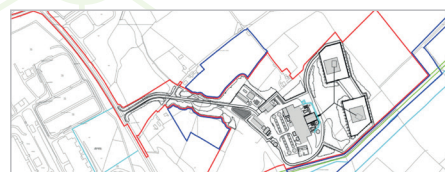


A STRATEGIC ENERGY SOLUTION FOR EUROPE



PROJECT-CAES LARNE, NI



Environmental Statement

Volume 4 – ES Non-Technical Summary



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ENVIRONMENTAL STATEMENT NON-TECHNICAL SUMMARY



PROJECT-CAES LARNE, NI

**Compressed Air Energy Storage project
Larne, Northern Ireland**

Contents

Introduction	3
Purpose of the ES	3
About the Applicant	4
About the Project	5
Project of Common Interest (PCI)	12
Project Need	13
Potential Environmental Effects	19
Human Beings	19
Terrestrial Flora and Fauna	23
Marine Flora and Fauna	25
Soils and Geology	34
Air Quality and Climate	37
Electric and Magnetic Field	38
Terrestrial Water Environment	39
Marine Water Quality	41
Noise	43
Cultural Heritage	44
Landscape and Visual Impact Assessment	46
Resource and Waste Management	48
Traffic and Transport	50
Conclusion	55

Introduction

The Environmental Statement (ES) supports a planning application by the planning unit of Gaelectric Energy Storage on behalf of Gaelectric CAES NI Limited. Gaelectric CAES NI Limited is proposing to develop a Compressed Air Energy Storage project (CAES) in Islandmagee, Larne, Northern Ireland. This document is the Non-Technical Summary of the ES.

This document is a summary of the information contained in the submitted ES. The following environmental aspects are considered within the ES and summarised in this Non-Technical Summary.

-  Human Beings
-  Flora and Fauna
-  Soils, Geology and Hydrogeology
-  Air Quality and Climate
-  Electric and Magnetic Fields
-  Water Environment
-  Noise and Vibration
-  Cultural Heritage
-  Landscape and Visual Impact
-  Waste Management
-  Traffic and Transport

For detailed information please consult the full ES document.

Purpose of the ES

The objective of the Environmental Statement is to identify and predict the likely environmental impacts; to describe the means and extent by which they can be reduced or ameliorated; to interpret and communicate information about the likely impacts; and to provide an input into the decision making and planning process. Avoidance of likely environmental impacts during the early stages of the assessment was achieved through the consideration of alternatives and the review of design.

The ES is the primary element of the Environmental Impact Assessment (EIA) process and is recognised as a key mechanism in promoting sustainable development, identifying environmental issues, and in ensuring that such issues are properly addressed within the capacity of the planning system.

EIA is defined as a systematic, integrated evaluation of both the positive and negative impacts of a project on the natural environment, on beneficial uses of the environment, including man-made structures, amenities and facilities, and of the socio-cultural environment.

The preparation of the ES informed the preparation of the Proposed Development. Compiling the baseline environmental information for the ES allowed for environmental considerations to be taken into account from the outset and resulted in a development proposal that integrated environmental information with design.

It is intended that this ES will assist the Planning Authority, statutory consultees and the general public in assessing all aspects of the application proposals.

About the Applicant

Gaelectric Holdings plc is an independent wind and energy storage development company. Founded in 2004, Gaelectric are active in wind farm development in Northern Ireland and the Republic of Ireland and also have operations in the United States.

Currently, Gaelectric operates or plans to operate onshore wind farms in 15 locations across the island of Ireland. Of these wind farms, 9 are located in Northern Ireland and 6 in the Republic of Ireland. Gaelectric plans to triple its wind-generating capacity by the end of 2015, from 66.4 MW to 177.6 MW and ultimately to 400 MW by 2017.

Gaelectric Energy Storage Ltd is involved in the assessment and development of Compressed Air Energy Storage (CAES) projects across Europe.

Gaelectric CAES NI Limited is the applicant for the Proposed Development referred to as Project-CAES Larne, NI. Gaelectric CAES NI Limited is a wholly owned subsidiary of Gaelectric Energy Storage Ltd. Gaelectric Energy Storage Ltd is a wholly owned subsidiary of Gaelectric Holdings PLC.

About the Project

Compressed Air Energy Storage (CAES) is an innovative large scale energy storage technology. A CAES Station stores excess energy from the grid by converting it to compressed air which is then stored in caverns created within salt layers deep underground from where it can be released through an electricity generator for later use by system operators.

CAES is an established and well proven technology with facilities in Germany and in Alabama, USA that have demonstrated high operational reliability for several decades. Project-CAES Larne, NI applies proven CAES technology in a novel and innovative way to the integration of renewable energy sources such as wind and solar.

