

## **Appendix 1: Article 6 Appropriate Assessment**

**Habitats Directive Article 6(3)  
Statement for Appropriate Assessment**

**Islandmagee Gas Storage Project**

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## 1.0 INTRODUCTION

RPS has been commissioned to provide a statement for Habitats Directive Article 6(3) Assessment (Appropriate Assessment or AA) on behalf of Islandmagee Storage Limited ('The Applicant') for a proposed underground gas storage facility beneath Larne Lough at Islandmagee, Co. Antrim in Northern Ireland. An Environmental Statement (ES) is being produced. This report makes reference to the results of ecology surveys undertaken as part of the Terrestrial Flora & Fauna Chapter 5.0 of the Environmental Statement (ES).

Under Articles 6 (3) of the EC Habitats Directive 92/43/EEC, an assessment is required where a project may give rise to significant effects upon the Natura 2000 network. Natura 2000 is a European network of protected sites which includes Special Areas of Conservation (SAC) and Special Protection Areas (SPA). The transposing legislation in Northern Ireland is The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995, requiring a Competent Authority (CA) to undertake an Appropriate Assessment, before deciding to undertake, or give any consent, permission or other authorization for a project.

As the Competent Authority in this instance, the Department of Environment for Northern Ireland must make key decisions prior to granting consent for a project which has potential to result in significant impacts on the Natura 2000 network. RPS has produced this report to collate and present the key data required for the CA to accurately undertake assessment. Data relating to the present scheme has been presented, and/or summarised for clarity. Provisional assessments have also been made of likely potential impacts, and which of these may be significant.

The proposed underground gas storage scheme is located within the Larne Lough Special Protection Area (SPA), and within 1km of the Swan Island SPA. These two sites are considered within Larne Lough SPA according to the Joint Nature Conservation Committee (JNCC) and are considered as one Natura site for the purposes of this report. The Larne Lough Ramsar and Larne Lough ASSI designated areas also share their boundaries with the SPA, but are not considered as part of this assessment as they are not protected under European law.

Please note the following abbreviations frequently used throughout this report primarily relating to legislation and scheme design. The latter is described in detail later in this report.

- Northern Ireland Environment Agency (NIEA)
- European Union (EU)
- Joint Nature Conservation Committee (JNCC)
- British Trust for Ornithology (BTO)
- Gas Plant Facilities (GPF)
- Sea-Water Intake Pumping Station (IPS)
- Seawater & Brine Pumping Facilities (Leaching Plant)

- Sub-surface Pipelines (SSP)
- Temporary Set Down and Storage Compound (TSC)

This report should be read with the following figures

- Figure 1 Conservation Objectives
- Figure 2 RPS Ecology Survey Areas
- Figures 3 A-B Habitat Maps
- Figures 4A-B Breeding Bird Survey Maps

There are also a large number of appendices included to this report which include a large number of existing bird survey datasets held by public bodies. All appendices are listed on the cover page to this report.

## **1.1 Scheme Area**

The scheme is located on the east Antrim coast, in northeast Northern Ireland and is dominated by farmlands and coastal habitats on the Islandmagee peninsula adjacent to Larne Lough (Figure 1; Plates in Appendix 8). Larne Lough is a sea Lough separating the Antrim mainland from the Islandmagee peninsula that is internationally important for both breeding and wintering seabirds and waterfowl. The Lough to the south of the site is shallow, having become extensively in-filled with sediments of fine muddy sand, and at low tide, large areas of intertidal flats are exposed. The northern parts of the Lough are wider and relatively deep, especially at the mouth by the commercial port of Larne, where dredging is regularly carried out. This area of the Lough is very weakly tidal, and there are small areas of mud and sandflats exposed at low tide.

## **1.2 Project Description**

A full description of the scheme is provided in Chapter 4.0 Project Description of the ES. The location of the scheme is illustrated in Figure 1. The detailed scheme design is illustrated in Appendix 1. The scheme entails creating an underground gas storage facility at Islandmagee, Co. Antrim. Gas will be stored beneath the eastern side of Larne Lough in caverns that are currently filled with salt layers from the Permian geological period. The complex of above-ground facilities for the proposed development is primarily located in farmland adjacent to the existing power station. However an additional element (Sea-Water Intake & Pumping Station) is located on the eastern shoreline of the Islandmagee peninsula at Castle Robin. Extensive sub-surface pipelines will be installed to interconnect the scheme elements.

The following is a list of the proposed elements of the scheme with estimated post-construction footprints (in hectares). Abbreviations are employed throughout this section to facilitate brief reference and are included in brackets after each element in the list below:

- Gas Plant Facilities (GPF) in farmland above eastern shore of Larne Lough (1.67ha)
- Sea-Water Intake Pumping Station (IPS) on shingle and farmland at Castle Robin Bay on eastern coast of Islandmagee Peninsula (CA. 0.02ha)
- Seawater & Brine Pumping Facilities (Leaching Plant) on hardstanding by Ballylumford Road (0.61ha)
- Brine outfall pipeline 450m off-shore of IPS location.
- Sub-surface Pipelines (SSP) connecting GPF and Wellpad, and connecting Leaching Plant with IPS by crossing Islandmagee farmland to reach outfall at Castle Robin Bay. Lengths of all pipelines provided in Chapter 4.0 Project Description
- Temporary Set Down and Storage Compound (TSCA) at junction of Ferris Bay Road and Ballylumford Road (2.7ha)
- Wellpad in farmland on eastern shore of Larne Lough south of GPF (0.48ha)
- Vent Stack between farmland and shingle above Larne Lough shoreline (0.8m<sup>2</sup>)

The detailed project description is included as Appendix 1.

## 2.0 FIELD SURVEY

In November 2008, prior to commencement of the EIA surveys, an in-house wintering bird desktop study (Appendix 2) was commissioned by RPS to highlight potential gaps in existing survey data at Larne Lough. The report concluded that the BTO WeBS dataset for the Lough was complete in terms of both coverage and quality of records, and recommended wintering farmland surveys for which only scattered CEDaR records are available despite known wintering populations of Yellowhammer *Emberiza citrinella* and Twite *Carduelis flavirostris*.

