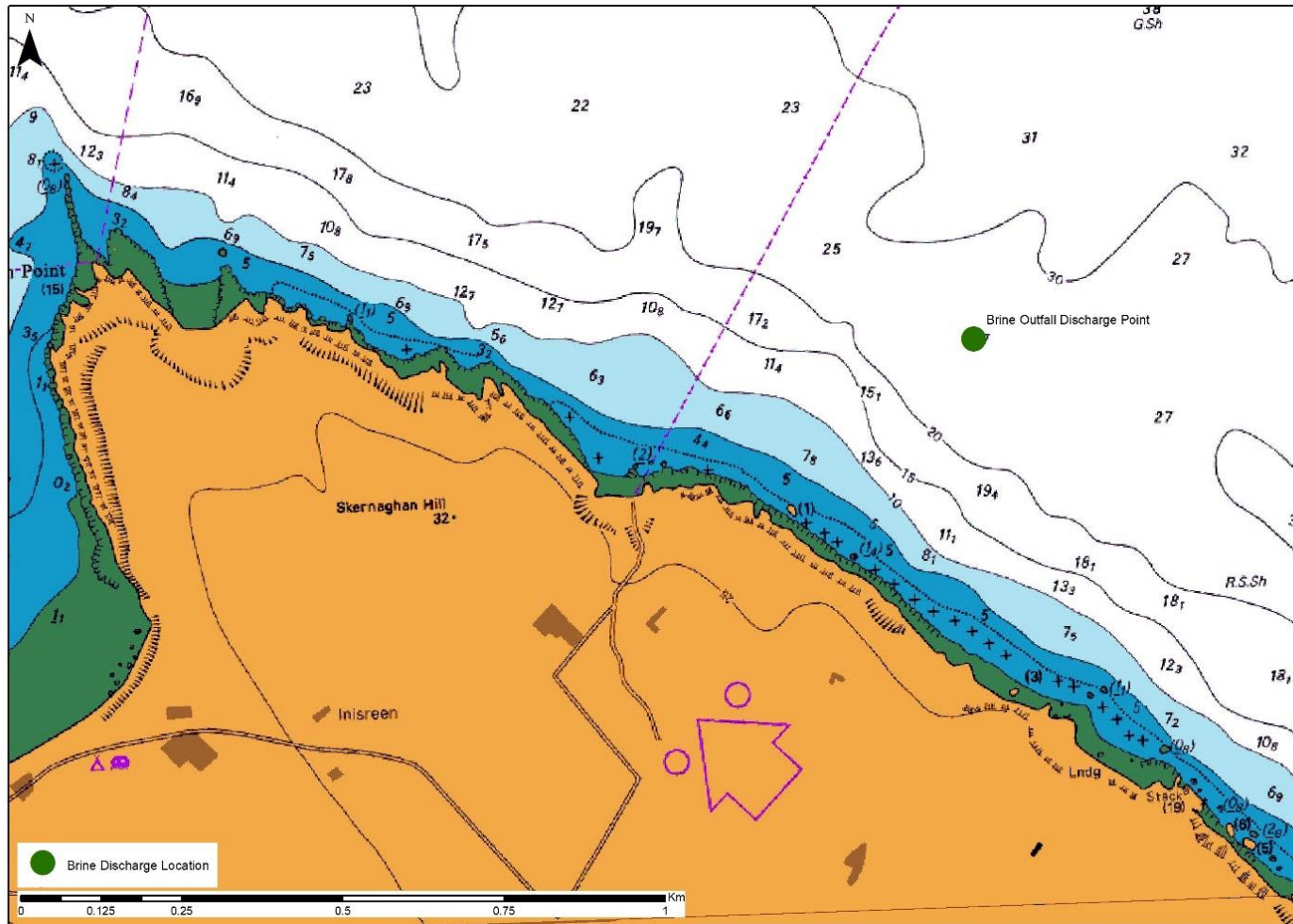


Figure 8-3 Location of Brine Outfall Infrastructure (Diffuser Heads)