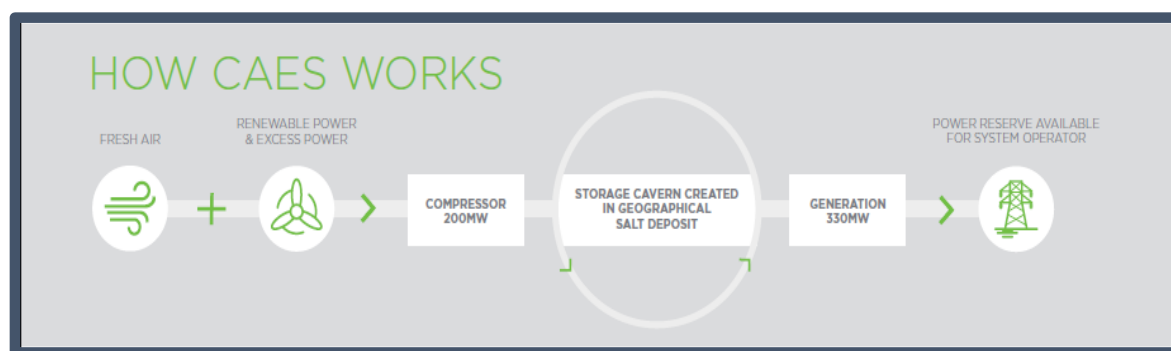


Figure 0-1 How a CAES System Works - Simplified



Figure 0-2 CAES Station Site Location

The proposed development (Project-CAES Larne, NI) can be summarised as a development consisting of a Compressed Air Energy Storage (CAES) station, ancillary buildings and 2 geological storage caverns located North of the Moyle Interconnector at

Ballycronan More and Ballycronan Beg, Islandmagee, Larne, Northern Ireland, in addition to a number of linear components such as a brine pipeline, water pipeline, gas and electricity transmission connection in the townlands of Ballycronan More, Ballycronan Beg, Ballylumford, Ballyprior Beg and Dundressan. For a full project description of the Overall Development and the Primary Planning application please refer to the Environmental Statement Section 1, 5 and the planning reports/design and access statement, engineering reports i.e. Construction Management Plan and drawings and area schedule submitted

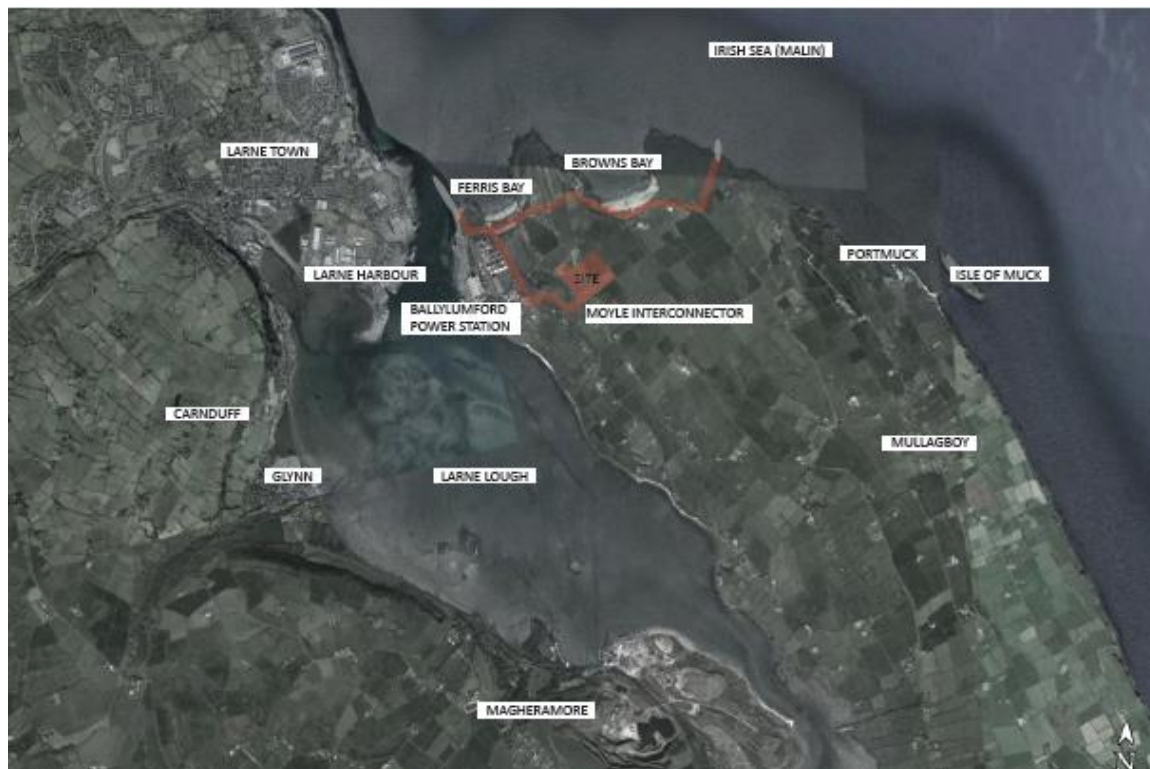


Figure 0-3 Site Location Overview of Project-CAES Larne, NI

The CAES station will use surplus energy in the grid to compress air into storage caverns constructed in bedded salt and use the compressed air energy to assist the production of 330 megawatts of power generation for a continuous period of 6 hours. The salt deposits in East Antrim have unique potential on the island of Ireland for development of storage caverns suitable for CAES.