Following this report and consultation with the Northern Ireland Environment Agency Natural Heritage (see Appendix 3); the following ecology surveys with relevance to Larne Lough SPA were undertaken within the study area as part of the EIA

- Extended Phase 1 Habitat Survey (May-August 2009) (Maps in Figures 3A-B)
- Breeding bird Survey (April-July 2009) (Maps in Figures 4A-B)
- Wintering farmland bird survey (November 2008-February 2009) (Not Mapped)
- Wintering & breeding open coastal bird survey (December 2008-August 2009) (Not Mapped)
- Black Guillemot *Cephus grylle* breeding survey (April-July 2009)

The survey areas are illustrated in Figure 2. The Phase 1 Habitat Survey (JNCC, 2003) Maps are provided in Figure 3. The Breeding Bird Survey Maps are provided in Figure 4. The Black Guillemot *Cephus grylle* breeding survey map is not included.

There were no records of SPA feature species in the wintering farmland bird surveys. Records of key SPA features from breeding bird and black guillemot surveys are detailed in section 5.2.2 of this report.

### 3.0 DESK STUDY

A desk study was carried out to gather information relevant for the evaluation of the SPA site. Information was obtained through consultation, databases, current legislation, planning policy guidance, published and peer-reviewed literature, and websites.

#### 3.1 Key Sources

The following legislation and key publications were consulted and/or are referred to in this document. Please note the abbreviations used throughout this document in brackets. Legislation is ordered chronologically

##### International

- The EC Habitats Directive (92/43/EEC) ('The Habitats Directive')
- The EC Birds Directive (92/43/EEC) ('The Birds Directive')
- Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy ('the Water Framework Directive');
- Directive 2006/44/EC of the European Parliament and of the Council of 6 September 2006 on the quality of fresh waters needing protection or improvement in order to support fish life ('the Fish Directive (consolidated)');

##### All-Ireland

- Lynas, P. 2007. The status of birds in Ireland: an analysis of conservation concern 2008-2013. *Irish Birds* 8: 149-167 ('Birds of conservation Concern - BoCCI')
- Heath, M. F. & Evans, M. I. (eds). 2000. *Important Bird Areas in Europe: Priority sites for conservation*. 2 vols. Cambridge, UK: BirdLife International.

##### Northern Ireland

- The Wildlife (Northern Ireland) Order 1985 (S.I. 1985/171 (N.I. 2)) as amended by The Wildlife (Amendment) (Northern Ireland) Order 1995 (S.I. 1995 No. 761 (N.I. 6)) ('The Wildlife Order');
- The Department of the Environment (DOE) Review of The Wildlife (Northern Ireland) Order 1985 – A Consultation Paper ('Review of The Wildlife Order');
- The Nature Conservation and Amenity Lands (Northern Ireland) Order 1985 (S.I. 1985/170) ('The Nature Conservation Order');
- The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (S.R. 1995 No. 380) as amended by the Conservation (Natural Habitats, etc.) (Amendment) Regulations (Northern Ireland) 2004 (S.R. 2004 No. 435) and The Conservation (Natural Habitats, etc.) (Amendment) Regulations (Northern Ireland) 2007 (S.R. 2007 No. 345) The Conservation (Natural Habitats, etc.) (Amendment) Regulations (Northern Ireland) 2009 (S.R. 2009 No. 8) ('The Conservation Regulations');



- Northern Ireland Biodiversity Strategy (EHS, 2002);
- The Environment (Northern Ireland) Order 2002 (S.I. 2002/3153 (N.I. 7)) ('The Environment Order');
- The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2003 (S.R. 2003 No. 544);

The following Databases were consulted to retrieve habitat and general ecological data:

- Northern Ireland Environment Agency (NIEA) Designation Maps  
[www.ni-environment.gov.uk/](http://www.ni-environment.gov.uk/).
- National Biodiversity Data Centre (NBDC) Records & Mapping  
<http://www.biodiversityireland.ie/>
- National Biodiversity Network (NBN) database  
(<http://data.nbn.org.uk/>)
- BTO/Birdwatch Ireland (BWI) Bird Atlas 2007-2011 Preliminary Results  
<http://blx1.bto.org/atlas/>

Many of the following ornithological datasets available for Larne Lough contain relevant data on Larne Lough SPA feature species and are referenced in this report. Those marked by an \* are included as appendices to this report:

- \* RPS Open Coast Bird Surveys December 2008-August 2009 (Appendix 4)
- \* BTO Wetland Bird Survey Data (WeBS) (Appendix 5)
- \*CeDAR Records (See CeDAR record locations in Figure 1 of Appendix 2)
- \*Royal Society for Protection of Birds (RSPB) Larne Lough Dataset Review Table (Appendix 6)
- BTO Non-Estuarine Wetland Bird Survey Data
- Swan Island Tern Colonies Survey Data (RSPB) (Not Included)
- JNCC Seabird 2000 Counts for Black Guillemot in Larne Lough

The following websites were also consulted

- BTO  
([www.bto.org/](http://www.bto.org/))
- Joint Nature Conservancy Committee (JNCC)  
(<http://www.jncc.gov.uk/>);
- Institute of Ecology & Environmental Management (IEEM)  
<http://www.ieem.net/>  
BirdLife International

### 3.2 Consultation

ES Consultation responses are included as Appendix 3.

#### 4.0 ARTICLE 6 ASSESSMENT METHODOLOGY

This Report has been completed in accordance with DOE(NI) and European Commission recommended methodology.

- Managing Natura 2000 Sites, The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC' (EC, 2000);
- 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);
- The Habitats Regulations: A guide for competent authorities, (EHS, 2002);
- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission; (EC, 2007).

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

The four stages are summarised diagrammatically below, and an outline of the steps and procedures involved in completing each stage follows. Stages 1-2 deal with the main requirements for assessment under Article 6(3). Stage 3 may be part of Article 6(3) or may be a necessary precursor to Stage 4. Stage 4 is the main derogation step of Article 6(4).

##### **Stage 1: Screening for Appropriate Assessment**

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

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

If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2 (AA). Screening should be undertaken without the inclusion of mitigation, unless potential impacts clearly can be avoided through the modification or redesign of the plan or project, in which case the screening process is repeated on the altered plan. The greatest level of evidence and justification will be needed in circumstances when the process ends at screening stage on grounds of no impact.