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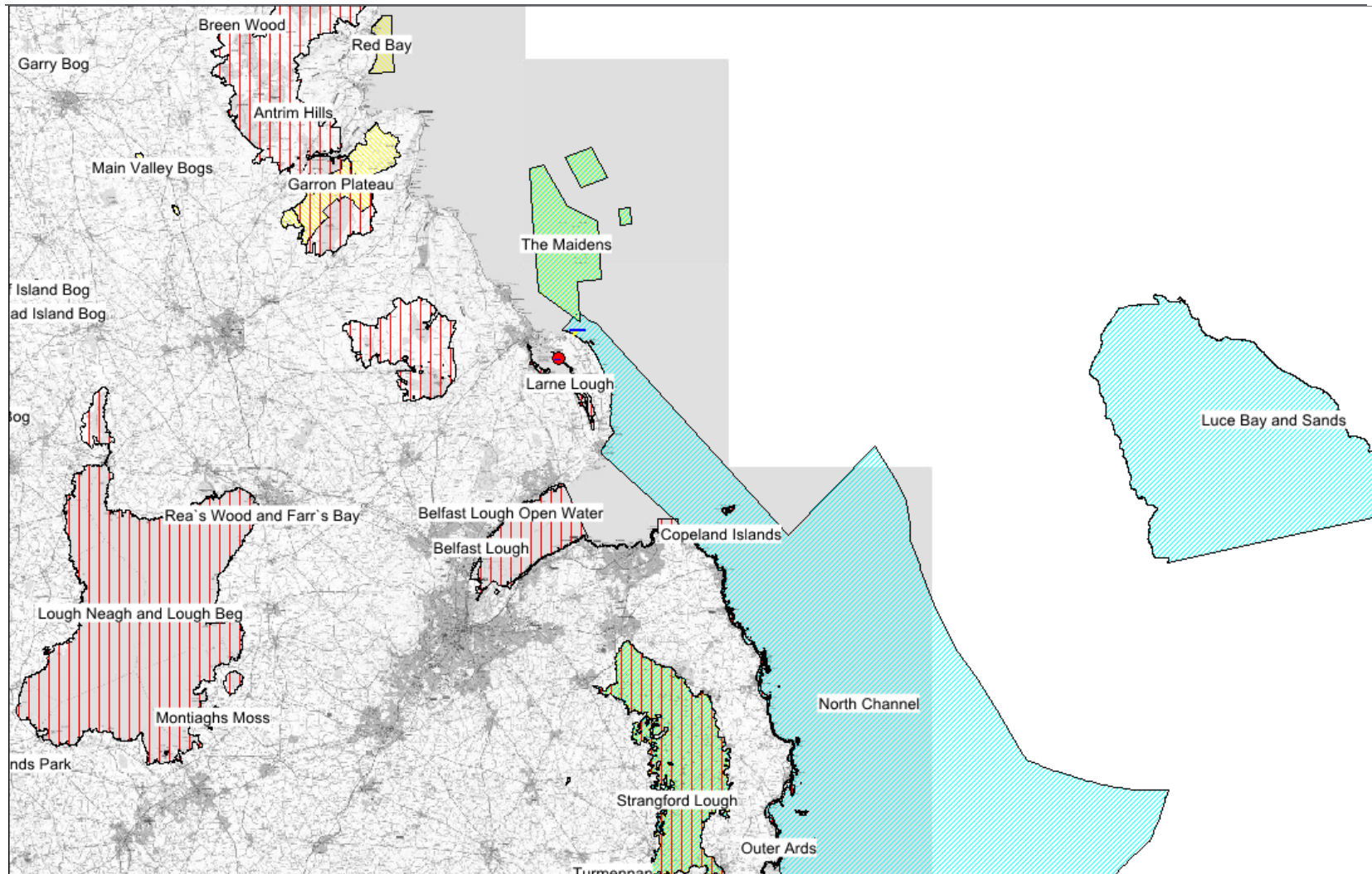


