

The Proposed Islandmagee Natural Gas Storage Facility



ORNITHOLOGICAL ADDENDUM REPORT

Islandmagee
Storage

Ornithological Addendum Report 2012

Islandmagee Gas Storage Project

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1 INTRODUCTION

This report has been produced in response to a request by the Department of the Environment (DOE) Strategic Planning Division (Ref: F/2010/0092/F) for further environmental information relating to the proposal to develop:

“Above ground facilities associated with proposed Gas Storage Facility for the storage of natural gas. Includes underground pipelines, gas storage plant, leaching plant, seawater pumping station, temporary construction compound and wellpad to accommodate drilling rig for 7 no. boreholes.”

The aim of this report is to collate all existing ornithological data collected in relation to the proposed Islandmagee Natural Gas Storage Facility presented in the original *Proposed Islandmagee Natural Gas Storage Facility Environmental Impact Statement* (hereafter referred to as the EIS) and associated reports, and new bird survey datasets to fulfil the Northern Ireland Environment Agency Natural Heritage (NIEA, NH) requirement for additional bird surveys to complete an Article 6 Appropriate Assessment.

Whilst most of the relevant information has been included, this report should be read with reference to the relevant chapters of the original Environmental Impact Statement referred to within the text and the following Appendices, Figures and Tables:

- Figure 1: Proposed Islandmagee Storage Project Scheme Layout
- Figure 2: Maximum Salinity During a Neap Tide Cycle – Bottom Layer
- Figure 3: Maximum Temperature During a Neap Tide Cycle – Bottom Layer
- Figure 4: Maximum Salinity During a Spring Tide Cycle - Bottom Layer
- Figure 5: Bird Survey Area
- Figure 6: RSPB Larne Lough Annual Reserve Colony Counts 2004-2010
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- Figure 8: Breeding Bird Territories Map 1
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- Table 1: Guidance on Describing Ecological Value of Features
- Table 2: Seabird 2000 Data for Gobbins Cliffs, County Antrim, Northern Ireland
- Table 3: Summary Isle of Muck annual seabird colony counts (2001-2011). BTO species codes are provided in Table 10.
- Table 4: Summary Ornithological Features of Interest
- Table 5: Peak Counts of Bird Species Recorded During the Wintering Farmland Bird Survey
- Table 6: Numbers of breeding bird territories recorded within the survey area

- Table 7: Peak counts for Open Coast Bird Surveys 2008/09
 - Table 8: Black Guillemot Breeding Population Survey Results
 - Table 9: Black Guillemot Productivity Results
 - Table 10: Open Coast Bird Survey 2011/12 Peak Section Counts
 - Table 11: Criteria for Determining the magnitude of Potential Ecological Impact
 - Table 12: Estimating the Overall Ecological Appraisal Category
 - Table 13: Summary table of Potential Impacts on Larne Lough SPA/Ramsar Site.
 - Table 14: Summary Table of Potential Impacts on Swan Island SPA.
 - Table 15: Summary Table of Potential Impacts on Larne Lough ASSI.
 - Table 16: Summary of Potential Impacts on Portmuck/Gobbins ASSI
 - Table 17: Summary of Potential Impacts on Local Species
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- Appendix 1: Appropriate Assessment
 - Appendix 2: Larne Lough Wintering Bird Desktop Study
 - Appendix 3: BTO WeBS and NEWS Data
 - Appendix 4: JNCC Tern Tracking Data
 - Appendix 5: Impacts on Marine Flora and Fauna – Response to FI Request
 - Appendix 6: Bird Survey Conditions
 - Appendix 7: Open Coast Bird Survey 2011/12 Monthly Peak Counts
 - Appendix 8: Species Accounts

1.1 Project Description

This section describes the main components of the proposed Islandmagee Natural Gas Storage Facility. This section should be read with reference to Chapter 4.0 Project Description contained within the EIS and Figure 1.

The above ground facilities for the proposed development are primarily located adjacent to the existing Ballylumford Powerstation, Islandmagee. The caverns themselves will be located beneath the eastern side of Larne Lough and will be accessed via a terrestrial wellpad located on a site, which is presently in agricultural use in Ballydown.

1.1.1 Gas Plant Facility (GPF) and Cold Vent

The main operational facility which will house gas compression, heating/cooling, dehydration and metering equipment required for the day-to-day operation of the gas storage facility will be located in farmland above the eastern shore of Larne Lough. The overall estimated post construction footprint of the main gas plant facility including the access road is approximately 16,700m².

The cold vent (vent stack) is a minor structure which will be used to purge the gas inventory from the gas plant and boreholes above the level of the safety shut-off valves in the event of an emergency. The vent stack will measure approximately 0.9m in diameter and 40m in height. The vent stack will be connected to the main gas plant facility by a subsurface pipeline using an open trenching method.

1.1.2 Sea Water and Brine Pumping Facilities (Leaching Plant)

A building housing the pumping equipment and brine tanks that will pump seawater into the wells (to create the caverns) and pump the brine out of the wells back to the sea, will be located on hardstanding by the Ballylumford Road. The overall estimated post construction footprint of the Leaching Plant area (including hardstanding and access) is approximately 6,110m².

1.1.3 Wellpad

A flat pad approximately 100m x 45m that will initially support the drilling rig required to create seven wells down to the salt layer and subsequently will contain the storage cavern connections in underground cellars. The Wellpad will be located in farmland on the eastern shore of Larne Lough south of the Main Gas Plant Facility. The estimated post construction footprint of the wellpad will be approximately 4,800m².

1.1.4 Seawater Intake Pumping Station (IPS)

The intake sump and pumping equipment located will be located on the eastern shore of the Islandmagee peninsula (referred to as Castle Robin Bay) which will draw in the fresh seawater and pump it to the Leaching Plant. The overall estimated footprint of the sea water intake pumping station is 175m².



Figure 1 Proposed Islandmagee Storage Project Scheme Layout

1.1.5 Connecting Pipelines

1.1.5.1 Seawater Intake Pipeline

The seawater intake pipeline will run largely over farmland between the Seawater Intake Pumping Station and the Wellpad via the Leaching Plant. The intake pipeline will measure approximately 2,570m in total length and can be divided into the following sections:

- Section A (725m) – a directionally drilled sub-surface pipeline extending from the Wellpad to a junction point where the seawater and brine pipelines diverge (see below). For this section of the pipeline route, a Horizontal Directional Drilling (HDD) rig is proposed to create a sleeved sub-surface tunnel in which the seawater intake, brine outfall and gas pipelines will travel together from the Gas Plant Facilities to the Wellpad Site.
- Section B (275m) – a dual conventionally trenched sub-surface pipeline (occupying the same trench as the brine outfall pipeline) from the HDD pit to the Sea Water and Brine Pumping Facilities.
- Section C (2,285m) – a dual conventionally trenched sub-surface pipeline (occupying the same trench as the brine outfall pipeline) from the Sea Water and Brine Pumping Facilities to the point at which the sea water and brine pipelines diverge.
- Section D (285m) – a solo conventionally trenched sub-surface pipeline from the point at which the seawater pipeline diverges from the brine pipeline to the Seawater Intake Pumping Station.

More detailed methodologies on pipeline installation are available in Section 4.3 of the EIS.

1.1.5.2 Brine Outfall Pipeline

The brine outfall pipeline will run between the Wellpad and the Outfall Discharge Point via the Brine Leaching Plant. The pipeline will measure approximately 3,880m in total length and can be divided into the following sections:

- Section A (725m) – a directionally drilled sub-surface pipeline extending from the Wellpad to the HDD pit beside the Main Gas Plant Facility. For this section of the pipeline route, a HDD rig will create a sleeved sub-surface tunnel in which the seawater leaching, brine outfall and gas pipelines will travel together from the Gas Plant Facilities to the Wellpad Site.
- Section B (275m) – a dual conventionally trenched sub-surface pipeline (occupying the same trench as the seawater leaching pipeline) from the HDD pit beside the Main Gas Plant Facility to the Sea Water and Brine Pumping Facilities.
- Section C (2,285m) – a dual conventionally trenched sub-surface pipeline (occupying the same trench as the seawater intake pipeline) from the Sea Water and Brine Pumping Facilities to the point at which the brine outfall diverges from the seawater intake, and the construction method switched to HDD.
- Section D (595m) – a directionally drilled single sub-surface pipeline extending from the brine outfall HDD pit to the Outfall Discharge Point located c.450m from the eastern shoreline of Islandmagee, at Castle Robin Bay. The HDD will have an angled trajectory from the junction point at Drundressan and will drill through the surface basalt and underlying sedimentary rocks, passing beneath the base of the cliff and travelling approximately 15-20m below the seabed surface before angling upwards

again and breaking through the surface at, or very close to the outfall discharge point.

More detailed methodologies on pipeline installation are available in Section 4.3 of the EIS.

1.1.6 Temporary Set Down and Storage Compound

The first aspect of the project will be to establish temporary construction offices and equipment laydown/storage areas adjacent to the site, together with the necessary associated connections to existing infrastructure. These may need to be outside of the permanent site boundary. A temporary set down and storage compound has been identified 850m northwest of the site on an existing unused hardstanding owned by Northern Ireland Electricity (NIE) at the junction of Ferris Bay Road and Ballylumford Road.

1.1.7 Brine Discharge and Dispersion Modelling

Islandmagee Storage Limited proposes to create seven caverns for gas storage within a rock salt interval underneath Larne Lough. The proposed cavern construction will be undertaken by solution mining of the salt deposits with the disposal of the saturated brine solution via an outfall located at Castle Robin Bay, on the eastern side of the Islandmagee peninsula.

The cavern designers anticipate that cavern construction (leaching) will follow a phased approach with up to four caverns being leached in parallel. The maximum leaching rate per cavern is designed to be 300m³/hr, and it is not anticipated that more than three caverns will be leached at this rate at the same time. The maximum brine discharge will occur when three caverns are discharging 300m³/hr simultaneously, with a fourth at an early stage of leaching. The maximum anticipated brine production rate will be 1000m³/hr (3 @ 300m³/h during the main leaching phase, plus 1 @ 100m³/hr initial sump leaching phase).

A brine dispersal study, involving the development and calibration of a tidal model of the waters along the eastern shore of Islandmagee was undertaken. The results of which were detailed in Chapter 9.0 "Coastal Processes" of the EIS. This report provides summary results of the brine dispersion modelling detailing the worst case scenario and should be read with Chapter 9.0 of the EIS.

The following characteristics for the worst case scenario for brine discharge:

- Outfall Discharge Rate: 1,000m³/hr;
- Discharge Salinity: 260psu;
- Discharge Temperature: 21.33°C.

Monthly time series data on background salinities and temperatures were acquired from three locations close to the outfall site, one at the entrance to Larne Lough, one just to the west of Skernaghans Point and one north east of the discharge point. The measurements were taken by AFBI and NIEA as part of their marine water quality monitoring programme. The datasets obtained showed a typically salinity range between 33.9 and 34.5psu and a temperature range between 8.4 and 12.9°C.

For the purposes of the dispersal modelling, the following background criteria were used:

- Background Salinity: 34.2psu;
- Background Temperature: 11.3°C.

The initial dilution modelling was undertaken using a brine diffuser with 3 ports of 0.2m in diameter. The dispersion model was run for a variety of spring and neap flow conditions to simulate the initial dilution at various stages of the tidal cycle.

The brine will initially tend to sink down to the seabed due to the density of the solution however the brine will be diluted as the outlet jets from each port spread out with distance from the outfall. The models predict that beyond the point where the brine first contacts the seabed dilution will continue to increase rapidly such that a dilution to 36.6psu is achieved between 5-10m from the outfall location.

1.1.7.1 Brine dispersion during neap tides

For the purposes of this report only the maximum salinity (Figure 2) and temperature (Figure 3) envelopes within the bottom layers of the water column are illustrated here. The salinity distributions within the bottom layer of the water column at high tide, low tide, mid ebb and mid flood are illustrated in Figures 9.23 to 9.26 respectively in Chapter 9 of the EIS. The maximum salinity for the middle layers and surface layer of the water column are shown in Figures 9.27 to 9.29 in Chapter 9 of the EIS and illustrate a significant decrease in salinity with distance up through the water column, with very little impact evident within the surface layer (Figures 9.30 to 9.32 in Chapter 9 of the EIS).

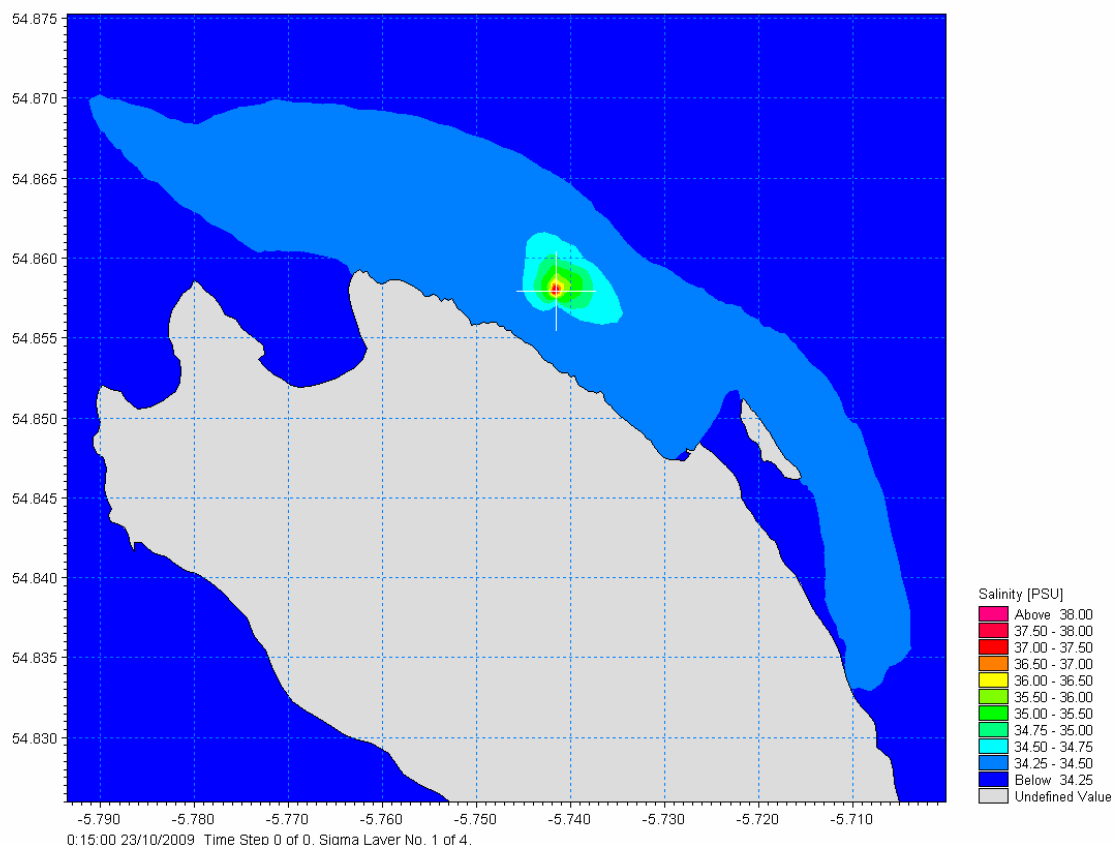


Figure 2 Maximum Salinity During a Neap Tide Cycle – Bottom Layer

Predicted salinity increases are relatively small with a maximum increase in salinity of less than 4psu indicated during model simulations, with the larger increases in salinity only occurring for a short period of time during the tidal cycle. Any salinity increases in excess of the range normally experienced in seasonal variations is expected to be restricted to the 'initial mixing zone', which is an area extending less than 100m from the outfall. Background salinities in this part of the North Channel off Islandmagee are known to range between c. 30.5psu and 34.8psu.