## **Stage 2: Appropriate Assessment**

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

## **Stage 3: Alternative Solutions**

This stage examines any alternative solutions or options that could enable the plan or project to proceed without adverse effects on the integrity of a Natura 2000 site. The process must return to Stage 2 as alternatives will require appropriate assessment in order to proceed. Demonstrating that all reasonable alternatives have been considered and assessed, and that the least damaging option has been selected, is necessary to progress to Stage 4.

## **Stage 4: Imperative Reasons of Overriding Public Interest (IROPI)/Derogation**

Stage 4 is the main derogation process of Article 6(4) which examines whether there are imperative reasons of overriding public interest (IROPI) for allowing a plan or project that will have adverse effects on the integrity of a Natura 2000 site to proceed in cases where it has been established that no less damaging alternative solution exists. The extra protection measures for Annex I priority habitats come into effect when making the IROPI case<sup>1</sup>. Compensatory measures must be proposed and assessed. The Commission must be informed of the compensatory measures. Compensatory measures must be practical, implementable, likely to succeed, proportionate and enforceable, and they must be approved by the Department.

## **5.0 NATURA SITE DESCRIPTION**

There is one Natura 2000 site that must be taken into consideration in the Appropriate Assessment; namely the Larne Lough SPA (Site Code 9020042). This report will determine the significance of the effects of the project on the selection features and conservation objectives of this Natura site.

### **5.1 Larne Lough SPA**

The Natura 2000 standard data form, NIEA site declaration form, and detailed NIEA conservation objectives are located in Appendix 7. Lough Larne SPA was classified as an SPA on the 19/03/1997. The extent of the SPA is 395.9ha (including Swan Island). The boundary of the SPA is shown in Figure 1 (Note Swan island is also illustrated in Figure 1)

### 5.1.1 Qualifying features and Conservation Objectives

Table 1 below describes the qualifying selection features for the designation of the SPA while the conservation objectives are presented in Appendix 7.

**Table 1: Qualifying Features for Larne Lough SPA (includes Swan Island SPA)**

Primary Feature	Factor <sup>3</sup>	Birds Directive Annex I Species	Population	Isolation	Count
Light-bellied Brent Goose <i>Branta bernicla hrota</i> (winter migratory population)			C	C	227.1 <sup>1</sup> individuals
Roseate Tern <i>Sterna dougalii</i> (European migratory breeding population)		√	C	C	6 Pairs <sup>1</sup>
Common Tern <i>Sterna hirundo</i> (Northeastern migratory breeding population)		√	B	C	199 Pairs <sup>1</sup>
Sandwich Tern <i>Sterna sandwicensis</i>					407 Pairs <sup>2</sup>
	Habitat extent				
	Roost site locations				
Key to Table 1					
<sup>1</sup> Population at time of designation (Appendix 7)					
<sup>2</sup> Average of 2000 and 2006 counts from Important Bird Area Review (Appendix 6)					
<sup>3</sup> Factor is the term used on the conservation objectives in Appendix 7 to describe habitats within context of the SPA designation					

## 5.2 Detailed Ecology of Larne Lough SPA

This section provides a brief description of the key plant habitats and bird populations within the SPA which are found within or adjacent to the scheme area, with reference to both existing survey data and the results of surveys undertaken by RPS from November 2008-August 2009. This section should be read with the plates in Appendix 9 which illustrate the study area photographically.

### 5.2.1 Habitats

Larne Lough SPA is a sea Lough with a diverse range of marine and intertidal habitats including salt marshes, artificial brackish lagoons (in the northwest), mudflats, sand flats, and tidal rivers and rocky shores (including shingle). Terrestrial

lands adjacent to the SPA are primarily pastoral farmlands. There are no sandy beaches within the SPA, but there are two to the northeast in Ferris Bay and Browns Bay. The Lough is only weakly tidal in its northern (or outer) part resulting in limited mudflats compared to the tidal areas in the southern (or inner) part. The coastal habitats along the Lough shoreline below the wellpad, vent stack, and gas plant facilities are weakly tidal shingle beaches with no exposed mud or sandflats at low tide.

As noted in Appendix 7 (Table 1 therein), Habitat is not a feature of the SPA, but Habitat extent, and Roost site locations are noted as 'factors' and are included within the SPA feature table in the conservation objectives. Specific habitat types for the factor are not provided within the conservation objectives, rather "areas of natural and semi-natural habitats potentially usable by Feature bird species (intertidal areas)" are. Table 2 below details all habitats within or immediately adjacent to the footprint of each element including JNCC category, conservation status, and links to SPA habitat 'factors' (read with Figure 3). Of all the habitats in Table 2, only two may be considered to fit the Habitat factor criteria, namely shingle which has potential as a Tern roost site, and improved grassland with potential as a Brent goose roosting/feeding site. During the suite of ecology surveys undertaken by RPS from November 2008-August 2009 (see section 2.0), there was no evidence of either species using shingle grassland habitats within or adjacent to the scheme.

**Table 2 Habitats potentially affected by scheme with ecological value and conservation status. Habitats which may be considered habitat 'factors' listed in the SPA conservation objectives are marked by an \*. To be read with Figure 3.**

Scheme Element (see section 1.2 and Appendix 1)	Habitat loss (JNCC)	Lost Habitat Conservation Value	Adjacent Habitat (JNCC)	NI Priority Habitat	Links with EU habitats	Notes
Wellpad	Improved Grassland* (B4)	Low	Shingle (H3) *	Coastal Vegetated Shingle	Perennial vegetation of stony banks (Code:1220)	-
	Intact native hedge (J2.1)	Medium	-			-
SSP	Semi-natural broad-leaved woodland (A1.1.2)	Low	-			Several Badger Setts
	Scrub (A2.1/A2.2)	Low	-			-
	Improved Grassland* (B4)	Low	Running Water (G2)	Low		-
	Intact native hedge (J2.1)	Low	-			One Protected Flower (Primrose).
	Neutral Semi-improved Grassland (B2.2)	Medium	-	Lowland Meadow		-
	Shingle (H3)	High	Hard Maritime Cliff (H8.1)	Coastal Vegetated Shingle	Perennial vegetation of stony	-