Figure 8-4 Designated Sites

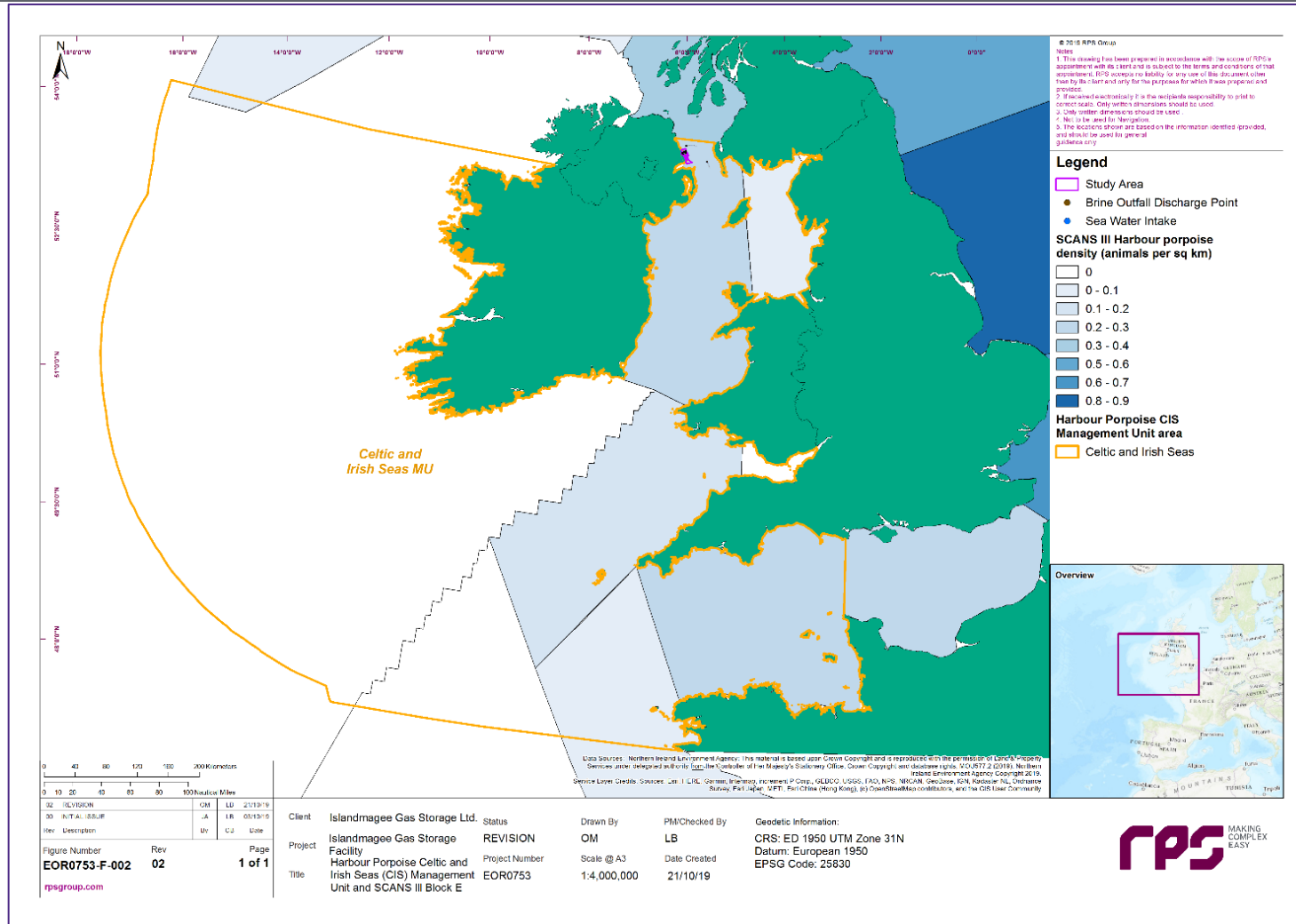


Figure 8-5 Harbour Porpoise Management Unit and E Block of SCANS III for harbour porpoise