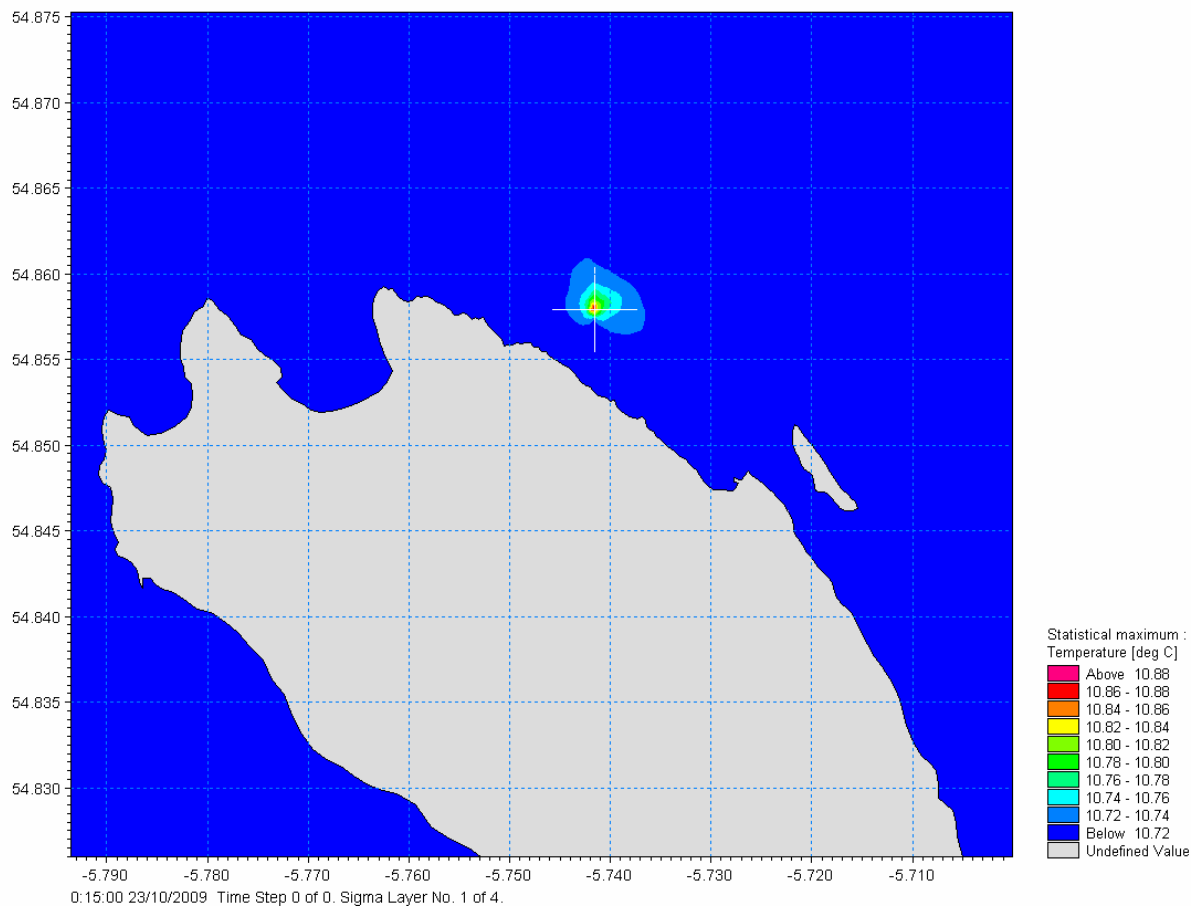


Figure 3 Maximum Temperature During a Neap Tide Cycle – Bottom Layer

Temperature changes are also shown to be small compared to background levels, with a noticeable increase only occurring for a short period of time within the tidal cycle. Figure 9.34 in Chapter 9 of the EIS illustrates how the temperature increases predicted around the outfall location decrease up through the water column.

1.1.7.2 Brine dispersion during spring tides

The impact on ambient salinity during neap tides is shown above to be minimal. Therefore, during spring tides where peak tidal velocities are typically double those of the neap tides, the impact on background salinity is further reduced.

The maximum salinity envelope for the bottom layer during spring tides is shown in Figure 4. Figures 9.36 to 9.40 in Chapter 9 of the EIS show the corresponding salinity concentrations at high tide, low tide, mid ebb and mid flood.

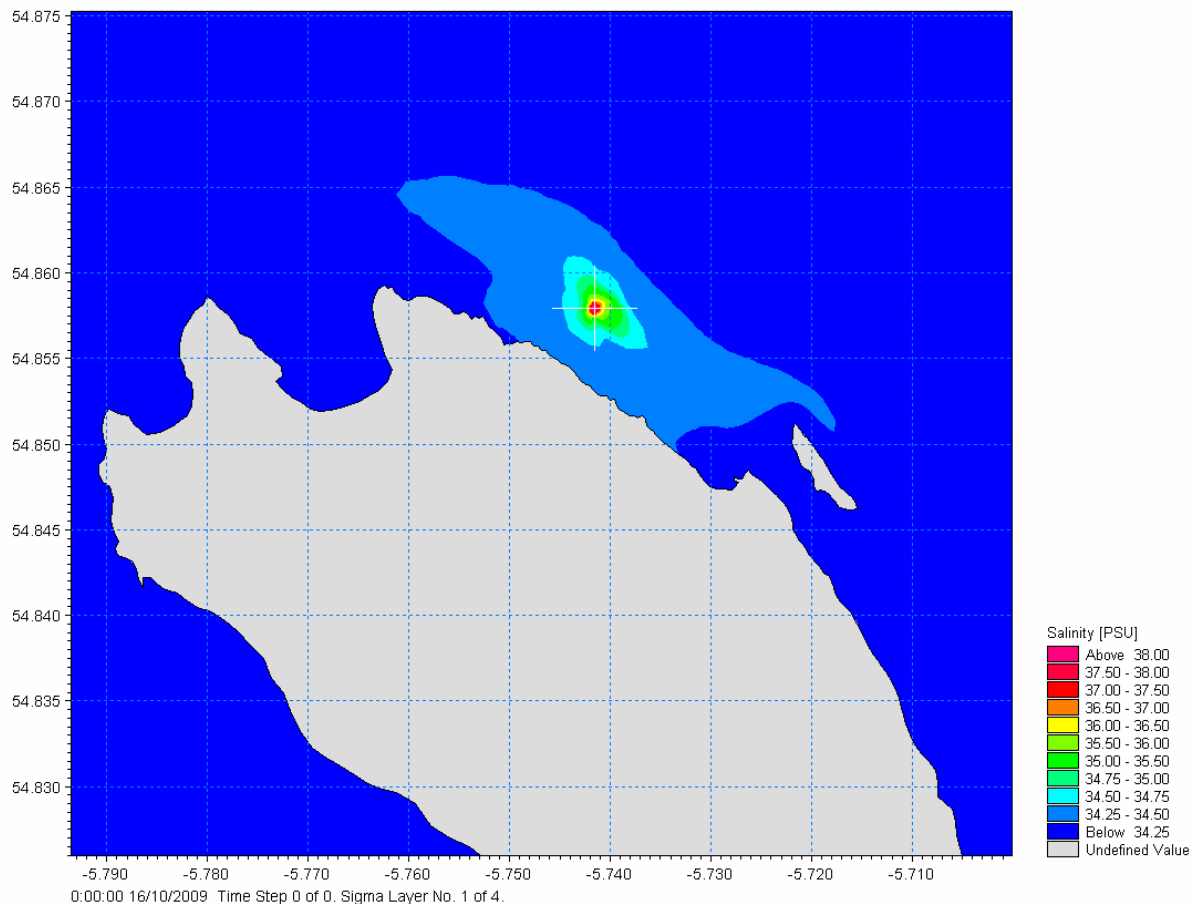


Figure 4 Maximum Salinity During a Spring Tide Cycle - Bottom Layer

As with the neap tide results the highest increases in salinity levels only occur for short periods beyond the immediate vicinity of the outfall location.

1.2 Report Scope

This report aims to collate all existing ornithological data collected in order to assess the potential impacts of the proposed Islandmagee Storage Project on ornithology. The information collated includes data collected and presented in the original EIS, external datasets and additional data collected following a request for further environmental information issued by DOE.

1.2.1 Scope of Ornithological Surveys

The following ornithological surveys have been undertaken to date within the survey area in order to assess the potential impact of the proposed Islandmagee Storage Project on ornithology:

- Breeding Farmland Bird Survey 2009;
- Wintering Farmland Bird Survey 2008/09;
- Breeding Black Guillemot Survey 2009;
- Wintering & Breeding Open Coast Bird Survey 2008/09;
- Open Coast Bird Survey 2011/12.

1.2.2 Statement for Appropriate Assessment

Due to the location of the scheme within and adjacent to the Larne Lough SPA, RPS was commissioned to provide a statement for an Habitats Directive Article 6(3) Appropriate Assessment (Appropriate Assessment or AA) on behalf of Islandmagee Storage Limited for the proposed Islandmagee Storage Project.

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

As the Competent Authority in this instance, the DOE for Northern Ireland must make key decisions prior to granting consent for a project which has potential to result in significant impacts on a Natura 2000 Site. To assist, RPS produced a report to collate and present the key data required for the CA to accurately complete an Article 6 Appropriate Assessment. This report (excluding appendices) is presented in Appendix 1.

1.2.3 Wintering Bird Desktop Study

Larne Lough SPA is primarily designated for internationally important populations of two breeding tern populations and over-wintering Brent Geese *Branta bernicla hrota*. As the breeding Tern populations are well documented, and located c. 1km to the southwest of the proposed project footprint at its nearest point, Terns were excluded from the review of all existing datasets in order to identify potential gaps in wintering bird survey data, which may require additional survey. Existing datasets reviewed within the Desktop Study included:

- British Trust for Ornithology Wetland Bird Survey (BTO WeBS);
- BTO Non-Estuarine Coastal Waterbird Surveys (BTO NEWS);
- Biodiversity records held by the Centre for Environmental Data and Recording (CEDaR).

A copy of the Larne Lough Wintering Bird Desktop Study is included in Appendix 2, which details the coverage of existing datasets (Figure 1 of Appendix 2). BTO WeBS and NEWS datasets obtained are summarised and presented in Appendix 3.

1.2.4 JNCC Tern Tracking Data

1.3 JNCC Tern Tracking Studies

The Joint Nature Conservation Committee (JNCC) in collaboration with other statutory nature conservation bodies, are currently working to identify the most suitable marine areas to be recommended as SPAs under the EC Birds Directive for breeding terns within the UK. Part of this work being undertaken is to collect data at a number of tern breeding sites to provide information on their at-sea foraging distributions during the breeding season. This data along with existing marine habitat data will be used to develop species-specific models of foraging habitat preferences. These models can then be used to predict potentially important sites in marine areas for which no at-sea foraging distribution data exists.

At-sea foraging tern distribution data has been collected from a number of sites including the Larne Lough, Copeland Island and Cockle Island tern colony sites in Northern Ireland. A request for any associated reporting was submitted to JNCC in August 2011 for the purpose of this report however, final reports for these studies are not yet available. JNCC were however able to provide a series of interim maps illustrating tracking and transect data from

Northern Ireland tern colonies (Larne Lough, Copeland Island and Cockle Island) collected in 2009, 2010 and 2011. An unpublished interim report (Wilson *et al.*, 2009) was also made available for the 2009 Proposed Islandmagee Natural Storage Facility Environmental Impact Statement (EIS) and is re-used here.

A summary and discussion of information obtained from JNCC tern tracking studies is presented in Appendix 4.

1.3.1 Impacts on Marine Flora and Fauna

Following a request for further environmental information regarding potential impacts on marine flora and fauna as a result of brine emissions at Castle Robin Bay an addendum response was produced and is included in Appendix 5. The report provides further information on several key topics relevant to this report and potential impacts on ornithological features:

- An Overview of Osmoregulation in Fish;
- Potential Impacts of the Brine Discharge on Sandeels.
- Potential Impacts of the Brine Discharge on Primary Productivity;
- Impacts on Scallop, Crab, Lobster and Shrimp.
- Impurities in the Brine.

2 BIRD SURVEY METHODOLOGY

2.1 Study Area

The study area is located on the east Antrim coast, in Northern Ireland and is dominated by farmlands on the Islandmagee peninsula adjacent to Larne Lough. Larne Lough is a sea lough separating the Co. Antrim mainland from the Islandmagee peninsula, which is of national and international importance for both breeding and wintering seabirds and waterfowl. The Lough to the south of the proposed development site is shallow, having become extensively infilled 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 only weakly tidal, and there are no mudflats exposed at low tide.

2.2 Bird Survey Approach

This section should be read with reference to Figure 5 which illustrates the bird survey area.

2.2.1 Wintering Farmland Bird Survey 2008/09

The proposed pipeline route was walked three times during the 2008/09 wintering period. The methodology adopted followed the guidelines for the BTO Bird Atlas Wintering Surveys. Peak counts of all birds seen or heard were recorded and all protected species carefully observed. Surveys were carried out in good weather conditions between the hours of 08h00 and 11h00.