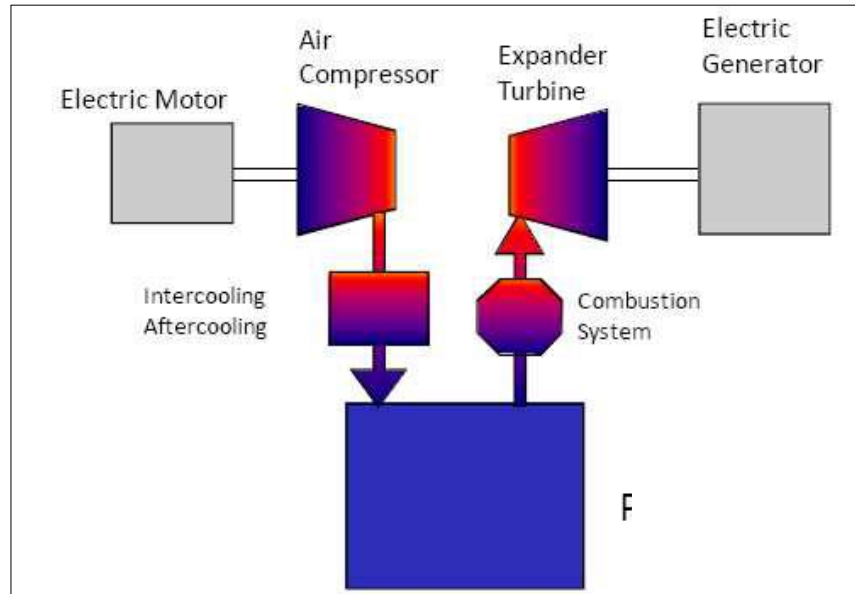


Figure 0-4 CAES Process Overview

At the Islandmagee CAES Station site, the caverns will be developed in the Permian Halite Member at a nominal depth of 1500 metres with a thickness of approximately 200 metres.

The caverns will be created using seawater for leaching which will be drawn from a seawater intake which is approximately 1.7 kilometres from the Islandmagee CAES Station Site, following a route over land and undersea to a location in the sea north west of Ferris Point. The produced brine will be discharged offshore, again following a route over land and under the sea to a location in the sea 4 kilometres from the Islandmagee CAES Station Site North East of Dundressan.