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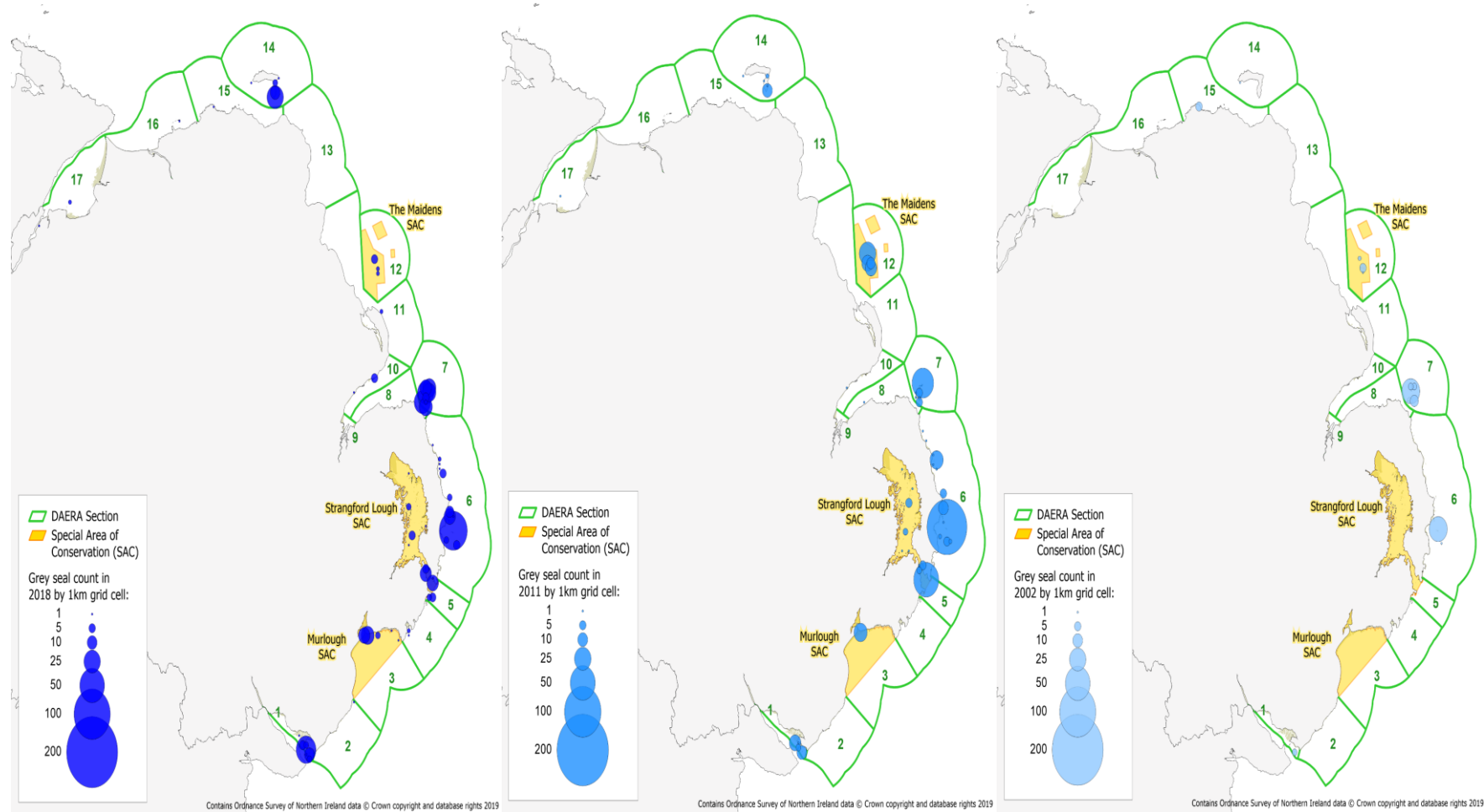


Figure 8-6 Distribution of grey seals by 1 km squares in Northern Ireland

(A) 2018, and (B) 2011 and (C) 2002 (Morris and Duck 2019)