2.2.2 Breeding Farmland Bird Survey 2009

The BTO Common Bird Census (CBC) Technique was employed to survey breeding birds. Additional guidance from Gilbert *et al.* (1998) on species-specific survey strategies was also adopted where required. The site was visited three times to record breeding bird territories within the survey area by mapping bird activity indicative of breeding. Surveys commenced an hour after dawn and were completed before 12h00. Surveys were not carried out in adverse weather conditions or in poor visibility. The survey area is illustrated in Figure 5. Territories were not mapped for the majority of the pipeline route as this would have significantly lengthened survey effort due to access and walking distance considerations. The justification for this slightly curtailed approach is that no significant nesting habitat loss is envisaged along the pipeline route. It is also highly likely that pipeline construction works will be undertaken outside of the breeding bird season.

2.2.3 Black Guillemot Breeding Survey 2009

Black Guillemots breed in regionally important numbers in Larne Lough, with one long-established colony nesting within the wooden jetties located at the Ballylumford Power Station, Islandmagee. The colony is located c. 700m from the proposed location of the Vent Stack and c.1km from the most northerly Wellpad. RPS undertook a breeding survey of the Ballylumford jetties in April/July 2009. Two surveys were undertaken in April to estimate population size, with two further visits (in May and July 2009) to estimate productivity (methods of Gilbert *et al.*, 1998).

Population Survey

The April population surveys use a peak count of all breeding adults over the two visits to provide a measure of the total breeding population. Surveys were undertaken from first light to about two hours later. Birds observed were divided into three categories:

- Birds in summer breeding plumage;

- Birds in non summer breeding plumage;
- Birds >300m offshore.

Other features recorded were detailed weather data (including sea state), presence of breeding gulls, signs of mammalian predators, and probable breeding habitat.

Productivity Survey

The May and July productivity surveys employed a non-invasive method for surveying inaccessible nest sites to provide a crude estimate of successful nest sites (i.e. productivity). This is achieved by recording parent changeovers at the nest, and fish deliveries to the nest both of which indicate a successful nest site. The productivity index (p) is the number of successful nest sites in July divided by the number occupied in May.

2.2.4 Open Coast Bird Surveys Winter 2008/09 and Summer 2009

The 2008/09 Open Coast Survey Area was defined as the non-estuarine eastern shore of the Islandmagee peninsula, stretching 2.6km from Skernaghans Point south to Portmuck Bay (Figure 5). The aim of the open coast bird surveys was to record the location of any breeding seabirds within the vicinity (c. 400m) of the proposed Castle Robin brine outfall pipe and pumping stations, and to record the use of the inshore coastal waters by foraging birds during the breeding and wintering season.

2.2.4.1 Wintering Open Coast Surveys 2008/09

Three surveys were undertaken between December and February 2008/09. Surveys were undertaken between 09h00 and 16h00. The 2.6km stretch of coastline between Skernaghans Point and Portmuck Bay was walked and all seabirds within 300m of the coast were recorded. Notes were made on species and significant seabird aggregations at distances >300m.

2.2.4.2 Breeding Open Coast Surveys 2009

A pragmatic combination of species-specific breeding seabird methodologies adopted from Gilbert *et al.*, 1998 was adopted to survey for nesting seabirds, waders, gulls and raptors c. 400m either side of the proposed location of the brine outfall pipe and pumping station at Castle Robin. Similarly the 2.6km stretch of coastline between Skernaghans Point and Portmuck Bay was walked and all seabirds within 300m of the coast recorded. Notes were made on species and significant seabird aggregations at distances >300m.

2.2.5 Open Coast Bird Surveys 2011/12

The requirement for additional Open Coast Bird Survey arose from the request for further environmental information. Following the submission of the EIS NIEA NH considered that there was insufficient information to assess the impact of the proposed scheme on Natural Heritage interests, and that further information was required in order to complete an Article 6 Appropriate Assessment. Following recommendations and guidance from NIEA NH the coastal inshore survey area extends c.2.6km from Skernaghan Point to Portmuck Bay (Figure 5).

Following a number of preliminary surveys Sandwich terns were regularly noted flying into Browns Bay and subsequently foraging for long periods of time before departing for Larne Lough. Browns Bay was therefore included in the coastal survey area as a reference. All coastal waters between Skernaghan Point and Portmuck Bay and also Browns Bay to a seawards distance of 1km were surveyed for seabirds, with notes made of significant aggregations of seabirds beyond this. Due to poor visibility the seawards distance was often <1km. The coastal survey area was divided into four sub-sections taking into account waters likely and unlikely to be affected by the brine discharge (Figure 2 and 4 and EIS Section

9.3.4.1), geographical features and also observations of foraging birds (N. Robinson *Pers Obs*):

- Section 1: Skernaghan Point to Castle Robin (c.1km of coastline)
- Section 2: Castle Robin to Mcllroys Port (c. 800m of coastline)
- Section 3: Mcllroys Port to Portmuck Bay (c. 800m of coastline)
- Browns Bay

The baseline salinity data obtained from AFBI and NIEA indicates that background salinities in the coastal survey area naturally range between c. 30.5psu and 34.8psu. Coastal waters likely to be affected by the brine discharge are identified as those where the salinity following brine discharge increases in excess of the waters natural range. Any salinity increase in excess of the range normally experienced in seasonal variations is expected to be restricted to the 'initial mixing zone', which is an area less than 100m from the outfall point. The initial mixing zone is restricted entirely to Section 2 of the Coastal Survey Area.

- 0 – 100m;
- 100 – 250;
- 250 – 500m;
- 500 – 750m;
- 750m – 1km;
- >1km.

2.2.6 Open Coast Survey Methodology 2011/12

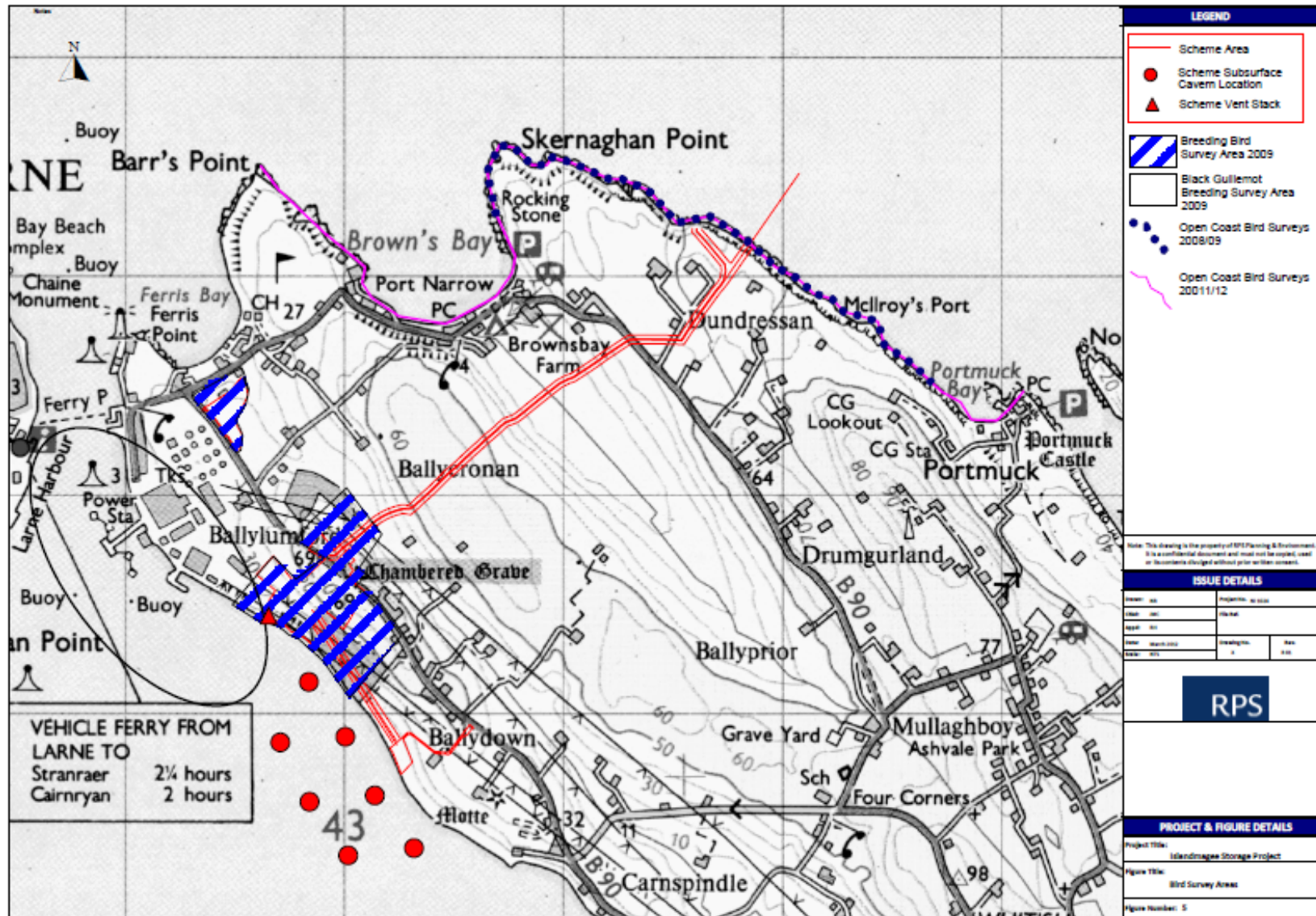
The aim of the 2011/12 surveys was to record the distribution, numbers and behaviours of seabirds within the coastal survey area taking into account seasonal, diurnal and tidal variations. Coverage of the coastal survey area was fortnightly following recommendations by NIEA NH, with additional survey effort to take into account tidal and diurnal variations. Survey effort was therefore focused on two survey types:

- Early Morning & Afternoon/Early Evening Counts – undertaken fortnightly;
- High Tide/Low Tide Counts –undertaken monthly.

2.2.6.1 Early Morning & Afternoon/Early Evening Counts

These counts aimed to record any diurnal variation between the distribution of seabirds within the coastal survey area, taking into consideration known timings of peak species counts (e.g. black guillemots typically present in peak numbers in waters adjacent to colonies shortly after dawn during the breeding season) and rafting behaviours of certain species (e.g. manx shearwater evening rafting). These counts were not restricted by tide times and therefore could be undertaken on a fortnightly basis in-so far as reasonably practical taking into consideration survey and visibility conditions.

On these count days cumulative hourly counts of all seabirds within each subsection were undertaken once within the morning of the survey day and once within the afternoon/early evening of the survey day. Counts were undertaken from carefully selected vantage points, which allowed complete coverage of each sub-section. During these counts all birds using the coastal survey area up to a seawards distance of 1km were recorded and their dominant behaviours noted i.e. foraging (F), loafing (L), displaying (D) and roosting (R). Notable numbers of seabirds in excess of 1km were recorded where visibility allowed, with the focus of identifying key areas for foraging terns associated with Larne Lough SPA outside of the coastal survey area. Seabirds flying over the survey area were also noted.



2.2.6.2 High Tide/Low Tide Counts

Each month a single high tide and low tide count was undertaken within the coastal survey area using the methodology for early morning and afternoon/early evening counts stated above. Tidal counts were restricted to being undertaken within two hours either side of the respective tide.

2.2.7 Impact Assessment

In the EIS an impact assessment was undertaken in accordance with the Institute of Ecology and Environmental Management (IEEM) Guidelines for Ecological Impact Assessment in the United Kingdom (IEEM, 2006), and also using experience of 'best practice' in the ecological assessment of proposed developments. The impact significance is a combined function of the conservation value of the affected feature (Table 1), and the magnitude of the potential impact. Magnitude of potential impact is often difficult or impossible to characterise, and the following list of parameters are considered when attempting to measure the magnitude of a potential impact:

- Physical Nature;
- Type: Positive (+ve) or Negative (-ve), Direct (D) or Indirect (I);
- Geographic Scale;
- Duration and Reversibility;
- Range and status of species and habitats potentially affected;
- Population sizes of species potentially affected.

Once identified, and characterised for magnitude, each potential impact is assigned a likelihood of occurrence and a value is assigned to indicate the confidence in the prediction. The overall appraisal of the potential impact is then determined by combining the value of the feature (Table 1), with the magnitude and likelihood of potential impact. Mitigation is proposed to neutralize potential impacts identified as likely. Impacts remaining after mitigation are termed residual impacts. Compensation is proposed to neutralize or reduce residual effects and enhancement is proposed if the project can contribute to nature conservation.

Table 1 Guidance on Describing Ecological Value of Features

Value	Criteria	Examples
Very High	High importance and rarity, <i>international</i> scale with limited potential for substitution.	Internationally designated sites.
High	High importance and rarity, <i>national</i> scale with limited potential for substitution.	Nationally designated sites. Regionally important sites.
Medium	High or medium importance and rarity, <i>local</i> or <i>regional</i> scale with limited potential for substitution.	Regionally important sites with potential for substitution. Locally designated sites.
Low	Low or medium importance and rarity, <i>local</i> scale.	Undesignated sites of some local biodiversity and earth heritage interest.
Negligible	Very low importance and rarity, <i>local</i> scale.	Other sites with little or no local biodiversity and earth heritage interest.

3 BASELINE ASSESSMENT

3.1 Sites Designated for Nature Conservation in Northern Ireland

This section should be read in conjunction with Figure 7 Conservation Designations. A number of sites designated for nature conservation occur within the Larne Lough locality and within 2km of the proposed project footprint. Only sites with ornithological features of interest are described here, additional sites are described in Section 5.3.2 of the EIS.

3.1.1 Special Protection Areas (SPAs)

SPAs are sites of European-wide conservation importance for rare, vulnerable and regularly occurring migratory bird species. They are designated under The Council Directive 2009/147/EC (79/409/EEC as amended) on the conservation of wild birds ('The Birds Directive').

3.1.1.1 Larne Lough SPA

Designated: 03/1997 (Updated 03/1998)

The Larne Lough SPA qualifies for designation under Article 4.1 of the Birds Directive (79/409/EEC) by regularly supporting internationally important numbers of:

- Overwintering Light-bellied Brent Geese *Branta hrota*.

The site also qualifies under Article 4.1 of the Birds Directive (79/409/EEC) by regularly supporting nationally important breeding populations of:

- Annex I species Roseate Tern *Sterna dougallii* and Common Tern *Sterna hirundo*.