Scheme Element (see section 1.2 and Appendix 1)	Habitat loss (JNCC)	Lost Habitat Conservation Value	Adjacent Habitat (JNCC)	NI Priority Habitat	Links with EU habitats	Notes
				Maritime Cliff & Slope	banks (Code:1220)	
Gas Plant Facilities	Neutral Semi-improved Grassland (B2.2)	Medium		Lowland Meadow		-
	Intact native hedge (J2.1)	Medium				-
	Improved Grassland * (B4)	Low				-
Leaching Plant	Semi-natural broad-leaved woodland (A1.1.2)	Low		-	-	-
	Scrub (A2.1/A2.2)	Low		-	-	
	Inland Rock Exposure (I1.4)	Low			-	Includes Orchid swarms
	Buildings (J3.6)			-	-	-
Vent Stack	Neutral Flush (E2.1)	Low	Shingle (H3)* Improved Grassland (B4) *	Coastal Vegetated Shingle	Perennial vegetation of stony banks (Code:1220)	-
IPS	Shingle (H3) *	High		Coastal Vegetated Shingle	Perennial vegetation of stony banks (Code:1220)	-
	Neutral Semi-improved Grassland (B2.2)	Medium	Hard Maritime Cliff (H8.1)	Maritime Cliff & Slope	-	
	Improved Grassland * (B4)	Low				
TSCA	Ephemeral/short perennial (J1)	Low		-	-	-
	Introduced Shrub (J1.4)			-	-	Snowberry <i>Symphoricarpos alba</i>
	Hard Standing (J5)			-	-	
Key to Table 2						
*Considered to be included in Habitat factor within SPA conservation objectives						

### 5.2.2 Ornithology

This passage gives a brief summary of the key SPA populations occurring within the scheme area, and also describes the range of non-SPA feature wintering and breeding bird species within the vicinity of Larne Lough SPA and the scheme. This section was written by pooling information from the sources in section 3.0, as well as existing, and RPS survey records. The observational information in this section is important as the BTO WeBS dataset for outer Larne Lough does not inform as to bird

use of the sections of Lough directly within or adjacent to the scheme (covers entire outer Lough).

#### 5.2.2.1 Birds within Larne Lough SPA

Please note that the scheme subsurface cavern areas are located in the northern (outer) part of the Lough (as defined by BTO WeBS inner and outer subsite boundaries- see Appendix 5).

There are similar total peak counts in the inner and outer Lough as evidenced by the 2001-2006 BTO WeBS mean winter peaks (Appendix 5) of 3557 for the inner Lough compared to 3528 for the outer. However Brent geese (SPA qualifying feature) are significantly less abundant in the outer Lough (within the scheme area) with a mean winter peak of 22 compared to 212 in the inner Lough. There are no known Brent goose grassland feeding sites within the scheme area. 6 were recorded in February 2009 foraging in seaweed by the Ballylumford jetties, while the (same?) 6 were recorded later that day at Ferris Bay. None were recorded on the open coast on the eastern coast of Islandmagee during RPS open coast surveys. No surveys of the Lough were undertaken by RPS due to quality and coverage of existing WeBS BTO counts, so the fine-scale distribution of Brent within the outer Lough is not known.

The Swan and Blue Circle islands (SPA) near the eastern shore of the outer Lough are home to the internationally significant breeding colonies of Common, Sandwich and Roseate Terns (SPA qualifying features) detailed in Table 1. The distribution of Terns in the inner and outer Lough cannot be elucidated from BTO WeBS data as Terns are optionally recorded in WeBS surveys and absent from most counts. Terns were recorded flying and dive fishing extensively along the eastern shore of the Lough during RPS Black Guillemot and breeding bird surveys in May-July 2009, but were never recorded landing along the eastern shore, possibly due to the high disturbance levels associated with the power station, nearby harbour, and housing.

The Swan and Blue Circle islands are also home to small breeding populations of ducks (Eider and Red-breasted Merganser) (Kerry Leonard, Personal Communication). A single pair of Merganser was recorded foraging within the area of proposed scheme subsurface caverns by RPS in summer 2009. These islands are located 0.9km to the nearest scheme subsurface cavern, and 1.4km west of the nearest on-land scheme element (Wellpad). The open water within the Lough provides feeding/roosting habitat to wintering ducks, grebes, swans, and divers, as well as wintering Cormorants and Shags including resident populations of the two latter species which breed at rocky coastal sites at Portmuck ASSI and Gobbins ASSI. Large flocks of black-headed gulls roost on the open water and shore near the eastern shore. Black Guillemots breed in the jetties beside the existing Ballylumford Power station, at Larne Harbour and in characteristically thinly scattered colonies in appropriate nesting sites along the entire Lough shoreline. RPS recorded a total of 9 nest sites (i.e. 9 pairs) in the jetties with an average productivity of 0.94 (see Figure 6). The jetties are located 0.6km northwest of the nearest subsurface cavern and



approximately 500m from the nearest on-site element. The JNCC Seabird 2000 data set recorded a total of 112 individual birds within Larne Lough in April 2000.

There are a wide range of other breeding and wintering birds within the SPA. However, there are very few wintering waterfowl feeding on the Lough shoreline by the scheme subsurface caverns and on-shore elements near the power station due to the lack of intertidal mudflat or sandflat feeding habitat here. Incidental records on the eastern Lough shoreline near the scheme by RPS during winter mammal and farmland bird surveys indicate very small numbers of Oystercatcher and Heron (non-feature species) as the only frequent land species. Cormorants, Shags, and divers are predictably frequent open water species near the shoreline here. There may be a small number of breeding waterfowl on the shingle beaches here, although none were recorded during breeding surveys in summer 2009. For example, there are anecdotal records of a single pair of ringed plover breeding here (David Galbraith, personal communication), and broken Oystercatcher eggs whose original location remains unknown (were found in the fields by the GPF, and were probably predated by gulls or crows).

#### 5.2.2.2 Birds outside Larne Lough SPA

Terns were recorded frequently crossing the Islandmagee farmland peninsula to forage on the open coast in the vicinity of the scheme brine outfall, as well as and around the coastline of Ferris and Browns Bay. It is worth noting the skilful avoidance of the many power cables linking Moyle interconnector power pylons by Sandwich Terns (in high winds). This was frequently observed during breeding bird surveys in summer 2009, and indicates the birds are extremely unlikely to suffer collisions with any of the proposed scheme elements.