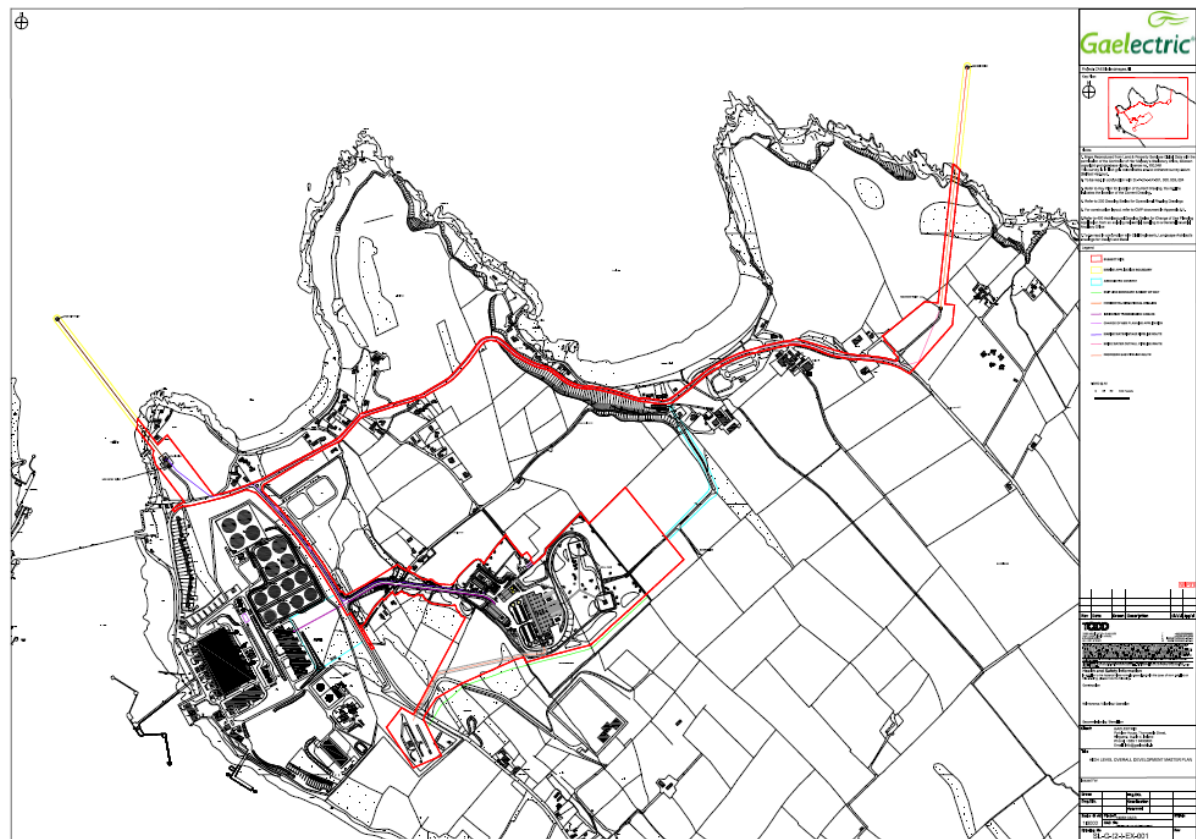


Figure 0-5 Detailed Site Location of Project-CAES Larne, NI

The site location associated with the Primary Planning Application is outlined above and stretches across the townlands of Ballycronan More, Ballycronan Beg, Ballylumford, Ballyprior Beg and Dundressan.



Figure 0-6 CAES Station Site (From centre of site, facing North West)

CAES Station Site

The CAES Station Site is located at Ballycronan More and Ballycronan Beg, Islandmagee and will consist of the following elements;

- CAES station building
- Storage caverns and associated well head buildings
- Gas pressurisation building
- GIS building
- Administration building
- Waste water treatment building
- Gas Above Ground Installation (AGI) station
- Leaching plant/ solution mining water pumping station
- Car park, site roads infrastructure and drainage details
- Cooling towers
- Additional balance of plant, ancillary infrastructure

The CAES station building is the primary building on the CAES Station site and will have the following dimensions; Length 102m, Width 42.0m and Height of 22.8m.



Figure 0-7 CAES Station Building

The storage caverns required for the CAES Station will be developed in the Permian Halite Member at a nominal depth of 1500 metres with a thickness of approximately 200 metres. The 'typical' shape of a salt storage cavern with a provisional cavern diameter of 61m and height of around 150-170m is shown in Figure 0-8.