Larne Lough SPA covers an area of 398ha and its boundary is entirely coincident with that of the Larne Lough Area of Special Scientific Interest (ASSI) and the Larne Lough Ramsar Site. The site includes Swan and Blue Circle Islands, which together support the Loughs breeding tern populations. Swan Island is leased and managed as a National Nature Reserve (Swan Island National Nature Reserve (NNR)) by the RSPB and is also designated as an SPA in its own right (Swan Island SPA, see below). Today the majority of Larne Loughs terns now breed on Blue Circle Island, an artificial island constructed in the 1970's using spoil from the former Magheramourne Quarry. In recent years Blue Circle Island has been the only island to have supported breeding Roseate Terns within Northern Ireland. Numbers of nesting pairs have however declined significantly since the 1970's (c.190 pairs) and 1990's (c. 22 pairs), with only one pair recorded in 2010. The Larne Lough tern colony as a whole has declined significantly over recent years (Figure 6).

Larne Lough SPA is located c.3.2km from the proposed brine outfall location at its nearest point.

3.1.1.2 Swan Island SPA

Designated: 10/03/1992

The Swan Island SPA qualifies for designation under Article 4.1 of the Birds Directive (79/409/EEC) by regularly supporting, in summer months, nationally important numbers of:

- Breeding Roseate Tern *Sterna dougallii* and Common Tern *Sterna hirundo*.

Small numbers of Sandwich Terns *Sterna sandicensis* are also known to breed on the island and Arctic Terns *Sterna paradisaea* have also been known to breed.

Swan Island SPA is located c. 3.6km from the proposed brine outfall location at its nearest point.

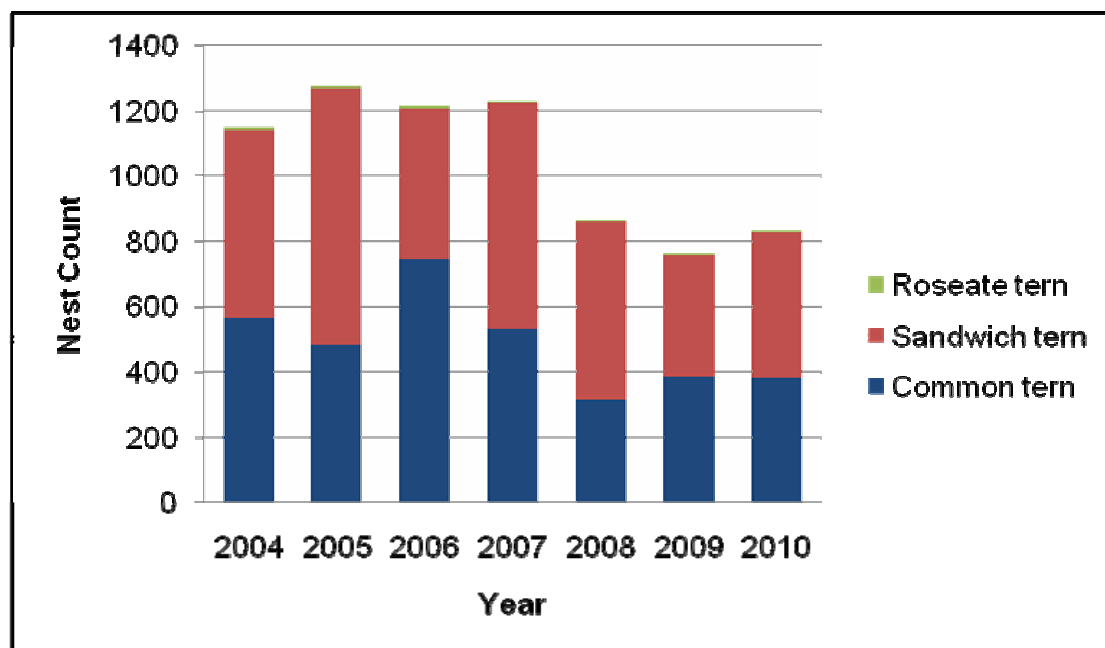


Figure 5 RSPB Larne Lough Annual Reserve Colony Counts 2004-2010

3.1.2 Areas of Special Scientific Interest

ASSIs are designated under the Wildlife (Northern Ireland) Order 1985 as amended by the Wildlife (Amendment) (Northern Ireland) Order 1995 and the Wildlife and Natural Environment Act (Northern Ireland) 2011. Their protection is strengthened under the Environment (Northern Ireland) Order 2002 as amended by the Wildlife and Natural Environment Act (NI) 2011.

3.1.2.1 Larne Lough ASSI

Designated: 16/09/1996

The Larne Lough ASSI (398ha) qualifies for designation by virtue of the diversity of habitats found there, ranging from artificial brackish lagoons to mudflats, rocky shores and saltmarshes. In addition to the SPA designation features of the overwintering Brent Goose population and breeding Roseate and Common Tern populations, the Larne Lough ASSI supports nationally important wintering wildfowl and wader species including Goldeneye *Bucephala clangula*, Great Crested Grebe *Podiceps cristatus*, Red-Breasted Merganser *Mergus serrator*, Shelduck *Tadorna tadorna*, Greenshank *Tringa nebularis*, and Redshank *Tringa totanus*.

Larne Lough ASSI is located c.3.2km from the brine outfall point at its nearest point.

3.1.2.2 Gobbins ASSI

Designated: 31/10/2011

The Gobbins ASSI (27.59ha) is an area of basalt sea-cliffs on the eastern coast of Islandmagee. At the time of the Seabird 2000 survey The Gobbins cliffs held 791 pairs of Kittiwakes *Rissa tridactyla* (1.6% of the all-Ireland population) and 552 Razorbills *Alca torda* (1.1% of the all-Ireland population). The site also supports the only mainland nesting Atlantic Puffins *Fratercula arctica* in Northern Ireland and significant populations of Fulmar *Fulmarus glacialis*, Cormorant *Phalacrocorax carbo*, Shag *Phalacrocorax aristotelis* and Common

Guillemot *Uria aalge* (Table 2). Peregrine Falcon *Falco peregrinus* also breeds within the designated area.

Table 2 Seabird 2000 Data for Gobbins Cliffs, County Antrim, Northern Ireland

Species	Count Unit	Count
Northern Fulmar <i>Fulmarus glacialis</i>	Occupied sites	17
Razorbill <i>Alca torda</i>	Individuals on land	552
Northern Fulmar <i>Fulmarus glacialis</i>	Occupied sites	200
Black-legged Kittiwake <i>Rissa tridactyla</i>	Occupied nests	791
Common guillemot <i>Uria aalge</i>	Individuals on land	1484
Atlantic Puffin <i>Fratercula arctica</i>	Individuals on land	28
Shag <i>Phalacrocorax aristotelis</i>	Occupied nests	16
Cormorant <i>Phalacrocorax carbo</i>	Occupied nests	41

The Gobbins ASSI is located c. 2.6km east of Larne Lough at its nearest point and c. 2.5km from the proposed outfall location and pumping station at Castle Robin.

3.1.2.3 Portmuck ASSI

Designated: 23/03/1998

Portmuck ASSI (20.18ha) on the eastern coast of Islandmagee is valued for its range of geological and geomorphological features, which extend from McIlroy's Port south-east to the Isle of Muck. The Isle of Muck is included in the ASSI and supports notable population of breeding seabirds including Razorbill, Common Guillemot, Puffin, Kittiwake and Fulmar.

The Isle of Muck is an Ulster Wildlife Trust Nature Reserve. Annual seabird colony counts were requested for the purposes of this report and are summarised in Table 3. Nesting puffins have been largely absent from the island for a number of years. Two individuals were recorded in the nearshore waters beneath the key nesting cliffs on the eastern side of the island in June 2011 (K. Leonard *et al.*, 2011) but were not thought likely to be nesting. Numbers of other nesting seabirds have fluctuated over recent count years.

Portmuck ASSI is located approximately 600m south of the proposed brine outfall location, with the Isle of Muck located approximately c. 1.5km south at its nearest point.

Table 3 Summary Isle of Muck annual seabird colony counts (2001-2011).

BTO Species Code	Count Unit*	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
F.	AOS	58	24	32	74	36	43	47	62	52	51	23
SA	AON	2	2	3	5	4	5	9	9	10	18	15
CM	AON	0	0	1	4	4	4	4	8	15	15	-
HG	AON	20	18	22	28	29	25	18	23	26	44	-
LB	AON	4	11	10	10	13	9	10	8	11	13	-
GB	AON	2	2	1	1	1	0	1	1	1	2	-
KI	AON	179	300	244	227	256	239	290	168	242	213	268
GU	Ind	755	1321	1404	1595	1383	1125	904	746	1330	1391	1744
RA	Ind	282	746	872	573	415	417	244	192	295	305	310
TY	Ind	13	19	12	13	6	14	20	17	14	11	8

Note: Figures in italics did not follow SMP Handbook methodology regarding timing of counts
*AOS – Apparently Occupied Site; AON – Apparently Occupied Nest; Ind – Individual

3.1.3 Ramsar Sites

Ramsar sites are wetlands of international importance and are designated under the Ramsar Convention [The Convention of Wetland of International Importance, especially as Waterfowl Habitat] an intergovernmental treaty, which provides a framework and international cooperation for the conservation and wise use of wetlands and their resources. .

3.1.3.1 Larne Lough Ramsar Site

Designated: 04/03/1997

The Larne Lough Ramsar site (398ha) qualifies under Criterion 2 and 6 of the Ramsar Convention:

- 2 – By supporting an important assemblage of vulnerable and endangered Irish Red Data Book bird Species. The site regularly supports nationally important numbers of breeding populations of Roseate Tern and Common Tern;
- 6 – By supporting internationally important numbers of light-bellied Brent geese in winter.

In addition bird species occurring at levels of national importance include:

- During the breeding season – Black-headed Gull *Larus ridibundus*, Sandwich Tern, Roseate Tern, Common Tern;
- During spring and autumn – Great Crested Grebe, Common Eider and Red-breasted Merganser.
- During the winter – Cormorant, Shelduck, Goldeneye, Redshank, Greenshank and Common (Mew) Gull.

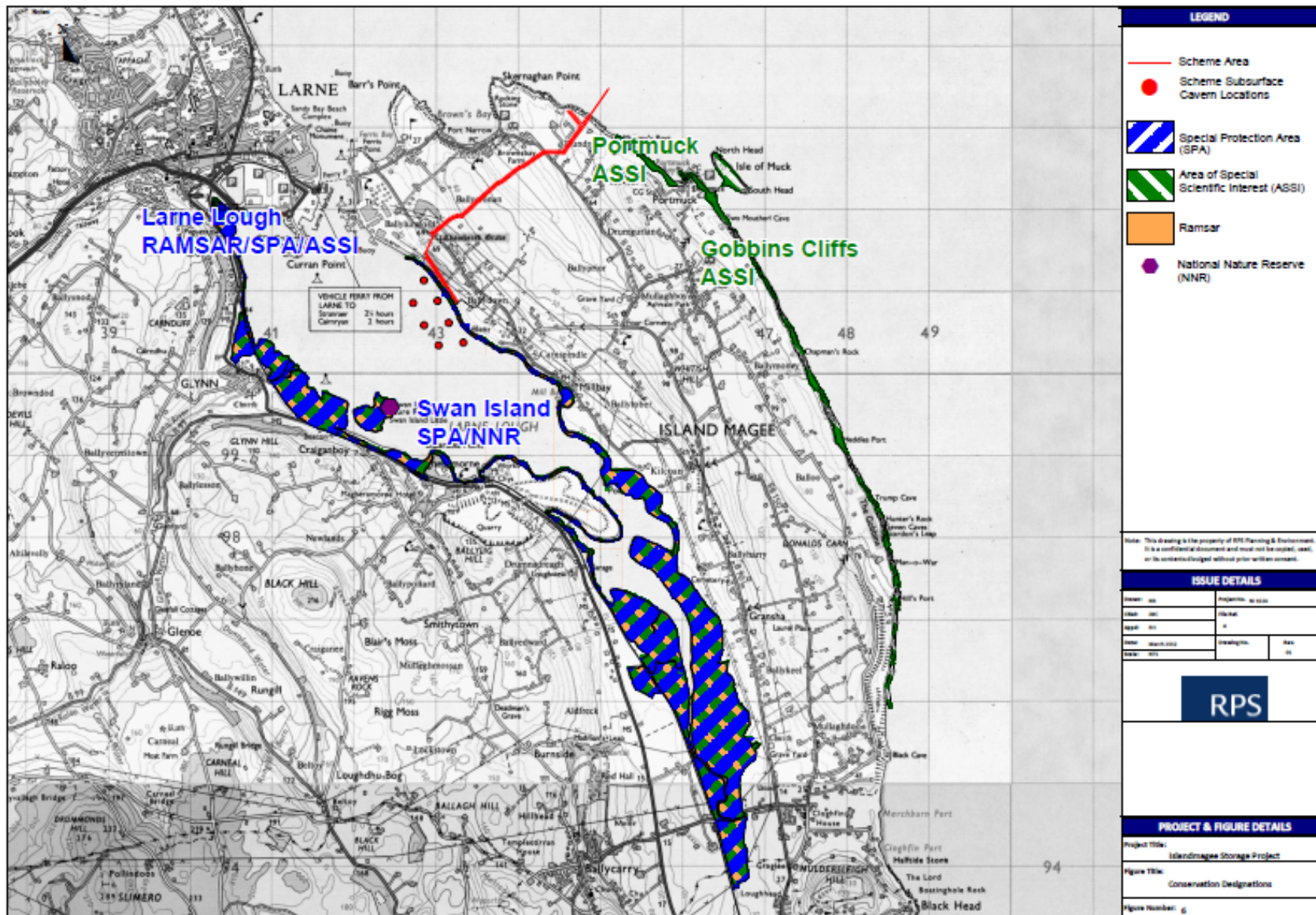
Larne Lough Ramsar Site is located c.3.2km from the brine outfall point at its nearest point.

3.1.4 Sites Designated for Nature Conservation in Northern Ireland: Summary of Ornithological Features

Table 4 below summarises the ornithological features of interest for relevant designated sites considered in this assessment.

Table 4 Summary Ornithological Features of Interest

Species	Larne Lough SPA	Swan Island SPA	Larne Lough ASSI	Larne Lough Ramsar Site	Gobbins ASSI	Portmuck ASSI
Pale-bellied Brent Goose	√		√	√		
Roseate Tern	√	√	√	√		
Common Tern	√	√	√	√		
Goldeneye			√	√		
Great Crested Grebe			√	√		
Red-breasted Merganser			√	√		
Shelduck			√	√		
Greenshank			√	√		
Redshank			√	√		
Black-headed Gull				√		
Sandwich Tern			√			
Eider				√		
Common Gull				√		
Kittiwake					√	
Razorbill					√	√
Puffin					√	√
Fulmar					√	√
Cormorant				√	√	
Shag					√	
Common Guillemot					√	√



3.2 Existing Ornithological Data Sets

Existing ornithological data sets obtained during the initial consultation and Larne Lough wintering bird desktop study are presented in the Larne Lough Wintering Bird Desktop Study (2008) in Appendix 2 (excluding BTO NEWS). Summary data is presented within Appendix 3.