The RPS open coast surveys (December 2008-August 2009) and NEWS dataset (2007 data only; not included) both covered areas from Skernaghan Point to Portmuck including the IPS location at Castle Robin, and revealed moderate numbers of resident (e.g. oystercatcher), passage (Whimbrel) and wintering waders (Curlew, Purple Sandpiper Redshank) roosting on the rocky coastline in addition to divers (Red-throated and Great Northern), Cormorant, Shag and gulls in open water. Foraging seabirds from Portmuck/Gobbins were frequently noted here, with summer/autumn peaks for Guillemot, and Razorbill. Cormorant and Shag are common here, but other foraging Portmuck/Gobbins birds are rare (e.g. Fulmar) or apparently absent (Puffin). No Brent geese were recorded on the open coast.

## **6.0 APPROPRIATE ASSESSMENT**

The AA is presented in sections 6.1, 6.2, and 6.3 to follow. First, all potential risks are screened and any likely significant effects are predicted (6.1). Mitigation measures are then proposed as part of the project to remove or reduce the residual effects



upon those features and attributes of the Natura 2000 sites (6.2). Finally, the residual risks which remain after mitigation measures have been considered (6.3). These residual impacts are examined with respect to the conservation objectives of the Natura 2000 sites, and their ecological structure and functioning, thereby examining whether or not the residual effects which remain adversely affect the integrity of the Natura 2000 sites.

## 6.1 STAGE 1 SCREENING

This section describes any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the Natura 2000 site by virtue of:

- Size and scale;
- Land-take;
- Distance from Natura 2000 site or key features of the site;
- Resource requirements (water abstraction etc);
- Emission (disposal to land, water or air);
- Excavation requirements;
- Transportation requirements;
- Duration of construction, operation, de-commissioning etc;

This section should be read with the project description in Appendix 1.

### 6.1.1 Elements of Project likely to give rise to impacts on Larne Lough SPA

In the absence of mitigation, construction and operation of the elements outlined in section 1.2, and detailed in Appendix 1 are likely to give rise to a series of pollution and disturbance impacts on Larne Lough SPA.

The project proposes the following elements on the eastern shore of Larne Lough near the Natura Site:

- Use of plant including 55m high (max potential height) drill rig apparatus and cranes to drill seven boreholes into existing subsurface caverns beneath the eastern shore of Larne Lough (within the SPA) to dissolve Permian salt layers, and fill these caverns with natural gas as a storage facility. These elements to be constructed on boundary of Natura site.
- Reprofilling of coastal grassland habitats bordering Larne Lough to provide a flat area of 105 x 45 meters to host a wellpad to house below-ground drilling rig plant on the boundary of the Natura site (i.e. 0m from Natura boundary).
- Removal of 16,700m<sup>2</sup> of coastal grassland to create above-ground Gas Plant Facilities and associated access roads and car parking within 10m of the Natura site.
- Construction of c.1m<sup>2</sup>, 40m high vent stack and stabilization of adjacent slope on eastern shore of Larne Lough within 10m of the Natura site.

The project proposes the following elements on the eastern Islandmagee coastline at Castle Robin at significant distance from the Natura Site:

- Excavation of a 174m<sup>2</sup> sump into the bedrock (by blasting) on the foreshore of Castle Robin Bay on the eastern coast of the Islandmagee peninsula 2.7km east of the Natura site to house pumps for seawater intake.
- Construction of seawater intake, brine outfall and gas pipelines to connect the elements described above. The pipeline will pass within 20m of the Natura site
- Discharging brine to open ocean on the eastern Islandmagee coastline at Castle Robin via the Brine outfall pipe. Nearest discharge will occur ca. 2.7km east of the Natura site
- Temporarily increased levels of construction traffic on roads within 300m of Natura site, and new presence of construction traffic on farmland within 10m of the Natura site.

#### 6.1.2 Likely Potential Impacts on Swan Island SPA (Part of Larne Lough SPA)

Table 3 summarises potential impacts to Larne Lough SPA prior to implementation of any mitigation measures. Of potential impacts identified in Table 3, one is probable, with all other impacts of unknown likelihood or unlikely.

Two potential impacts are very large adverse (and of unknown likelihood), and two are slight adverse (one likely and one unlikely). Both very large adverse impacts are potential pollution incidents during construction or decommissioning whose likelihood is difficult. The potential consequence of worst-case large scale pollution is direct fatalities/injuries to Terns and Brent Geese or indirect disturbance via pollution-induced food depletion. No potential collision impacts with newly built artificial elements are predicted to Terns due to their small size and agile flight. No potential collision impacts with newly built artificial elements are predicted to Terns due to their small size and agile flight. No potential collision impacts with Brent are predicted due to their rare occurrence in significant numbers in the locality. Sandwich terns were seen to easily navigate through the series of Pylons by the Moyle interconnector in high winds in late summer 2009.

The remaining two slight adverse impacts are the unlikely potential indirect impacts to Tern colonies due to brine-induced decreases in prey abundance (see below), and the potential slight adverse physical disturbance impacts predicted for foraging terns from physical construction disturbance.

All residual impacts are non-significant

#### 6.1.2.1 Potential Impact of Brine emissions on Foraging Terns

The potential brine impact of brine emissions on terns has been classed as slight adverse. The data in this section 6.1.2.1 has been taken from Chapter 9.0 Coastal Processes of the ES (Appendix 10) which presents detailed tidal, bathymetric, and brine emission modeling data