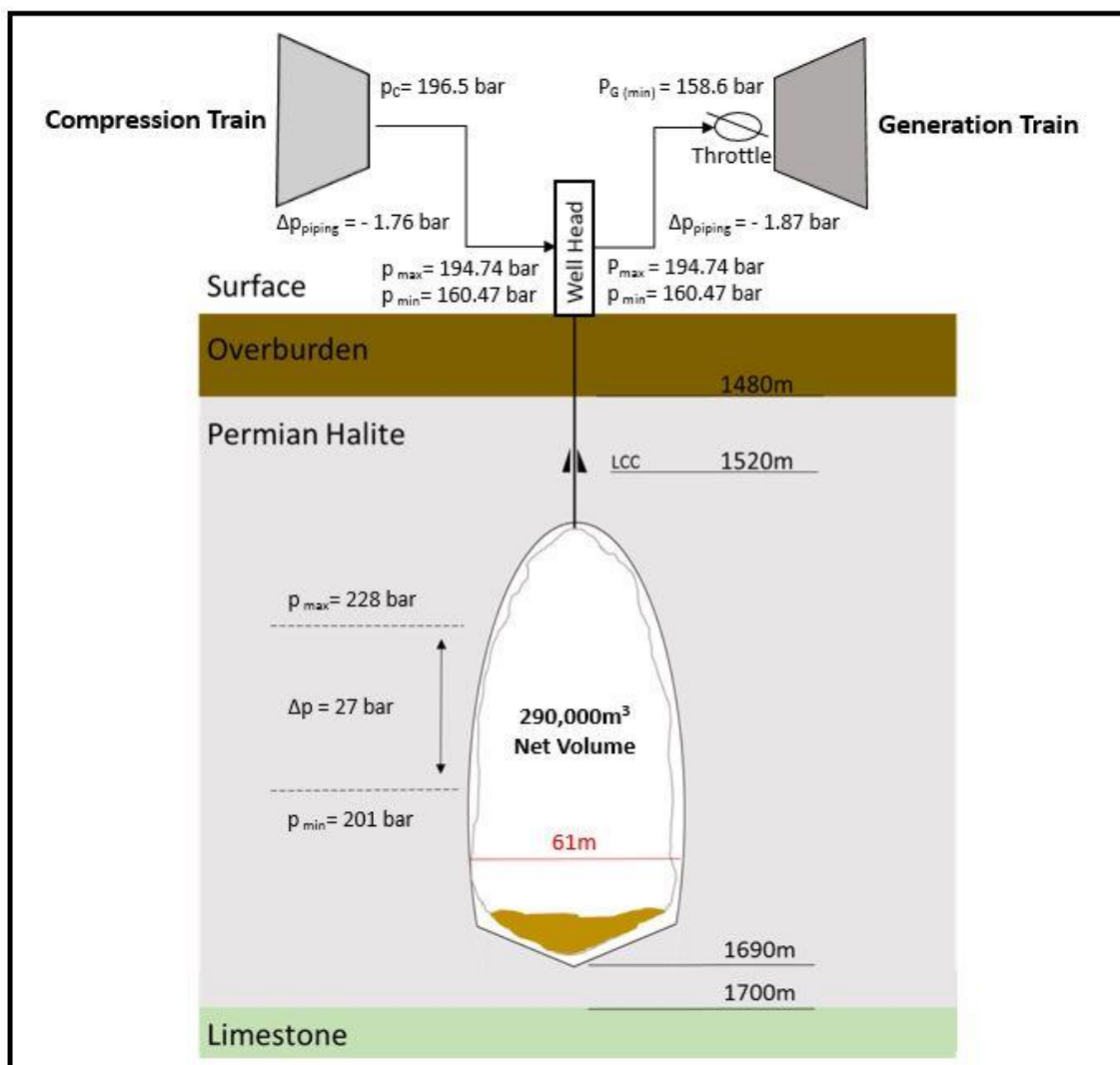


Figure 0-8 Preliminary cavern design and pressure regime

Additional Sites and Linear Components

The additional site works and linear components associated with the Proposed Development include the following;

- A 275 kV underground transmission cable circuit and associated infrastructure with a route length of approximately 670 metres, connecting from the proposed GIS building (associated with the CAES Station) to the Ballylumford 275 kV substation.
- An underground gas pipeline from the proposed AGI on the CAES Station site to make a tie-in connection into the inlet header to Filter streams at Ballylumford Gas AGI.
- Brine outfall pipeline and diffuser arrangement;

The brine outfall pipeline will convey the brine from the Leaching Plant in the CAES Station Site along Ballylumford Road, Ferris Bay Road and Browns Bay Road to a site at Dundressan and the Horizontal Direction Drilling (HDD) entry point and then offshore to an outfall point north east of Dundressan where the brine will be returned to the sea by means of a diffuser comprising a number of “duck billed” diffuser valves.

- Brine Outfall Site

The Brine Outfall Site is located in an agricultural field in the townland of Dundressan in the North East of Islandmagee and will include an access road, Brine Outfall Pipeline and a manhole to allow monitoring of the brine outfall.



Figure 0-9 Brine Outfall Site

- Marine Water Intake Pipeline and inlet screen;

The marine water intake pipeline will abstract seawater via an intake screen placed at a location offshore north west of Ferris Point through a gravity pipeline, constructed by HDD, to the Pump Station at the Intake site south of Ferris Point, and along Ferris Bay Road and Ballylumford Road, and on to the Leaching plant at the CAES Station site where the seawater will be injected through the cavern well head to leach the cavern to the required geometry and volume.

- Marine Water Intake Site including an Access Road, Water Intake Pipeline, Water Intake Pump Station, Intake Wet Well and associated electrical substation at a site south of Ferris Point, Islandmagee

The Marine Water Intake Site is located in an agricultural field in the townland of Ballylumford in the North West corner of Islandmagee and approximately 150m south of Ferris Point Lighthouse and will include the elements listed above.



Figure 0-10 Marine Water Intake Site

Project of Common Interest (PCI)

In October 2013, Project-CAES Larne, NI was designated as a Project of Common Interest (PCI) amongst Member States under the European Union Regulation 347/2013 on guidelines for trans-European energy infrastructure. PCI status demonstrates that PCI projects conform to a range of criteria, including

- Having significant benefits to at least two Member States
- Contribute to market integration and further competition
- Enhance security of supply, and
- Reduce CO₂ emissions

Furthermore the project, as a PCI Project, was awarded a €6.4million EU PCI grant to progress preliminary project works in July 2015.

This confirmed the project not only as a PCI Project, but a PCI Funded Project, and as a significant development opportunity for Northern Ireland as a whole.

Project Need

Project-CAES Larne NI will deliver substantial benefits to Northern Ireland. It will provide bulk, grid-level storage that will be responsive and effective and will support the integration of Northern Ireland's renewable energy resource.

Project-CAES Larne NI is a development that will help to address a number of issues within Northern Ireland's electricity system ranging from security of supply to facilitation of renewables on the grid, and is a highly useful infrastructure in a region of high wind penetration.

The Project will provide substantial benefits to Northern Ireland and indeed the All Island grid system. These include the following;

- Enhancement of security of supply in Northern Ireland and Ireland.
- Reduction of energy isolation in Northern Ireland and Ireland.
- Reduction of system-wide energy costs in Northern Ireland and Ireland
- Reduction of wind curtailment by improving matching of generation and demand within the system, resulting in increased wind penetration.
- Demonstration of CAES optimised to integrate variable renewable energy generation, promoting roll-out deployment of the technology across Europe and worldwide.
- Assist the TSOs to achieve their objectives to ensure the safe, secure and economic operation of the power system to enable the management of variable energy sources
- Provision of existing and new system services as outlined in SEM Decision Paper DS3 System Services Procurement Design, facilitating more flexible operation of the grid without additional grid reinforcement.