3.2.1.1 BTO WeBS Data

BTO WeBS Core Count data was requested as part of the Larne Lough Wintering Bird Desktop Study in the form of *tabulated five-year synopses* (2001/02-2005/06) for the following sub-sites:

- Inner Larne Lough (Site Code: 02902);
- Outer Larne Lough (Site Code: 02903).

BTO WeBS data obtained for this request is presented in a copy of the Larne Lough Wintering Bird Desktop Study in Appendix 2. Five-year winter peak counts and the month in which the peak was recorded for each species are presented in Appendix 3.

3.2.1.2 BTO NEWS Data

BTO NeWS data from the 1997/98 and the 2006/07 wintering seasons were requested for the following sub site:

- Site Code: 450604: which stretches from the mouth of Larne Lough along the eastern coastline of the Islandmagee peninsula, taking in Browns Bay and the rocky shoreline between Skernaghans Point to Whitehead.

Summary peak counts as illustrated in the EIS are presented in Appendix 3.

3.3 Bird Survey Results

The results presented here are consistent with those presented in the EIS excluding the results of Open Coast Bird Surveys 2011/12.

3.3.1 Bird Survey Conditions

All bird survey conditions are presented in Appendix 6.

3.3.2 Wintering Farmland Bird Survey 2008/09 Results

Table 5 lists peak counts for the wintering farmland bird survey undertaken during the 2008/09 wintering period. Protected species are highlighted in bold text. Birds of Conservation Concern in Ireland (BOCCI) listings have been omitted from the conservation status as the Red and Amber listings apply only to breeding populations.

A total of 42 species were recorded during the wintering farmland bird survey and the range of species reflects the relatively homogenous nature of the habitats within the survey area. There were no Pale-bellied Brent Geese (nor other geese spp,) recorded feeding in improved grassland fields within the survey area, however Pale-bellied Brent Geese were frequent visitors to the *Zostera* beds in the Lough. Lapwing was the only wetland species recorded feeding within improved fields in small flocks (peak no. 70).

Table 5 Peak Counts of Bird Species Recorded During the Wintering Farmland Bird Survey.

Species	Peak Count	Conservation Status	Notes
Blackbird <i>Turdus merula</i>	25		
Blue Tit <i>Parus caeruleus</i>	22		
Bullfinch <i>Pyrrhula pyrrhula</i>	6		
Buzzard <i>Buteo buteo</i>	2	WO	Farmland throughout.
Chaffinch <i>fringilla coelebs</i>	23		
Coal Tit <i>Periparus ater</i>	18		
Collared Dove <i>Phylloscopus collybita</i>	4		
Dunnock <i>Prunella modularis</i>	10		
Fieldfare <i>Turdus pilaris</i>	102		
Goldcrest <i>Regulus regulus</i>	2		
Goldfinch <i>Carduelis carduelis</i>	12		
Great Tit <i>Parus major</i>	6		
Greenfinch <i>Carduelis chloris</i>	22		
Grey Heron <i>Ardea cinerea</i>	10	WO	Heronry located on scrubby hill along SSP route east of Quarterland Road.
Grey Wagtail <i>Motacilla cinerea</i>	2		
Hooded Crow <i>Corvus cornix</i>	9		
House Sparrow <i>Passer domesticus</i>	26		
Jackdaw <i>Corvus monedula</i>	75		
Kestrel <i>Falco tinnunculus</i>	1	WO	Hunting over drill rig grasslands.
Lapwing <i>Vanellus vanellus</i>	72	NI	Feeding in fields along E-W pipeline route.
Linnet <i>Carduelis cannabina</i>	12		
Magpie <i>Pica pica</i>	12		
Meadow Pipit <i>Anthus pratensis</i>	15		

Merlin <i>Falco columbarius</i>	1	WO	Coastal fields near Robin Stack.
Mistle Thrush <i>Turdus viscivorus</i>	4	NI	
Pheasant <i>Phasianus colchicus</i>	7		
Pied Wagtail <i>Motacilla alba</i>	5		
Redwing <i>Turdus iliacus</i>	60		
Reed Bunting <i>Emberiza schoeniclus</i>	5	NI	
Robin <i>Eithacus rubecula</i>	30		
Rock Pipit <i>Anthus perosus</i>	6		
Rook <i>Corvus frugilegus</i>	134		
Siskin <i>Carduelis spinus</i>	2		
Skylark <i>Alauda arvensis</i>	24		
Song Thrush <i>Turdus philomelos</i>	6	NI	
Sparrowhawk <i>Accipiter nisus</i>	2	WO	Farmland throughout.
Starling <i>Sturnus vulgaris</i>	190	NI	
Stonechat <i>Saxicola torquata</i>	3		
Tree Sparrow <i>Passer montanus</i>	6		
Twite <i>Carduelis flavirostris</i>	4	WO	Mixed with linnets in farmland near middle of E-W pipeline route.
Woodpigeon <i>Columba palumbus</i>	22		
Wren <i>Troglodytes troglodytes</i>	24		
<u>Key to Table 5</u> WO – Protected at all times by The Wildlife (NI) Order 1985 (as amended) NI – Northern Ireland Priority Species			

3.3.3 **Breeding Farmland Bird Survey 2009 Results**

This section should be read with reference to Figures 8 and 9. Table 6 presents estimated numbers of breeding bird territories within the survey area. In contrast to the wintering farmland bird survey, there were no protected species recorded as breeding within the survey area.

Table 6 Numbers of breeding bird territories recorded within the survey area.

Species	Peak Count	Conservation Status	Notes
Blackbird <i>Turdus merula</i>	11		
Blackcap <i>Sylvia atricapilla</i>	2		
Blue Tit <i>Parus caeruleus</i>	6		
Bullfinch <i>Pyrrhula pyrrhula</i>	2		
Buzzard <i>Buteo buteo</i>	0	WO	Single bird occasionally flying over improved fields along SSP route.
Chaffinch <i>fringilla coelebs</i>	3		
Coal Tit <i>Periparus ater</i>	3		
Dunnock <i>Prunella modularis</i>	9		
Goldcrest <i>Regulus regulus</i>	1		
Goldfinch <i>Carduelis carduelis</i>	4		
Great Tit <i>Parus major</i>	2		
Greenfinch <i>Carduelis chloris</i>	7		
Grey Heron <i>Ardea cinerea</i>	0	WO	Heronry located c. 250m west of the SSP route, near junction of the Quaterland/Ballylumford Road.
Hooded Crow <i>Corvus cornix</i>	1-2		
House Martin <i>Delchion urbica</i>	0	Amber	One pair feeding within survey area.
Jackdaw <i>Corvus monedula</i>	0		Feeding flocks along SSP route.
Linnet <i>Carduelis cannabina</i>	4	Amber	
Long-tailed Tit <i>Aegithalos caudatus</i>	1		
Magpie <i>Pica pica</i>	2		
Meadow Pipit <i>Anthus pratensis</i>	2		Few Territories in fields along pipeline route.
Mistle Thrush <i>Turdus viscivorus</i>	1	NI	

Peregrine Falcon <i>Falco peregrinus</i>	0	EU, WO	Single bird hunting by Ballylumford Power Station in July 2009.
Pheasant <i>Phasianus colchicus</i>	2		Common in locality due to release of stock from scrub hill along SSP route.
Raven	0		Occasionally recorded over SSP route
Ringed Plover	1	Amber	Castle Robin Bay (IPS)
Robin <i>Eithacus rubecula</i>	8		
Rook <i>Corvus frugilegus</i>	0		Rookerie in mature treeling outside northwestern site boundary.
Skylark <i>Alauda arvensis</i>	0	Amber	
Song Thrush <i>Turdus philomelos</i>	1	NI	
Sparrowhawk <i>Accipiter nisus</i>	0-1	WO	Not recorded during survey but anecdotal record of breeding pair in scrublands south of power station (RF – David Logan, Pers Comms)
Starling <i>Sturnus vulgaris</i>	1		
Stonechat <i>Saxicola torquata</i>	1		
Swallow	0	Amber	Regularly feeding over grassland throughout survey area.
Whitethroat	4		
Woodpigeon <i>Columba palumbus</i>	4		
Wren <i>Troglodytes troglodytes</i>	17		

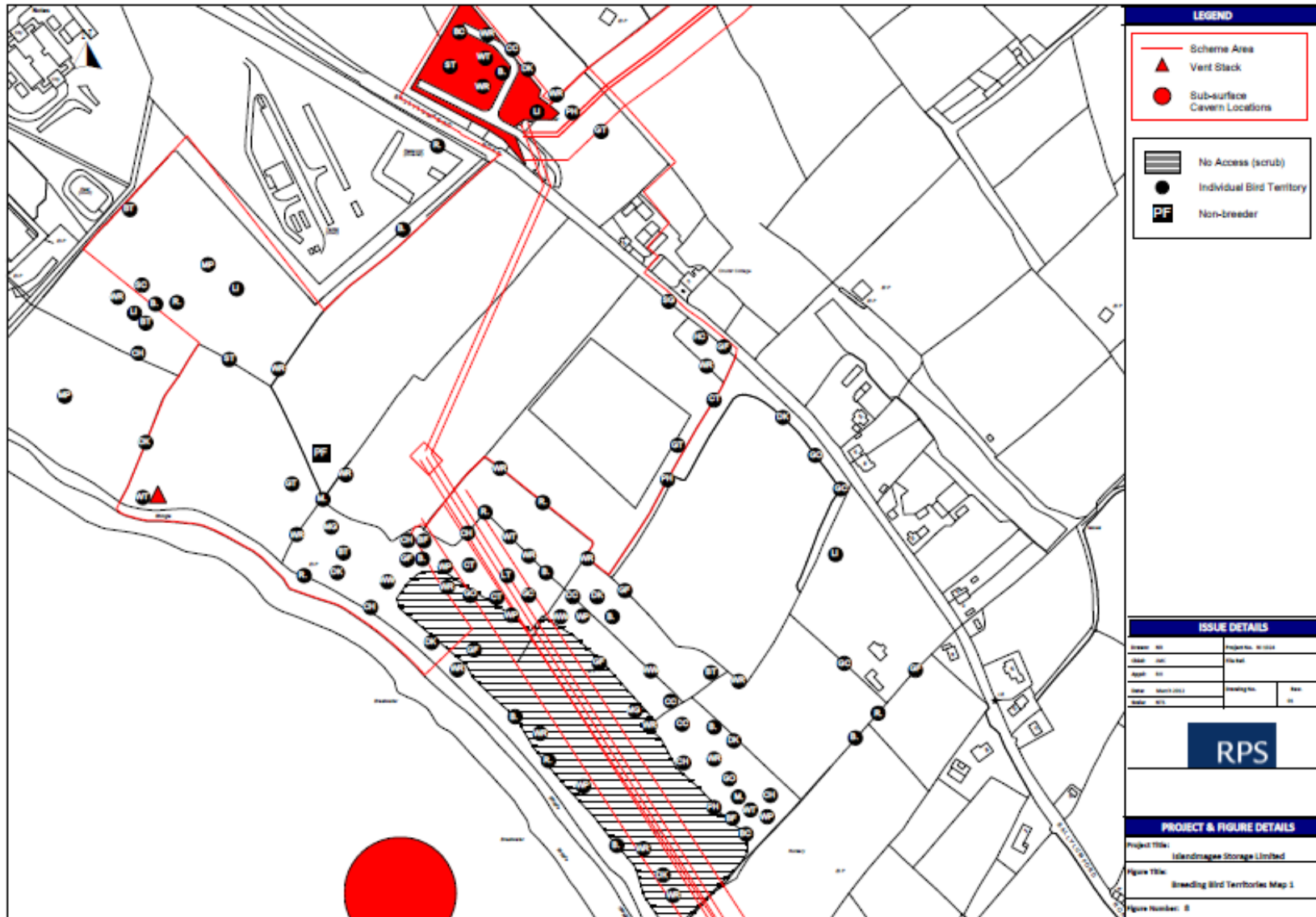
Key to Table 6

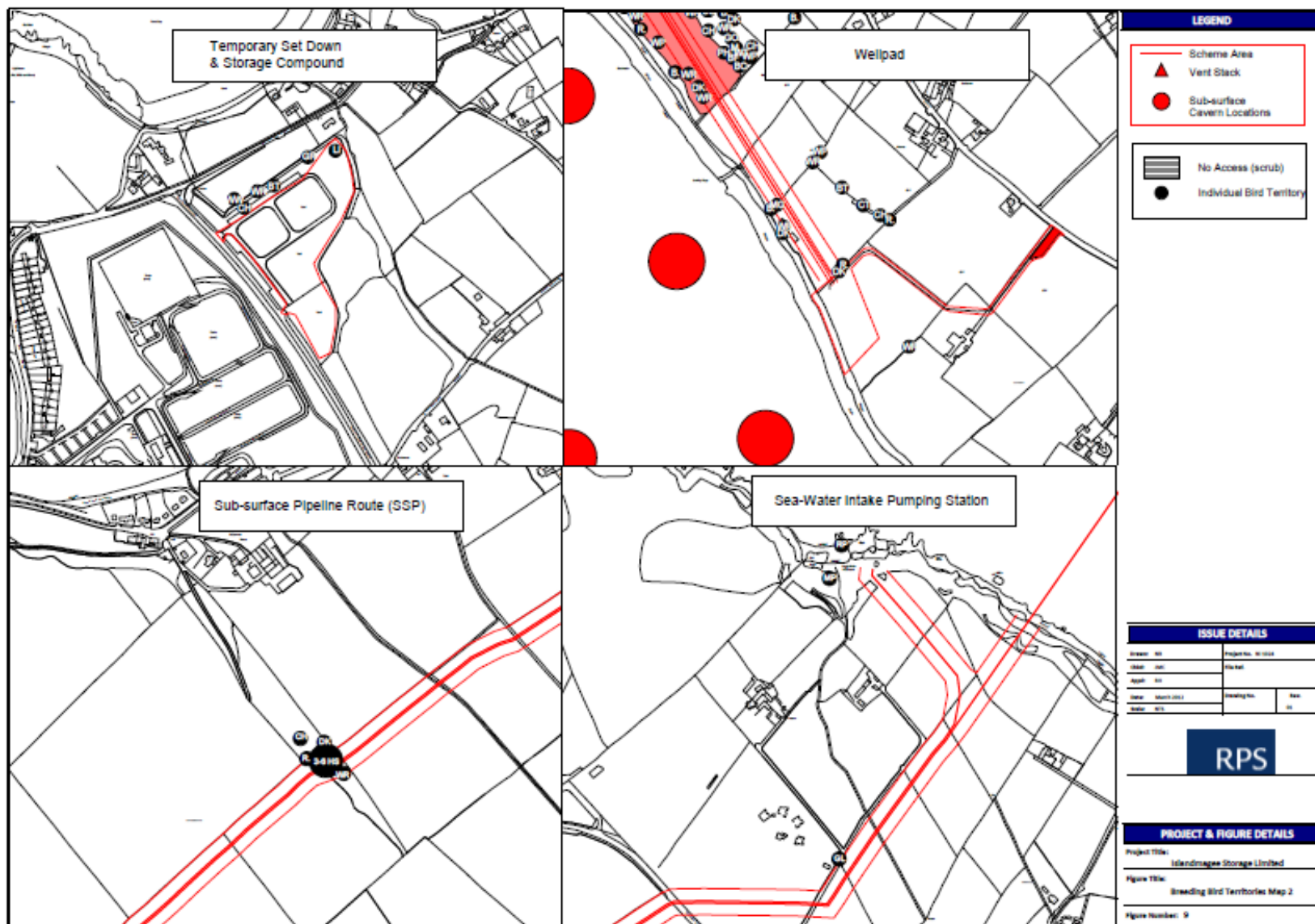
EU – Birds Directive Annex I Species

WO – Protected at all times by The Wildlife (NI) Order 1985 (as amended)

NI – Northern Ireland Priority Species

Amber – Amber-listed Bird of Conservation Concern in Ireland (BOCCI)





3.3.4 Open Coast Bird Survey Results 2008/09

In the request for further environmental information issued by the DOE, NIEA NH following discussions with RPS consultants felt that the Open Coast Bird Survey datasets from 2008/09 were insufficient to enable an Article 6 Appropriate Assessment to be completed. Although a peak count summary is presented below the results of this survey are not discussed in detail. The results of the Open Coast Bird Survey 2011/12 override this dataset.