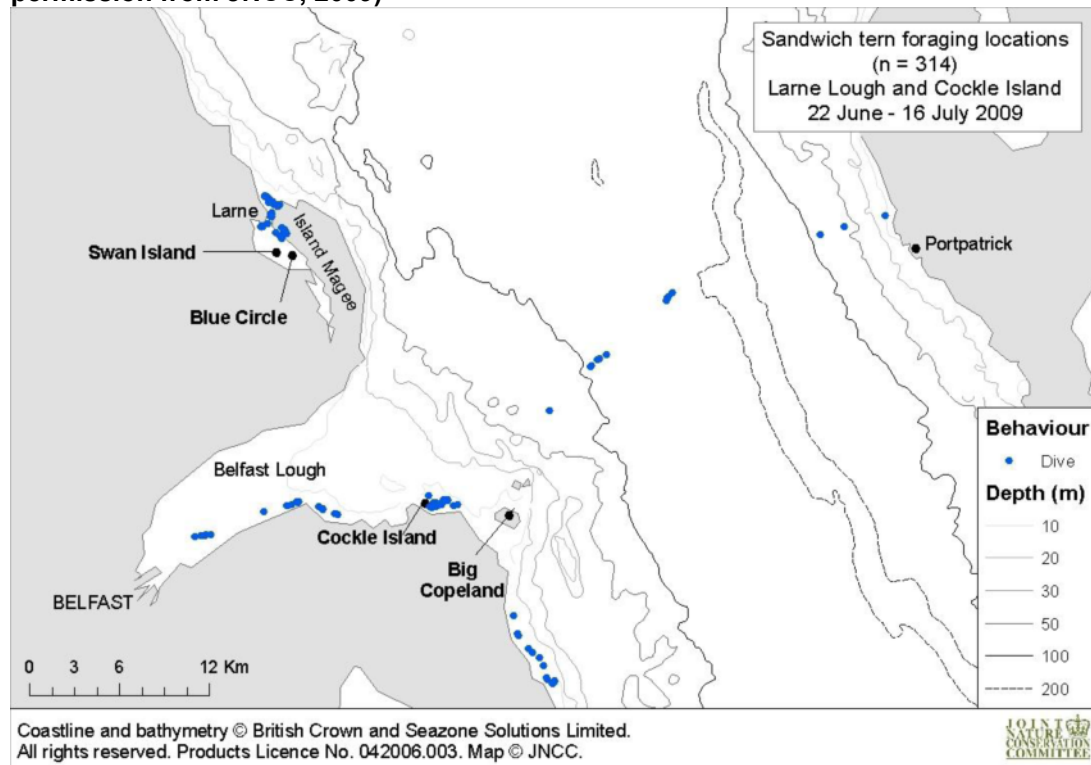
The brine outfall will discharge brine approximately 450m off-shore, with the discharge point located at 27 metres depth (chart datum). The brine, even at 10°C above ambient, will be more dense than the surrounding seawater, thus there will be a tendency for the brine plume to initially sink. However the eddying in the water column will mix the brine and seawater as the tidal currents flow across the outfall area (average tidal current speed of 0.22m/s). Any salinity increase in excess of the range normally experienced in seasonal variations is expected to be restricted to the initial mixing zone of <100m from the outfall. This corresponds to a distance of ca. 550m from the open coastline at its nearest point. Applying the Precautionary Principle (SNIFFER, 2006), this distance has been increased to 800m for the purposes of the analysis below, and is referred to as 'the limit of significant brine influence'.

Open coast surveys (Appendix 4) indicated that within the Open Coast survey area (limited to area in Figure 2) no fishing was observed by Terns. However incidental observations during other surveys such as the Black Guillemot surveys around the power station indicated that Sandwich Terns appeared to fish frequently along the eastern shore of Larne Lough north of Ballylumford. Common and Arctic Terns were not observed fishing in the Open Coast survey area, or wider area. However the open coast surveys only recorded birds within approximately 300m of the coastline.

Data on Tern distributions at distances of greater than 300m are provided by the preliminary results of the recent JNCC study on Tern foraging distributions (Wilson et al., 2009). The JNCC data mirror the open coast survey observations for the 300m buffer from the open coastline, in that all three Tern species appeared to avoid fishing here. The data further shows that each species in fact occupies a distinct foraging area either far off-shore, or within Larne Lough as shown in the following Charts 1-3. The distances below have been calculated by comparing foraging observations on the JNCC charts 1-3 with the proposed limit of significant brine influence of 800m.

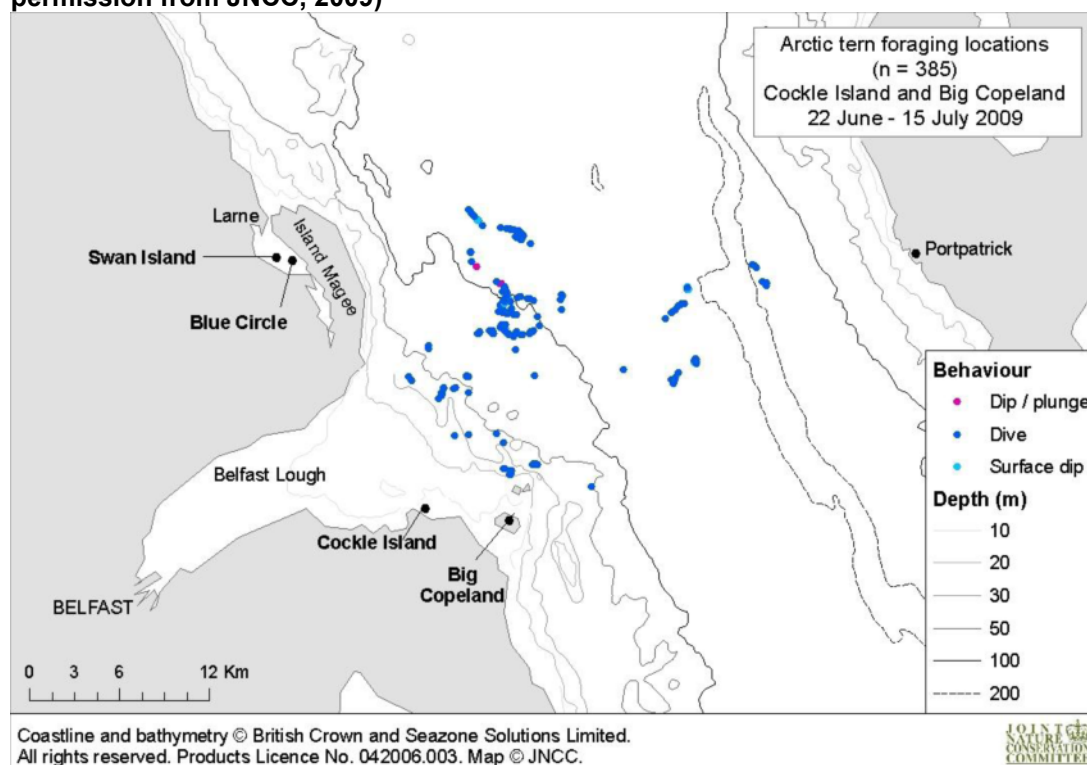
Sandwich Terns show a strong preference for fishing within Larne Lough (Chart 1) and were not recorded fishing east of Barrs Point by JNCC. No brine impacts are therefore predicted on Arctic Terns.