Project-CAES Larne NI addresses capacity / security of supply issues in Northern Ireland's electricity system. The Project will provide a secure and domestic energy supply which will help to alleviate Northern Ireland's dependence on imported energy.

The availability of Project-CAES Larne NI, in addition to the Moyle Interconnector and North-South Interconnector will ensure that the long term stability of the electricity system in Northern Ireland is maintained and the integration of renewables is further encouraged.

The overall employment impact – 359 FTEs (Full Time Equivalent) during the construction and operational phases – represents a significant jobs boost for the Mid & East Antrim District Council Area (DCA) which includes Islandmagee.

The social impacts from the project are also substantial and include job creation, tackling deprivation and contributing to a cleaner and more sustainable environment.

The Economic activity or the value of output in NI due to the proposed project is calculated at £270m, the GVA or gross value added from the project is calculated at £68m; with the exchequer contributions from the Proposed Development calculated at £33m, which would be available to the NI Executive to fund infrastructure across the region.

The proposed project will not only boost economic activity and employment locally but it would also act as a positive signal for further investment in Northern Ireland and even greater economic activity and employment by other enterprises in the years to come.

Alternatives Examined

The ES has included consideration of the reasonable alternatives studied by the developer in order to prevent and mitigate environmental impacts.

The different categories of alternatives that were examined include:

- technological alternatives;
- location/site alternatives;
- process alternatives;
- phasing alternatives;
- routing alternatives;
- site layout alternatives;
- scale alternatives; and
- design alternatives.

These alternatives are discussed in detail in the ES.

An alternative application of CAES technology in deeper salt on Islandmagee led to a substantial reduction in environmental impact from a previous application of the technology at a site at Carnduff south of Larne Town.

A thorough site selection process identified and investigated a number of alternative sites on Islandmagee and led to the selection of the chosen site based on consideration of environmental impacts. This process has been documented in the site selection study submitted.

Potential routes for seawater intake and brine outfall pipelines were also examined in a route selection process. This process has been documented in the route corridor selection study submitted.

Alternative methods of disposing of the brine solution were also examined and found to be not viable. This included shipping the brine out to sea to a disposal point, evaporation of the brine onsite and overland piping of the brine solution.

Scoping and Consultation

Scoping

As part of the EIA a review of all environmental aspects was undertaken by the EIA team and those aspects for which impacts are not anticipated to be significant were “scoped out” of the EIA, that is, not included, or dealt with at a high level. Where the review and results of consultation indicated that areas should consider aspects in more detail, these were considered in the ES. The scoping process assisted so that all relevant environmental issues being scoped in or scoped out. Early consultation with statutory and non-statutory bodies was also undertaken to determine the proposed scope of the ES.

Consultations

The consultation phase of an Environmental Impact Assessment is of utmost importance, as it enables all concerned and interested parties to voice their opinions on the Proposed Development during the initial stages of the project. This enables changes to be made during the design stage of the development, taking on board comments and ideas from the consultation process.

There is a continued commitment to an open and comprehensive consultation with key stakeholders and the local community. Consultation meetings were held with the community, relevant stakeholders and principal statutory consultees such as the Northern Ireland Environment Agency, the Northern Ireland Planning Service and the Department of Enterprise, Trade and Investment Northern Ireland from the outset and throughout the life time the project. The consultation with statutory and non-statutory stakeholders continued throughout the Environmental Impact Assessment.

The applicant was engaged in Pre Application Discussions (PAD) where a 7 no. meetings have taken place to date. Please refer to Table 1 below. In addition to PAD meetings, there has been a number of interdepartmental meetings with NIEA Water Management Unit, DoE Planning, DoE Marine Divisions, Geological Survey NI, DRD Transport NI, NI Water, SONI, Mid-East Antrim Borough Council, NIEA IPRI, DETI, etc.

No. PAD Meetings	Date of PAD Meetings
1 st	6 th September 2011
2 nd	27 th October 2011
3 rd	8 th May 2012
4 th	8 th August 2013
5 th	12 th December 2013
6 th	9 th July 2014
7 th	15 th September 2015

Table 1: Project – CAES Larne, NI PAD Meetings.

It is also recognised that consultation and input from local stakeholders is of key importance. GES have been committed throughout the project to an open, transparent and active consultation with all interested parties. The following meetings/presentations were held with local interest and stakeholder groups throughout the consultation process.

Date of Meeting/Presentation	Stakeholder Group
31 st October 2013	Royal Society for the Protection of Birds
12 th November 2013	Marine Conservation Northern Ireland
21 st November 2013	East Antrim Friends of the Earth
12 th December 2013	Northern Coast Lobster Fishermen's Association
24 th February 2014	Carrickfergus Road Local Residents Meeting
3 rd April 2014	North Irish Divers Meeting
13 th May 2014	Marine Conservation Northern Ireland
13 th May 2014	East Antrim Friends of the Earth
26 th August 2014	Carrickfergus Road Local Residents Meeting
18 th May 2015	National Trust
26 th May 2015	Carrickfergus Road Local Residents Meeting
27 th May 2015	Islandmagee Local Residents Meeting
24 th August 2015	National Trust
11 th November 2015	Islandmagee Local Residents Meeting

Table 2: Project – CAES Larne NI Stakeholder/Focus Group Meetings.