Table 7 presents summary peak counts for open coast surveys undertaken in Winter 2008/09 and Summer 2009. Protected species are highlighted in bold.

Table 7 Peak counts for Open Coast Bird Surveys 2008/09

Species	Peak Count	Conservation Status	Notes
Arctic Tern <i>Sterna paradisaea</i>	2	EU, WO, Amber	
Black-headed Gull <i>Larus ridibundus</i>	4	Amber	
Black Guillemot <i>Cephus grille</i>	3	Amber	
Pale-bellied Brent Goose <i>Branta bernicla hrota</i>	6		Recorded in Browns Bay.
Common Guillemot <i>Uria aalge</i>	27	Amber	
Common Gull <i>Larus canus</i>	16	Amber	
Common Tern <i>Sterna hirundo</i>	5	EU, WO, Amber	
Cormorant <i>Phalacrocorax carbo</i>	4	Amber	
Curlew <i>Numenius arquata</i>	2	NI, Red	
Eider <i>Somateria mollissima</i>	1	Amber	
Fulmar <i>Fulmarus glacialis</i>	2		
Gannet <i>Morus bassanus</i>	3	Amber	>300m from shore
Great Northern Diver <i>Gavia immer</i>	2		
Herring Gull <i>Larus argentatus</i>	1	Red	
Lesser Black-backed Gull <i>Larus fuscus</i>	3	Amber	
Oystercatcher <i>Haematopus ostralegus</i>	5		
Razorbill <i>Alca torda</i>	5	Amber	
Red-throated Diver <i>Gavia stellata</i>	3		
Redshank <i>Tringa tetanus</i>	2	NI, Red	

Ringed Plover <i>Charadrius hiaticula</i>	1	Amber	
Sandwich Tern <i>Sterna sandvicensis</i>	13	EU, Amber	
Shag <i>Phalacrocorax aristotelis</i>	10		
Shelduck <i>Tadorna tadorna</i>	1		
Snipe <i>Gallinago gallinago</i>	1	Amber	
Turnstone <i>Arenaria interpres</i>	1		
Whimbrel <i>Numenius phaeopus</i>	11		Passage migrant.

Key to Table 7

EU – Birds Directive Annex I Species

WO – Protected at all times by The Wildlife (NI) Order 1985 (as amended)

NI – Northern Ireland Priority Species

Amber – Amber-listed BOCCI

Red – Red-listed BOCCI

3.3.5 Breeding Black Guillemot Survey

The results of the breeding black guillemot survey at the Ballylumford Jetties area are illustrated in Figure 10. Table 8 presents the breeding population results, where the count unit is “Adults Associated with a Colony”. There were three nesting locations identified: Jetties A and B and the Ballylumford Power Station Wall.

Table 8 Black Guillemot Breeding Population Survey Results

Date	Jetty	Breeding Adults	Non-breeders	Adults >300m	Peak Breeding Population
10/04/2009	A	13	1	3*	Jetty A: 13 Adult Birds (6-7 pairs) Jetty B: 4 Adult Birds (2 pairs.
	B	4	0		
17/04/2009	A	8	2	5*	
	B	3	9		
*Probably associated with another breeding colony in Larne Harbour.					

Table 9 presents results for breeding productivity. The index for productivity (p) is:

$$p = \text{no. occupied sites in May} / \text{no. occupied sites in July}.$$

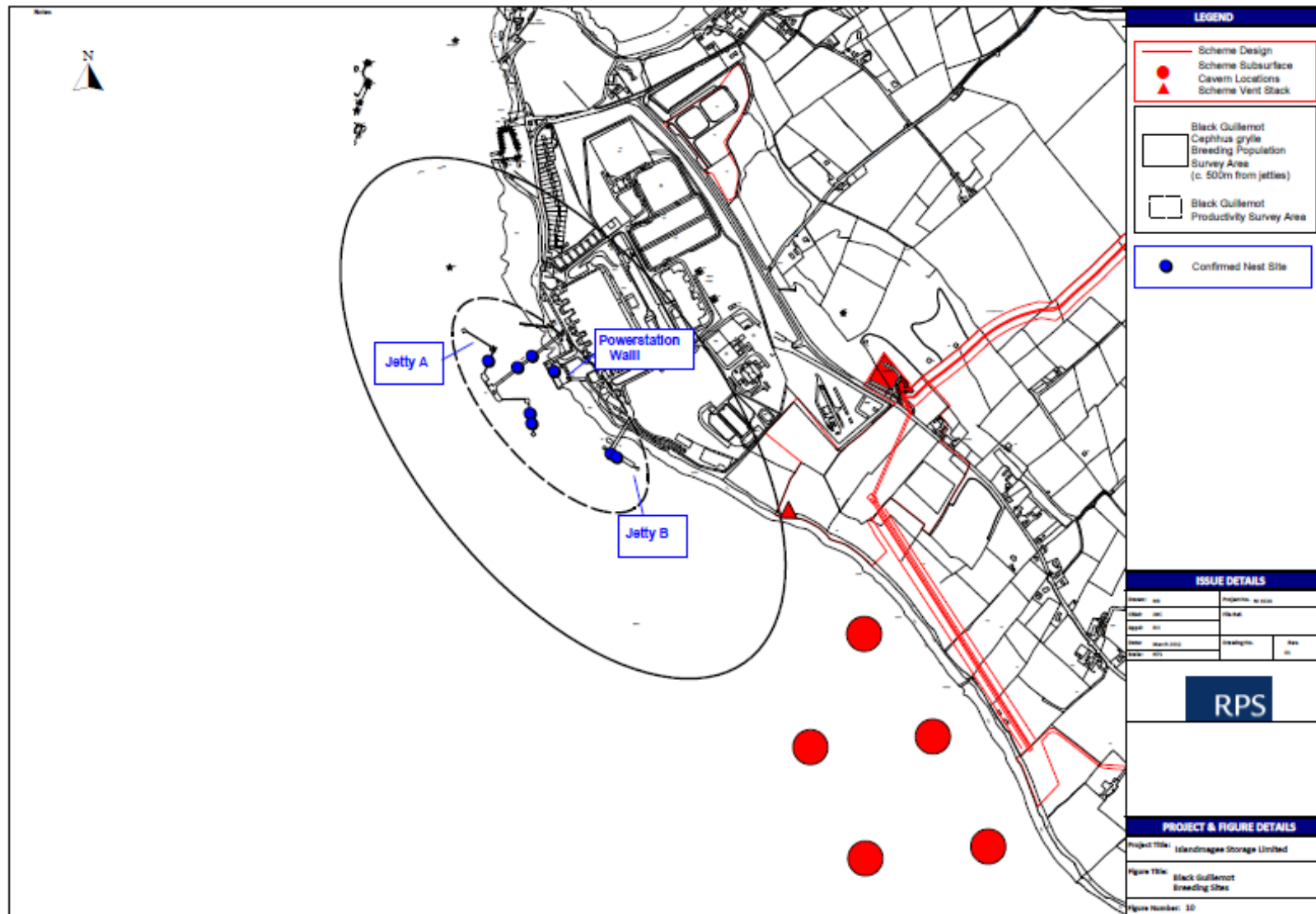


Table 9 Black Guillemot Productivity Results

Jetty	Occupied Nest Sites (May)	Occupied Nest Sites (July)	Productivity (p)
A	6	5	0.83
B	2	2	1
Power Station Wall	1	1	1

The survey results show a total of 8 breeding black guillemot pairs with 5 at Jetty A, 2 at Jetty B and 1 in the wall of the Ballylumford Power Station. The productivity of the larger colony (Jetty A) was lower than the two smaller colonies (Jetty B and the power station wall).

3.3.6 Open Coast Bird Survey 2011/12

This section presents summary datasets from the Open Coast Bird Survey 2011/12. Raw datasets will be provided in an electronic form to NIEA NH and are available on request from RPS Planning and Environment.

3.3.6.1 Peak Section Counts (April 2011 – March 2012)

Table 10 presents peak counts per subsection for the Coastal Seabird Survey collected between April 2011 and March 2012. Peak counts illustrated here are derived from peak “total” counts. Total counts were calculated by adding together the number of birds recorded in each distance band in each section on each survey, to give a total for that section during that survey.

Table 10 Open Coast Bird Survey 2011/12 Peak Section Counts

Species	BTO Species Code	Peak Counts				Conservation Status
		Section 1	Section 2	Section 3	Browns Bay	
Arctic Skua <i>Stercorarius parasiticus</i>	AC	1	0	1	0	NI, UKBAP
Arctic Tern <i>Sterna paradisaea</i>	AE	2	0	0	2	Annex I, WO S1, Amber
Black-headed Gull <i>Larus ridibundus</i>	BH	14	33	54	209	Red, NI
Black-tailed Godwit <i>Limosa limosa</i>	BW	0	0	0	1	WO S1, Amber, NI, UKBAP
Black Guillemot <i>Cephus grille</i>	TY	8	11	42	11	Amber
Common Gull <i>Larus canus</i>	CM	34	17	33	914	Amber
Common Tern <i>Sterna hirundo</i>	CN	12	4	8	32	Annex I, WO S1, Amber
Cormorant <i>Phalacrocorax carbo</i>	CA	7	2	5	4	Amber
Curlew <i>Numenius arquata</i>	CU	5	0	1	4	WO S1, Red, NI, UKBAP

Dunlin <i>Calidris alpina</i>	DN	0	0	34	0	Annex 1, WO S1, Amber, NI
(Common) Eider <i>Somateria mollissima</i>	EI	9	9	27	5	Amber
(Northern) Fulmar <i>Fulmarus glacialis</i>	F.	3	4	8	0	
(Northern) Gannet <i>Morus bassanus</i>	GX	10	9	4	4	Amber
Goldeneye <i>Bucephala clangula</i>	GN	7	0	0	22	Amber, NI
Great Black-backed Gull <i>Larus marinus</i>	GB	3	2	6	6	Amber
Great Crested Grebe <i>Podiceps cristatus</i>	GG	0	0	0	1	Amber
Common Guillemot <i>Uria aalge</i>	GU	28	14	48	15	Amber
Grey Heron <i>Ardea cinerea</i>	H.	1	1	1	2	WO S1
Herring Gull <i>Larus argentatus</i>	HG	15	3	29	74	Red, NI, UKBAP
Iceland Gull <i>Larus glaucoideus</i>	IG	0	0	0	1	
(Black-legged) Kittiwake <i>Rissa tridactyla</i>	KI	7	20	85	1	Amber
Lapwing <i>Vannellus vanellus</i>	L.	0	0	3	0	WO S1, Red, NI, UKBAP
Lesser Black-backed Gull <i>Larus fuscus</i>	LB	1	0	1	1	Amber
Long-tailed Duck <i>Clangula hyemalis</i>	LN	1	0	0	0	
Mallard <i>Anas platyrhynchos</i>	MA	0	4	5	5	
Mute Swan <i>Cygnus olor</i>	MS	0	1	0	0	Amber
Mediterranean Gull <i>Larus melanocephalus</i>	MU	0	0	2	1	Annex 1, WO S1, Amber
Manx Shearwater <i>Puffinus puffinus</i>	MX	3	2	3	0	WO S1, Amber
Great Northern Diver <i>Gavia immer</i>	ND	2	3	3	2	Annex 1
Oystercatcher <i>Haematopus ostralegus</i>	OC	3	2	11	21	Amber
Pale-bellied Brent Goose <i>Branta bernicla hrota</i>	PB	0	0	1	3	Amber, NI
Purple Sandpiper <i>Calidris maritima</i>	PS	1	0	1	0	
Atlantic Puffin <i>Fratercula arctica</i>	PU	0	0	1	0	WO S1, Amber
Razorbill <i>Alca torda</i>	RA	65	14	66	9	Amber
Red-throated Diver <i>Gavia stellata</i>	RH	4	4	8	2	Annex 1, WO S1, Amber

Redshank <i>Tringa tetanus</i>	RK	4	0	5	3	WO S1, Red, NI
Red Breasted Merganser <i>Mergus serrator</i>	RM	2	2	4	2	
Ringed Plover <i>Charadrius hiaticula</i>	RP	3	0	17	3	Amber
Sandwich Tern <i>Sterna sandvicensis</i>	TE	4	16	28	40	Annex 1, WO S1, Amber
Shag <i>Phalacrocorax carbo</i>	SA	46	30	16	32	Amber
Shelduck <i>Tadorna tadorna</i>	SU	0	4	2	0	Amber
Turnstone <i>Arenaria interpres</i>	TT	5	0	11	6	
Whooper Swan <i>Cygnus cygnus</i>	WS	0	0	0	1	Annex 1, WO S1, Amber, NI

3.3.6.2 Section 1 Monthly Peak Counts

Section 1 is defined as the inshore coastal waters (<1km) and coastline stretching c1km from Skernaghans Point to Castle Robin Bay. Table 1 in Appendix 7 presents monthly peak counts obtained from all count types undertaken within that month i.e. the peak count for black-headed gulls in May 2011 is the peak number of black-headed gulls recorded from all fortnightly early morning and afternoon/early evening counts and monthly high tide and low tide counts undertaken in May 2011.