**Chart 1 Sandwich Tern Foraging Locations around Larne Lough (Reproduced under permission from JNCC, 2009)**



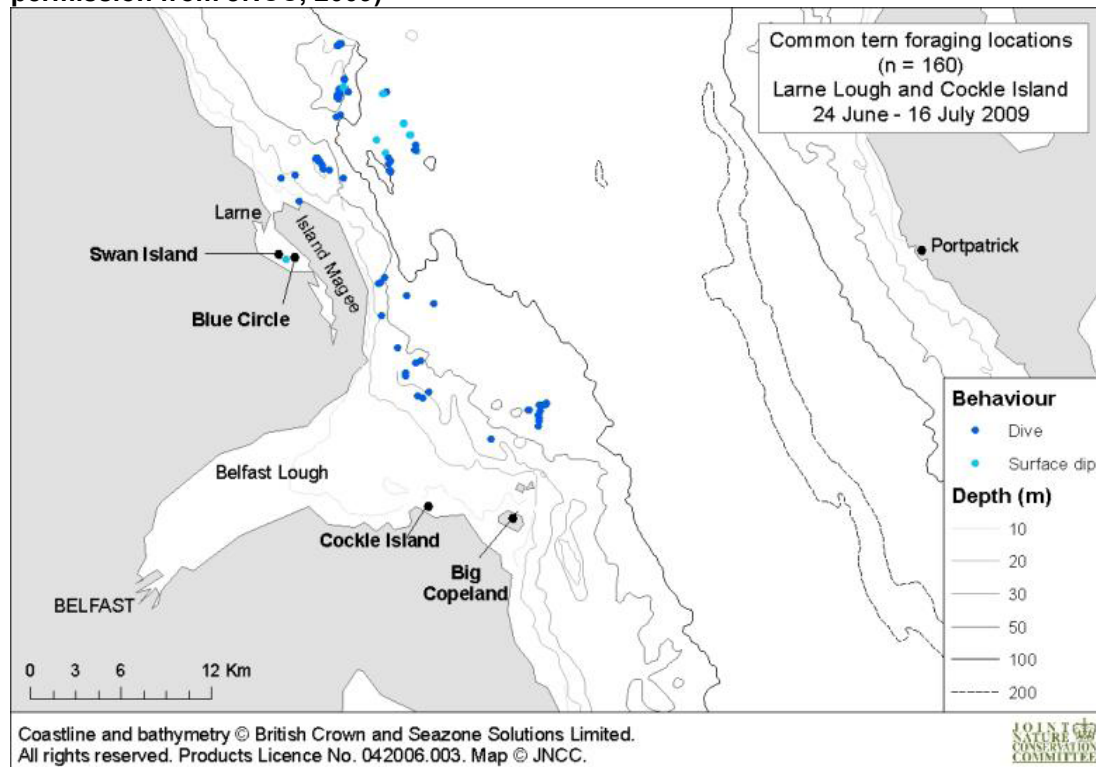
In contrast, Arctic Terns (Chart 2) fished only the open ocean far out to the east and south of Skernaghan Point. This species did not fish within c.8km of the limit of significant brine influence on a single occasion. No brine impacts are therefore predicted on Arctic Terns.

**Chart 2 Arctic Tern Foraging Locations around Larne Lough (Reproduced under permission from JNCC, 2009)**



Common Terns (Chart 3) fished the open ocean to the east and north of Skernaghan Point. In contrast to both Sandwich and Arctic Terns, this species did occasionally fish in the vicinity of the open coastline. However the species only fished once at Skernaghan Point (c.3km from limit of brine influence), and occasionally in the open ocean 3km off-shore to the north (also c. 3km from limit of brine influence). Further out to sea from the limit of brine influence, the Common Tern forages in a scattered northerly distribution at distances of up to 11km from the limit of significant brine influence. Common Terns generally forage in different open water locations to Arctic Terns. Applying the precautionary principle, a slight adverse impact to Common Terns is predicted.

**Chart 3 Common Tern Foraging Locations around Larne Lough (Reproduced under permission from JNCC, 2009)**



**Table 3 Summary of Potential Impacts to Swan Island SPA (Part of Larne Lough SPA) prior to Mitigation.**

Potential Impact	Nature	Magnitude <sup>1</sup>	Ecological Value of Habitat/Species/	Significance of Impact	Potential Impact Type	Phase of occurrence	Duration	Direct/ Indirect	Likelihood of Occurrence <sup>2</sup>	Mitigation Proposed	Significance of Residual Impacts
Pollution of Larne Lough during construction leading to Tern disturbance from food resource depletion	-ve	Major	Very High	Very Large adverse	Indirect Fatality/Disturbance	Construction	Temporary (36 months)	I	Unknown	Yes	N.S.
Pollution of Larne Lough at Decommissioning causing Tern disturbance via food resource depletion	-ve	Major	Very High	Very Large adverse	Indirect Fatality/Disturbance	Decommissioning	Temporary (Unknown)	I	Unknown	Yes	N.S.
Physical disturbance to Terns from change in prey distribution due to brine emission from outfall	-ve	Minor	Very High	Slight Adverse	Disturbance via prey loss	Construction	Temporary (5 years)	I	Unlikely	Yes	N.S.
Physical disturbance to Terns from drilling at wellpad during construction	-ve	Minor	Very High	Slight Adverse	Disturbance and/or Displacement	Construction	Temporary (18 months)	D	Likely	Yes	N.S.