In order to provide for effective and pro-active engagement with the community, a series of community consultation rounds were hosted during the pre-application consultation phase of the project. The Gaelectric Energy Storage project team made available project experts, technical specialists, environmental specialists and consultants at each round to engage with members of the community and answer any queries or questions that may arise.

In accordance with Section 27 of the Northern Ireland Planning Act 2011 and Regulation 5(2) of the Development Management Regulations, the applicant held a Seventh Community Consultation during the 12 week pre-application period. Five rounds of community consultation events were held prior to the enactment 2011 Act and as good practice. A further two rounds were held in accordance with regulation 5(2).

The community consultation rounds were held to keep the community informed as the project progressed and as issues became apparent. The community consultation rounds also helps identify local issues of importance.

The format of the community consultation encouraged the community to visit the venues from 2.30pm to 8pm. Members of the project team explained the displays, answered any questions that arose and recorded feedback as it was given. Experts in a number of fields including technical design, marine and ecology were available at all open days.



Figure 0-11 Photograph of the Community Consultation Rounds

Feedback forms and questionnaires were available and handed out on the day to capture feedback. The details of each of the community consultations are outlined below in Table 3.

Venue	Date	Time
First Community Consultation		
Larne Tourist Information Office, Larne	17 th April 2012	11 am to 8 pm
Second Community Consultation		
Larne Town Hall	10 th September 2013	11 am to 8 pm
First Presbyterian Church, Islandmagee	11 th September 2013	2.30 pm to 8 pm
Larne Rugby Club, Glynn	12 th September 2013	11 am to 8 pm
Third Community Consultation		
First Presbyterian Church, Islandmagee	27 th November 2013	2.30 pm to 8 pm
Glynn Community Centre	28 th November 2013	2.30 pm to 8 pm
Fourth Community Consultation		
Boat Club, Islandmagee	25 th March 2014	2.30 pm to 8 pm
Glynn Community Centre	26 th March 2014	2.30 pm to 8 pm
Larne Town Hall	27 th March 2014	2.30 pm to 8 pm
Fifth Community Consultation		
Glynn Community Centre	24 th June 2014	2.30 pm to 8 pm
First Presbyterian Church, Islandmagee	25 th June 2014	2.30 pm to 8 pm
Larne Town Hall	26 th June 2014	2.30 pm to 8 pm
Sixth Community Consultation		

First Presbyterian Church, Islandmagee	12 th August 2015	2.30 pm to 8 pm
Larne Town Hall	13 th August 2015	2.30 pm to 8 pm
<i>Seventh Community Consultation</i>		
Larne Town Hall	8 th October 2015	2.30 pm to 8 pm
First Presbyterian Church, Islandmagee	9 th October 2015	2.30 pm to 8 pm

Table 3: Project – CAES Larne, NI - Community Consultation venues, dates and times.



Figure 0-12 Photograph of the Community Consultation Rounds

All details of this consultation are outlined in full in the Pre-Application Community Consultation Report submitted as part of this application.

The completed ES has been through a rigorous scoping and pre-application assessment. This has ensured that all potential constraints have been identified and either avoided through appropriate design or adequately mitigated against.

POTENTIAL ENVIRONMENTAL EFFECTS

The ES reports the findings of the EIA, identifying the potential environmental effects as a result of the Project, together with the mitigation measures. A summary of the findings for each aspect of the environment is presented below.

Human Beings

The demographic data for settlements in proximity of the Proposed Development and in particular to the CAES Station site and along the linear infrastructure comprising of terrestrial brine pipeline, transmission line and gas pipeline have been reviewed and summarised in Section 7 of the Environmental Statement (ES).

The main rural and urban populations potentially impacted by the Proposed Development include Islandmagee and Larne. The types of issues which developments of this nature typically raise in relation to this environmental topic include the potential for impacts on population, settlement, employment and economic opportunities.

The construction and operation of the Proposed Development at Islandmagee has been carefully planned and optimised to protect against adverse impacts on the environment. Likewise, the interests of the people living, working or visiting the area of Islandmagee must also be protected.

The Proposed Development provides for a significant new development into the Islandmagee area and with an expected lifetime of 20-50 years. It will contribute significantly to shoring-up and maintaining the existing bulk infrastructure development by providing agglomeration advantages and forward and/or backward economic linkage to them. It is considered, based on the Socio-Economic Impact Assessment Report contained in Appendix 7.1, that the strategic and regional/local scale benefits will have a significant effect on human beings. These positive interactions and effects on the national and regional/local economy can be summarised as:

Significance as a Major Energy Storage Project for Northern Ireland

- The Proposed Development would be the first CAES Station in the world to be connected to a cross-border electricity grid and would be capable of generating over 300 megawatts (MW) of electricity.
- It represents a unique initiative that would build on Northern Ireland's (NI) innate comparative advantages in renewable energies and the region's unique geology.
- It will be seen as major green infrastructural project emitting a positive economic signal for NI.