3.3.6.3 Section 2 Monthly Peak Counts

Section 2 is defined as the inshore coastal waters (<1km) and coastline stretching c.800m from Castle Robin Bay to the north of Portmuck Bay. Table 2 in Appendix 7 presents monthly peak counts.

3.3.6.4 Section 3 Monthly Peak Counts

Section 3 is defined as the inshore coastal waters (<1km) and coastline stretching c. 800m from the north of Portmuck Bay into and including Portmuck Bay but excluding the Isle of Muck. Table 3 in Appendix 7 presents peak monthly counts.

3.3.6.5 Browns Bay Monthly Peak Counts

Table 4 in Appendix 7 presents peak monthly counts obtained from all count types undertaken within that month as above.

3.3.6.6 Species Accounts

The purpose of the additional Open Coast Bird Surveys undertaken in 2011/12 was to more fully inform the assessment of the importance of the coastal waters between Skernaghans Point and Portmuck Bay and to allow NIEA NH to complete their assessment of the potential impact on foraging seabirds as a result of brine emissions. Appendix 8 provides detailed species accounts of all species recorded within the survey area during the Open Coast Bird Surveys 2011/12. Details of foraging habits and significance of the survey area for each species are used to illustrate and discuss the potential impacts as a result of the proposed construction works and brine emissions at Castle Robin Bay.

3.3.6.7 Nesting Black Guillemots at Castle Robin Bay

In 2009 an Open Coast Breeding Seabird Survey was undertaken by RPS. The aim of this survey was to locate breeding seabirds within c. 400m of the proposed brine outfall location

and pumping station at Castle Robin Bay, which may be impacted by this aspect of the proposed development. At the time of this survey, 2009, no breeding seabirds were located within 400m of the outfall location. In 2011 it was not the intention to repeat the Open Coast Breeding Seabird Survey, the purpose of the surveys was to identify the use of the nearshore coastal waters by foraging seabirds. However during the survey a minimum of two black guillemot nests were recorded just north of the proposed outfall location. A maximum of 6 birds were noted to regularly associate with this small colony during surveys undertaken between April and July 2011. The construction of the outfall location and pumping station at Castle Robin Bay will not directly result in the loss of these nest sites however, construction works may cause significant disturbance to nesting pairs if carried out during the breeding season. The nesting sites are located c.100m from the proposed pumping station and c.200m from the outfall pipe. Mitigation regarding timing of works at this locale will therefore be proposed due to the potential of disturbance to nesting birds.

4 IMPACT ASSESSMENT

The aim of this report is not to undertake a new impact assessment but to re-present and update (where necessary) the original impact assessment on ornithological features presented in the EIS, following the inclusion of Open Coast Bird Survey datasets collected in 2011/12. These updates may then be used by NIEA NH to complete the Article 6 Appropriate Assessment. The only impacts potentially updated are therefore associated with construction activities and brine emissions proposed at Castle Robin Bay.

An impact assessment was undertaken in accordance with the Institute of Ecology and Environmental Management Ecological Impact Assessment Guidelines (IEEM, 2006), and also using evidence of 'best practice' in the ecological assessment of proposed developments.

Where impacts are predicted the magnitude of the potential impact is assessed using the criteria set out in Table 11. The impact significance (Table 12) is a combined function of the ecological value of the affected feature (Table 1) and the magnitude of the impact (Table 11). It is important to note that there is no universally recognised definition of what constitutes *significance* as described in Table 1 and 11. A combination of data (where available), experience and the precautionary principle are therefore employed to select the appropriate value, and magnitude categories. In cases where it is not possible to estimate magnitude, the precautionary principle is applied to assume a worst case scenario.

The ecological value is generally relatively easy to categorise. However, the magnitude of the potential impact may be difficult (or in certain cases impossible) to categorize, and the following list of parameters are considered:

- Physical Nature;
- Type: Positive (+ve) or Negative (-ve), Direct (D) or Indirect (I);
- Geographic Scale;
- Duration and Reversibility;
- Range and status of species and habitats potentially affected;
- Population sizes of species potentially affected;
- Cumulative effects.

Once identified and characterised for magnitude, each potential impact is assigned a likelihood of occurrence (after mitigation):

- Certain (100%);
- Near-certain (95-100%);
- Probable (50-95%);
- Unlikely (5-50%);
- Extremely Unlikely (0-5%).

Please note that potential impacts described below assume no mitigation as described in the following Section 5 Mitigation has been applied. Mitigation is proposed to neutralise impacts identified as likely.

Table 11 Criteria for Determining the magnitude of Potential Ecological Impact

Magnitude	Criteria
Major Negative	The proposal (either on its own or with other proposals) may adversely affect the integrity of the site, in terms of coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the population levels of species of interest.
Intermediate Negative	The site's integrity will not be adversely affected, but the effect on the site is likely to be significant in terms of its ecological objectives. If in the light of full information it cannot be clearly demonstrated that the proposal will not have an adverse effect on integrity, then the impact should be assessed as a major negative.
Minor Negative	Neither of the above applies, but some minor negative impact is evidence. In the case of Natura 2000 sites a further appropriate assessment may be necessary if detailed plans are not yet available.
Neutral	No observable impact in either direction.
Positive	Impacts which provide a net gain for wildlife overall.

Table 12 Estimating the Overall Ecological Appraisal Category

Magnitude of Potential Impact	Ecological Value of Sites Damaged or Improved				
	Very High	High	Medium	Low	Negligible
Major Negative	Very Large Adverse	Very Large Adverse	Moderate Adverse	Slight Adverse	Neutral
Intermediate Negative	Large Adverse	Large Adverse	Moderate Adverse	Slight Adverse	Neutral
Minor Negative	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Neutral
Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Positive	Large Beneficial	Large Beneficial	Moderate Beneficial	Slight Beneficial	Neutral

The nature of the proposed development involves the disruption of the local ecology directly during the operational and construction phases. The main potential impacts can be classified into the following broad categories:

- Whole or partial habitat loss (and resulting breeding/feeding habitat loss);

- Fragmentation or isolation of breeding and/or feeding corridors of avifauna as a result of habitat loss;
- Noise, physical and visual disturbance.

This Section should be read with reference to Appendix 8.

4.1 Potential Impacts on Ornithological Features of Sites Designated for Nature Conservation

The nearest designated sites with ornithological features of interest are the Larne Lough SPA, Swan Island SPA, Larne Lough ASSI, Larne Lough Ramsar Site, Portmuck ASSI and the Gobbins ASSI.

Potential impacts to ornithological features of the designated sites by the scheme fall into the following specific categories:

- **Potential Pollution Impacts**

Direct pollution impacts to wintering and breeding bird populations during construction (phased across a 48 month period);

Indirect pollution impacts causing disturbance via food resource depletion/displacement (phased across a 48 month period).

- **Potential Disturbance Impacts**

Direct collision impacts on swans and geese with construction plant machinery (phased across 18 months);

Noise and visual disturbance to wintering birds during Wellpad, SSP and GPF construction.

- **Potential Habitat Loss Impacts**

Permanent loss of wintering improved grassland fields with potential as Pale-bellied Brent Goose foraging habitat.

4.1.1 Potential Impacts on Larne Lough SPA/Ramsar Site

Potential impacts on the Larne Lough SPA/Ramsar Site are summarised in Table 13.

The Larne Lough SPA and Larne Lough Ramsar Site are located (boundaries also coincident with the Larne Lough ASSI) along the Lough shorelines adjacent to the proposed sub-surface caverns, and immediately west of the terrestrial Wellpad, Vent Stack, and the Main GPF elements of the scheme.

Potential collision impacts on Pale-bellied Brent Geese are considered unlikely due to the temporary presence of plant and machinery. Only the Vent Stack will remain as a permanent feature. Pale-bellied Brent Geese are significantly less abundant in Outer Larne Lough (within the scheme area), compared to the Inner Larne Lough (Appendix 3) where key inter-tidal foraging sites (*Zostera* beds) are located. This will further reduce the collision risk. The preference over foraging sites within Inner Larne Lough will also reduce the impact of disturbance and potential for loss of terrestrial foraging fields. Birds typically habituate to noise over time and therefore any disturbance to overwintering birds as a result of increased noise levels close to the drill site will subside over time.

Impacts on terns are discussed in Section 4.1.2 below.

Table 13 Summary table of Potential Impacts on Larne Lough SPA/Ramsar Site.

Potential Impact	Nature	Magnitude ¹	Ecological Value of Feature	Significance of Impact	Impact Type	Phase of occurrence	Duration	Direct/ Indirect	Likelihood of Occurrence ²	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	Temp (36 months)	D/I	Unlikely	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	Temp (Unknown)	D/I	Unlikely	Yes	N.S.
Collision impacts of Brent Geese with 55m high drill rig, 40m high vent stack, and cranes	-ve	Intermediate	Very High	Large Adverse	Bird Death	Construction	Temp (36 months) (Drill rig, cranes) Permanent (Vent Stack)	D	Unlikely	Yes	N.S.

Potential Impact	Nature	Magnitude ¹	Ecological Value of Feature	Significance of Impact	Impact Type	Phase of occurrence	Duration	Direct/ Indirect	Likelihood of Occurrence ²	Mitigation Proposed	Significance of Residual Impacts
Noise and visual feeding/roosting Brent geese from drilling at wellpad	-ve	Intermediate	Very High	Large Adverse	Disturbance	Construction	Temporary (36 months)	D	Probable	Yes	N.S.
Disturbance to Brent Geese through loss of approx 3.7ha grassland feeding fields (235 Individuals ⁴)	-ve	Minor	Very High	Slight Adverse	Displacement	Construction & operation	Permanent	I	Certain	No	N.S.
¹ See notes on magnitude in Table 11.											
² Likelihood of impact is post-mitigation.											

4.1.2 Potential Impacts on Swan Island SPA

Potential impacts on the Swan Island SPA are summarised in Table 14.

Swan Island SPA is located approximately 1km southwest of the proposed caverns and 1.4km southwest of the terrestrial Wellpad element of the scheme, where noise levels from the drilling activities will be significantly reduced. The potential disturbance impact to breeding terns as a result of disturbance from increased noise will be non-significant.

No potential collision impacts with the Vent Stack or plant and machinery are predicted for terns due to their small size and agile flight. Sandwich terns were seen to easily navigate through the series of pylons by the Moyle interconnector in high winds in late summer 2009 (R. Fennelly *Pers Obs.*).

The potential indirect impact on foraging terns associated with the Larne Lough and Swan Island SPAs and Arctic Tern recorded during Open Coast Bird Surveys 2011/12 regarding prey displacement in the vicinity of the outfall location at Castle Robin Bay is considered to be slight adverse (Appendix 8).

Table 14 Summary Table of Potential Impacts on Swan Island SPA.

Potential Impact	Nature	Magnitude ¹	Ecological Value of Habitat/Species/Feature	Significance of Impact	Potential Impact Type	Phase of occurrence	Duration	Likelihood of Occurrence ²	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)	Unlikely	Yes	N.S.
Pollution of Larne Lough during Decommissioning leading to Tern disturbance from food resource depletion	-ve	Major	Very High	Very Large adverse	Indirect Fatality/Disturbance	Decommissioning	Temporary (Unknown)	Unlikely	Yes	N.S.
Physical disturbance to Terns from displacement of potential prey items due to brine emissions at Castle Robin Bay	-ve	Minor	Very High	Slight Adverse	Disturbance via prey loss	Construction	Temporary	Probable	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)	Unlikely	Yes	N.S.

¹See notes on magnitude in Table 11.

²Likelihood of impact is post-mitigation.

4.1.3 Larne Lough ASSI

Potential impacts on the Larne Lough ASSI are summarised in Table 15.

Larne Lough ASSI is located along the shoreline adjacent to the boreholes, immediately west of the terrestrial wellpad and vent stack elements of the scheme.

In the original EIS no impacts as a result of brine emissions on species associated with the Larne Lough ASSI (excl. tern spp. and pale-bellied brent goose) were predicted as they were not recorded during the 2008/09 Open Coast Bird Surveys. During the 2011/12 Open Coast Surveys 2011/12 the following species associated with the Larne Lough ASSI (excl. tern spp. and pale-bellied brent goose) were recorded:

- Goldeneye;
- Red-Breasted Merganser;
- Shelduck;
- Redshank.

Table 15 Summary Table of Potential Impacts on Larne Lough ASSI.

Potential Impact	Nature	Magnitude ¹	Ecological Value of Feature	Significance of Impact	Impact Type	Phase of occurrence	Duration	Direct/Indirect	Occurrence ²	Mitigation Proposed	Significance of Residual Impacts
Pollution of Larne Lough during construction leading to wintering bird deaths/depletion of food resources	-ve	Major	High	Very Large adverse	Indirect Bird death/Disturbance	Construction	Temporary (36 months)	D	unlikely	Yes	N.S.
Pollution of Larne Lough during decommissioning leading to wintering bird deaths/depletion of food resources	-ve	Major	High	Very Large adverse	Indirect Bird death/Disturbance	Decommissioning	Temporary (Unknown)	D	unlikely	Yes	N.S.
Physical disturbance to ASSI feature species from displacement of potential prey items due to brine emissions at Castle Robin Bay	-ve	Minor	Very High	Slight Adverse	Disturbance via prey loss	Construction	Temporary	I	Probable	Yes	N.S.
Noise and visual disturbance ASSI feature species during construction	-ve	Minor	High	Slight Adverse	Disturbance	Construction	Temporary (36 months)	I	Certain	Yes	N.S.
¹ See notes on magnitude in Table 11.											
² Likelihood of impact is post-mitigation.											

4.1.4 Portmuck ASSI/Gobbins ASSI

Potential impacts on the Portmuck and Gobbins ASSIs are summarised in Table 16.

Breeding seabirds associated with the Portmuck and Gobbins ASSIs are largely considered to be unaffected by the proposed construction activities at Castle Robin Bay, due to the majority of the associated colonies being located at least 600m away.