### 6.1.3 Likely Potential Impacts on Larne Lough SPA

Table 4 (overleaf) summarises potential impacts to Larne Lough SPA (excluding Swan Island SPA)

Of potential impacts identified in Table 4, only one is likely, with the rest of unknown probability of occurrence or unlikely. Two impacts are very large adverse (likelihood unknown), two are large adverse (one likely, one unlikely), and one is slight adverse (unlikely). All very large adverse impacts are direct bird fatalities, or injury or indirect food loss disturbance due to an unlikely pollution incident during construction or decommissioning.

Potential collision impacts on Brent Geese are deemed to be unlikely due to the temporary presence of all construction plant structures (drill rig and cranes for 36 months only). Only the vent stack (40m high) will remain a permanent feature. The small Brent populations in the locality of the scheme (WeBS Peak Count 26; RPS Peak count 6) will further reduce collision risk. As noted in section 5.2.2.1, Brent geese are significantly less abundant in the outer Lough (within the scheme area) compared to the inner Lough (where intertidal mudflats are located).

The remaining slight adverse impact is due to the permanent loss of potential grassland bird feeding fields. The word potential here is key, because there is no evidence that the improved fields to be lost during project construction are used by local Brent populations. In any case, the areas lost (3.7ha) are relatively small and significant areas of alternative improved feeding fields to the south of the wellpad site.

All residual impacts are non-significant



**Table 4: Summary of Potential Impacts to Larne Lough SPA (Excluding Swan Island SPA) prior to Mitigation.**

Potential Impact	Nature	Magnitude <sup>1</sup>	Ecological Value of Habitat/Species/Feature	Significance of Impact	Impact Type	Phase of occurrence	Duration	Direct/Indirect	Likelihood of Occurrence <sup>2</sup>	Mitigation Proposed	Significance of Residual Impacts
Point pollution of Larne Lough during construction leading to degradation of plant habitats and Brent Goose feeding resources	-ve	Major	Very High	Very Large Adverse	Bird Death/Disturbance	Construction	Temporary (36 months)	D/I	Unknown	Yes	N.S.
Point pollution of Larne Lough during decommissioning leading to degradation of plant habitats and Brent Goose feeding resources	-ve	Major	Very High	Very Large Adverse	Bird Death/Disturbance	Decommissioning	Temporary (Unknown)	D/I	Unknown	Yes	N.S.
Collision impacts of Brent Geese with 55m high drill rig, 40m high vent stack, and cranes (22 Individuals <sup>3</sup> )	-ve	Intermediate	Very High	Large Adverse	Bird Death	Construction	Temporary (36 months) (Drill rig, cranes) Permanent (Vent Stack)	D	Unlikely	Yes	N.S.

Noise and visual disturbance to feeding/roosting Brent geese from drilling at wellpad	-ve	Intermediate	Very High	Large Adverse	Disturbance	Construction	Temporary (36 months)	D	Likely	Yes	N.S.
Disturbance to Brent Geese through loss of approx 3.7ha grassland feeding fields (235 Individuals <sup>4</sup> )	-ve	Minor	Very High	Slight Adverse	Displacement	Construction & operation	Permanent	I	Unlikely	No	N.S.

#### 6.1.4 Cumulative effects

There is potential for the two identified disturbance impacts on Terns (construction disturbance and brine-induced changes in fish prey distribution) to cumulatively interact and result in an overall disturbance impact greater than the individual impacts. However, following mitigation, neither of the individual impacts is considered to be greater than slight adverse, and the cumulative impact is similarly predicted to be insignificant.

There is equally potential for the two identified disturbance impacts on Brent geese (construction disturbance and collision risk) to cumulatively interact and result in an overall disturbance impact greater than the individual impacts. However again, this is not considered significant.

No significant cumulative effects resulting from other extant or proposed projects are known.

## **6.2 MITIGATION MEASURES**

Mitigation of the identified potential impacts in section 6.2 is addressed by both avoidance of impact and management or reduction of impact.

- **Pollution and Disturbance Impacts during Construction and Operation**

Sensitive construction methods have been integrated into engineering works as detailed in the Project Description (Appendix 1). Pollution prevention guidelines have been outlined in the Ecology Chapter of the ES (Appendix 10), and will be an integral part of the Site Environmental Management Plan (EMP), which will be prepared during the detailed design stage.

- **Pollution and Disturbance Impacts during Decommissioning**

Prior to undertaking planning of any decommissioning works, an ecologist will be contracted to undertake an ornithological review of the scheme area, and undertake further surveys should he/she consider it necessary. Pollution prevention guidelines will be strictly adhered to during the decommissioning phase, and measures required to minimise construction disturbance to wintering birds will be agreed in consultation with NIEA following the outcome of the ornithological review. This may include installation of acoustic fencing to reduce noise and screening to reduce the level of perceived threat due to visible human presence.

- **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 be preferably 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.

- Changes in fish distribution at brine outfall

The brine outfall pipe will discharge brine solution on the seabed to improve mixing of discharge and reduce potential impacts to localized fish populations, which are potential prey items to Terns

- Disturbance to wintering birds during construction of IPS

At this stage of the preliminary design, it is not certain whether blasting will be required at the site of the IPS. Upon completion of the pre-construction ground investigation studies, if it is determined that blasting is required; a detailed methodology will be prepared and submitted with the environmental management plan for approval by the NIEA. If required and where possible, Islandmagee Storage will endeavour to undertake blasting works during the month of September, which will significantly reduce the potential adverse impact on birds. This avoids the bird breeding season, and has the lowest counts of both Brent goose and total wintering wildfowl numbers at Larne Lough (Five-year peak of 5 individuals see Appendix 5.7), and on the island of Ireland (Data from Boland & Crowe, 2007). If blasting works are required outside of the month of September, a strategy for mitigation will be agreed with the NIEA ahead of any works commencing.

### **6.3 RESIDUAL EFFECTS ON NATURA SITE INTEGRITY**

There will be no significant residual effects following full and proper implementation of the recommended mitigation measures which the project proponent is committed to undertaking.

## **7.0 CONCLUDING REMARKS**

Following mitigation, the scheme is likely to result in several slight adverse disturbance impacts to key SPA Brent geese and Tern populations however no identified impacts are considered significant. Mitigation has been proposed to minimise the magnitude of the slight adverse impacts. No significant impacts to SPA habitat factors are predicted.

## 8.0 REFERENCES

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