During the 2011/12 Open Coast Bird Surveys it was not the intention to repeat the breeding seabird survey undertaken during the 2008/09 Open Coast Bird Survey however, a small colony of nesting black guillemots was recorded. The nesting sites are located c.100m south of the proposed pumping station and c.200m north of the outfall pipe. Whilst it is not envisaged that these nest sites will be lost as a result of the scheme construction, there is potential to cause significant disturbance to this small colony during construction activities, particularly if blasting is required.

The impact of brine emissions on foraging seabird populations is considered slight as significant foraging activity in the vicinity of the initial mixing zone where there is a potential for localised prey avoidance was not recorded.

Table 16 Summary of Potential Impacts on Portmuck/Gobbins ASSI

Potential Impact	Nature	Magnitude ¹	Ecological Value	Significance of Impact	Potential Impact Type	Phase of occurrence	Duration	Direct/ Indirect	Likelihood of Occurrence ²	Mitigation Proposed	Significance of Residual Impacts
Noise and visual disturbance to foraging ASSI feature species during construction of activities at Castle Robin Bay	-ve	Minor	High	Slight Adverse	Disturbance	Construction	Temporary (18 months)	D	Probable	No	N.S
Physical disturbance to ASSI feature species from displacement of potential prey items due to brine emissions at Castle Robin Bay	-ve	Minor	High	Slight Adverse	Disturbance	Construction	Temporary (5 years)	I	Unlikely	No	N.S

4.1.5 Impacts on Local Species

Potential impacts on local species are summarised in Table 17.

The largest adverse impact is the unlikely potential pollution of Larne Lough resulting in death or injury of wintering/and or breeding waterfowl of international conservation importance.

A potential moderate adverse impact is the unlikely potential collision of geese and waterfowl with temporary construction plant. The remaining four moderate adverse impacts relate to disturbance to breeding birds during construction. Several slight adverse impacts are predicted due to the loss of and disturbance to a small number of farmland and coastal bird breeding territories.

To expand on the breeding bird habitat loss, the following nine territories will be lost (scheme element responsible in brackets):

- 1 Whitethroat territory (Vent Stack);
- 1 Dunnock territory (GPF access roads);
- 1 Blue Tit, Linnet, Meadow Pipit, Song Thrust, Robin and Wren territory (GPF);
- 1 Meadow Pipit (IPS).

Potential impacts of brine emissions to foraging open water species have been considered slight. There are seven Amber-listed BOCCI species, one Red-listed BOCCI, one Northern Ireland Priority Species, four species listed on Schedule 1 of the Wildlife (NI) Order 1985 (as amended) and five species listed on Annex 1 of the EU Birds Directive that were recorded as foraging or having the potential to forage within the vicinity of the proposed brine outfall location at Castle Robin Bay. Open Coast Bird Surveys undertaken in 2011/12 however, show that these species are present in relatively small numbers and that the potential avoidance of prey items at the outfall location will be localised to within 100m, c.350-500m from the Islandmagee coastline.

Table 17 Summary of Potential Impacts on local species

Potential Impact	Nature	Magnitude ¹	Ecological Value of feature	Impact Significance	Potential Impact Type	Phase of occurrence	Duration	Direct/ Indirect	Likelihood of Occurrence	Mitigation Proposed	Significance of Residual Impacts
Pollution impacts to wintering/ breeding water birds during construction	-ve	Major	Very High	Very Large Adverse	Direct fatality and/or disturbance	Construction	Temporary (36 months)	D	Unlikely	Yes	N.S.
Pollution impacts to wintering/ breeding water birds during decommissioning	-ve	Major	Very High	Very Large Adverse	Direct fatality and/or disturbance	Decommissioning	Temporary (Unknown)	D	Unlikely	Yes	N.S.
Collision impacts of Mute Swans(Peak 26 ³), Whooper Swan (Peak 36 ³), Greylag goose (Peak 27 ³), Pink-footed goose (Peak 2 ³), Snow goose Peak 2 ³), Cormorant (Peak 20 ³), Shag (Peak 42 ³) with max 55m high drill rig, 40m vent stack and cranes	-ve	Intermediate	Very High	Large Adverse	Direct Fatalities	Construction & Operation	Temporary (36 months) (Drill rig, cranes) Permanent (Vent Stack)	D	Unlikely	Yes	N.S.
Disturbance to breeding birds during construction of IPS (bedrock blasting)	-ve	Intermediate	Medium	Moderate	Disturbance via displacement	Construction	Temporary (36 months)	I	Certain	Yes	N.S.
Displacement of prey items at the brine outfall location of five Annex I seabird	-ve	Minor	Very High	Slight Adverse	Disturbance	Construction	Temporary	I	Probable	Yes	N.S.

Potential Impact	Nature	Magnitude ¹	Ecological Value of feature	Impact Significance	Potential Impact Type	Phase of occurrence	Duration	Direct/ Indirect	Likelihood of Occurrence	Mitigation Proposed	Significance of Residual Impacts
species											
Displacement of prey items at the brine outfall location of four WO S1 seabird species	-ve	Minor	High	Slight Adverse	Disturbance	Construction	Temporary	I	Probable	Yes	N.S
Displacement of prey items at the brine outfall location of one NI seabird species	-ve	Minor	High	Slight Adverse	Disturbance	Construction	Temporary	I	Probable	Yes	N.S
Displacement of prey items at the brine outfall location of one Red-listed BOCCI seabird species	-ve	Minor	Medium	Slight Adverse	Disturbance	Construction	Temporary	I	Probable	Yes	N.S
Displacement of prey items at the brine outfall location of seven Amber-listed BOCCI seabird species	-ve	Minor	Medium	Slight Adverse	Disturbance	Construction	Temporary	I	Probable	Yes	N.S
Loss/disturbance of 9 farmland breeding territories including one Amber-listed Linnet territory at site of GPF, Vent Stack and IPS.	-ve	Minor	Low-Medium	Slight Adverse	Habitat Loss and fragmentation	Construction	Permanent	D	Certain	Yes	S
Noise and visual disturbance to nine breeding Black Guillemot pairs on	-ve	Minor	Medium	Slight Adverse	Disturbance	Construction	Temporary (18 months)	I	Extremely unlikely	Yes	N.S.

Potential Impact	Nature	Magnitude ¹	Ecological Value of feature	Impact Significance	Potential Impact Type	Phase of occurrence	Duration	Direct/ Indirect	Likelihood of Occurrence	Mitigation Proposed	Significance of Residual Impacts
Ballylumford jetties during construction											

5 MITIGATION

Mitigation of the identified potential impacts in Chapter 4 is addressed by both avoidance of impact and management or reduction of impact.

There will only be one residual impact on ornithological features remaining after mitigation across all designated sites and local habitats, namely the loss of nine breeding farmland bird territories.

5.1 Designated Sites

5.1.1 Pollution Mitigation

General mitigation aimed at reducing potential pollution impacts to designated sites, which may impact on ornithological features during the operational and construction phases of the proposed scheme is summarised below:

- Best practice construction guidelines and an effective Environmental Management Plan (EMP) will be drawn up and adhered to by the successful contractor. The EMP shall be submitted to the Client Representative and NIEA for approval prior to works. NIEA, NH and RSPB will have the opportunity to input and pass comment on the EMP before it is submitted.
- All works should be undertaken in accordance with the Fisheries Act (Northern Ireland) 1996 (as amended) with particular reference to the protection of habitat, spawning areas, fry or juvenile fish, and avoidance of obstruction to migratory fish.
- There shall be no discharge of suspended solids or any other deleterious matter to watercourses. During construction silty water shall be treated using silt traps/settlement ponds and temporary interceptors. Traps will be installed until such time as permanent facilities are constructed. Any surface run-off must be treated to ensure that it is free from suspended solids, oil or any other polluting materials.

Petrol and oil interceptors will be used to prevent contaminants entering Larne Lough and adjacent tidal ponds. All fuels, lubricants and hydraulic fluids will be kept in secure areas away from watercourses.

As part of the EMP to be produced by the successful contractor (at the detailed design stage), an effective spillage procedure will be put in place with all staff properly trained in its implementation.

Fuelling and lubrication of plant machinery will not be undertaken within 15m of the nearest watercourse. 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 captured, treated and removed to a suitable treatment facility by a licensed waste contractor.

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 licences.

5.1.2 Impact-specific Mitigation

5.1.2.1 Pollution and Disturbance Impacts

Prior to undertaking planning of any decommissioning works, an ecologist will be contracted to undertake a review of bird use of the scheme area, and undertake further surveys should

these be required. Pollution prevention guidelines will be strictly adhered to, and measures required to minimise construction disturbance to wintering birds will be agreed in consultation with NIEA NH and RSPB, and included in the EMP. This may include the installation of acoustic measures to reduce noise and screening to reduce the level of perceived threat due to visible human presence and increased erratic noise.

- **Bird Collision Impacts**

Construction cranes and the drill rig will be lit at night. Illumination of the vent stack may also reduce the risk of bird collision, particularly to Pale-bellied Brent Geese (and other swan and geese species) during their autumn arrival to Larne Lough. The risk of collision is however considered unlikely and lighting the stack would significantly increase the visual impact of the vent stack to local observers.

- **Potential Avoidance of Seabird Prey Items at the Brine Outfall Location**

Potential avoidance of seabird prey items is expected to be restricted to the initial mixing zone, within 100m of the proposed brine outfall location. The brine outfall pipe will be fitted with a high pressure dispersal nozzle to increase turbulence to the brine discharge to enhance mixing and cause rapid dispersal of the brine. Residual impacts to potential seabird prey items will not be significant.

- **Disturbance to wintering and breeding birds during construction at Castle Robin**

It is not certain whether blasting will be required at the site of the IPS or brine outfall pipe. This will be defined at the detailed design stage and upon the completion of the pre-construction ground investigation studies.

Article 4 of Part II of the Wildlife (Northern Ireland) Order 1985 as updated by the Wildlife and Natural Environment Act (Northern Ireland) 2010 states that —

1) *Subject to the provisions of this Part, if any person intentionally or recklessly—*

- (a) *kills, injures or takes any wild bird; or*
- (b) *takes, damages or destroys the nest of any wild bird while that nest is in use or being built; or*
- (ba) *at any other time takes, damages or destroys the nest of any wild bird included in Schedule A1; or*
- (bb) *obstructs or prevents any wild bird from using its nest; or*
- (c) *takes or destroys an egg of any wild bird,*

he shall be guilty of an offence.

If it is determined that blasting is required at the site of the pumping station at Castle Robin a detailed methodology will be prepared and submitted with the EMP for approval by the NIEA. To comply with statutory legislation construction works at Castle Robin Bay should be undertaken outside of the breeding bird season due to the presence of nesting black guillemots associated with the Portmuck ASSI. The breeding bird season is not defined in Northern Ireland legislation but is broadly acknowledged as March to August. September has been highlighted as an appropriate month during which to carry out any required blasting. Commitment to blasting (if required) in September will also reduce the impact to key overwintering birds foraging within the vicinity of proposed construction works at Castle Robin.

5.2 Non-designated Site Ornithological Features

- **Collision Impacts to Swans and Geese**

Cranes and the drill rig will be lit at night for safety reasons. It has been suggested that the lighting at these structures should be blue or green, as these have been shown to disorientate migrating birds considerably less, leading to lower collision risks especially in poor visibility (Poot *et al.*, 2008). Detailed lighting plans will be included in the EMP.

- **Disturbance to Breeding Farmland Birds During Construction**

Construction and site clearance activities (including vegetation removal) will be undertaken outside the breeding bird season in line with national legislation. An ecologist should be contracted prior to any planned site clearance activities to undertake a 'pre-vegetation clearance survey'. Commitment to limiting any blasting to within the month of September and undertaking construction activities outside of the bird breeding season at Castle Robin Bay will also prevent disturbance to nesting ringed plovers.

5.3 Residual Impacts

Following the successful implementation of the above mitigation measures and adherence to a comprehensive EMP subject to review by NIEA NH and RSPB, only one residual impact on ornithological features, namely the loss of nine farmland bird breeding territories will remain.

5.4 Compensatory Measures

- **Loss of Nine Farmland Bird Territories**

The placement of bird boxes within newly planted and/or existing semi-mature trees on the fringes of the GPF and IPs will provide a positive biodiversity gain for tree and hedge-row nesting birds. Details of their type, numbers and placement will be agreed following consultation with NIEA NH and Natural Heritage and included in the EMP.

The loss of ground-nesting birds e.g. Meadow Pipit at the GPF cannot be mitigated against but is likely these will be displaced into adjacent habitats.

5.5 Habitat Enhancement Measures

Islandmagee Storage Limited is committed to local wildlife conservation and welcome recommendations made by RSPB with regards habitat enhancement measures, which could be included as conditions in the event of planning permission being granted for the proposal.

- **Species Rich Plots and Bird Boxes**

The planting of species rich plots would go some way to providing insects for priority bird species. Such plots could be located adjacent to the locations of bird boxes detailed above. It is acknowledged that the provision of suitable foraging habitat e.g. giant bird tables and species rich meadows to provide seed and insect sources near to nest boxes encourages their uptake. Such measures will be discussed with landowners and it is hoped RSPB and NIEA NH will welcome discussions regarding species rich plots, their suitability, placement and design to improve local habitats for birds.

- **Black Guillemot Roost Sites and Nest Sites**

In addition to the commitment to restricting any blasting works potentially required at Castle Robin Bay to outside of the breeding bird season, habitat enhancement measures through the placement of nesting tunnels in consultation with RSPB and

NIEA NH could be adopted. Such measures may also be adopted following consultation at the Ballylumford Jetties.

- **Yellowhammer and Twite**

Both species are red-listed BOCCI and were recorded during Wintering Farmland Bird Survey (twite) and within existing datasets during the desktop study (yellowhammer). Through consultation and agreements with landowners habitat management measures to benefit these species would be considered at the detailed design stage in conjunction with RSPB and NIEA NH.

5.6 Monitoring

Islandmagee Storage Limited will seek to employ a third party auditor as best practice to undertake monitoring of key ornithological features. It is hoped that NIEA NH and RSPB will welcome discussions on the scope and duration of monitoring to be included in the EMP, and in the production of a clear list of key seabird prey items, which will be included in investigative studies on the impact of elevated salinity and also in real-time monitoring.

6 REFERENCES

Willson, L.J., Bingham, C.J., Black, J., Kober, K., Lewis, M., Webb, A. & Reid J.B. (2009) Identifying important marine areas for terns. Unpublished JNCC 1st interim report, December 2009.