- the monetised impacts are likely to underestimate the true (but unobservable) future economic impacts arising as a result of the proposed project – foreign direct investment (FDI) into NI in the coming years being one likely important benefit attributable to CAES.
- Improve NI regions competitiveness and attractiveness for investment location.

Socio-Political and National Economic benefits

- Contribute towards the EU's aim of encouraging more private sector investment in renewable related energies, in order to diversify energy supply and address security of supply to enable a more competitive and sustainable low carbon EU energy sector.
- Contribute towards the pending renewable energy target of 40% renewables by 2020, which both NI and Ireland are committed to achieving.
- Creates the possibility for NI to establish itself as an international leader in renewable energies and bulk energy storage technologies, given the uniqueness and significance of the undertaking, and other renewable energy projects underway in NI.
- It complies with the 2012 Economic Strategy for Northern Ireland, which aims to broaden the mix of economic activities and ensure a more competitive region.

Additional macroeconomic impacts

- Economic activity or the value of output in NI due to the proposed project of £270m;
- GVA or gross value added from the project of £68m;
- Exchequer contribution from the proposal of £33m, which would be available to fund infrastructure and services locally and NI-wide.

Single Electricity Market (SEM)-related economic impacts

- Reduction in the cost of producing electricity in the SEM, averaging £5.47m per annum during the project's operational phase (2022-2046);
- Enhanced security of supply of £1.86m per year during this time;
- Reduced wholesale electricity price volatility valued at £6.28m per annum during the operational phase, reflecting the balancing benefits of CAES technology and the development of a market framework accommodating CAES energy storage under the I-SEM (Integrated SEM) initiative.

SEM-related non-monetary benefits over the operational period

- Reduced wind curtailment or enhanced integration of renewable energy sources
- (RES) onto the SEM of 136 gigawatt hours (GWh) per year on average, which would represent a 30% reduction of the rate of wind curtailment in 2024 (to which the latest All-Island Generation Capacity Statement pertains); and
- Reduced carbon dioxide (CO₂) emissions averaging 21,850 tonnes per year or 1.2% abatement of CO₂ carbon dioxide per year due specifically to the proposed project (compared with the baseline estimate of CO₂ emission in 2030 without CAES).

Potential Impacts

Population demographics will continue to change in future years irrespective of whether this Proposed Development proceeds. However, the socio-demographic profile of the baseline environment indicates that there is likely to be a strong demand for increased employment opportunities within the Larne area.

In economic terms, the capital value of Project-CAES Larne, NI is estimated to be in the region of £300million. The Proposed Development will give rise to employment opportunities, both directly and indirectly of approximately 268 FTE (Full Time Employment), during the construction period. The construction phase of the Proposed Development will provide approximately 101 FTE direct during the construction phase of construction workers in the local area. Similarly, local employment opportunities will occur during the operational phase of the Proposed Development as it will give rise to 91 FTEs per annum in total comprising of 32 FTEs and a further 59 FTEs from indirect and induced effects per year in the Northern Ireland economy. The total FTE's generated both directly and indirectly during both the construction and operation will amount to 359.

Local businesses and services will benefit indirectly from the additional people and activity during the construction period.

Impacts to tourism will not be direct, as no tourist sites will be physically affected by the Proposed Development. There will potentially be a minor positive impact on employment and the hospitality industry in the local area at the construction stage of the Proposed Development, as contractors and other workers may stay in the local area during construction.

Islandmagee's main appeal is to those on a leisure day trip who enjoy the area for its convenience, to visit a specific attraction and its scenery. Consequently, there may be temporary construction impacts arising from the visual impacts, noise and traffic. These impacts are short term, and minor in significance. However, there will be the potential for a niche tourism to be built around renewable energy initiatives such as Project-CAES Larne. There is the potential for an increase in tourism from the operation period given the uniqueness and significance of the Proposed Development internationally.

During the construction phase, there is the potential for short-term disruption relating to noise or traffic to a limited number of people in the immediate environs. To this end the applicant will aim to set up a mechanism for liaison with the community, to inform residents of the programme of works anticipated over the construction period and advising of any unusual construction events, e.g. the transport of an oversize load or noisy operations. Updates will be provided on the website www.project-caeslarne.co.uk and through other advertising mechanisms.

Mitigation Measures

Specific mitigation measures are being included for the construction stage of the Proposed Development to ensure any adverse impacts on human beings will be minimised. These are detailed in the relevant chapters the ES. The Proposed Development will be developed in a manner such that the impact on human beings is minimised.

Terrestrial Flora and Fauna

The site of the Proposed Development is not located within the boundary of any current statutory or non-statutory site designated for nature conservation importance. The seawater intake and brine discharge infrastructure are both located within a site known to be currently under consideration by the Department of the Environment to be notified as a marine Special Protection Area at some future stage. This future designation has been taken into consideration.

Larne Lough Special Protection Area, Area of Special Scientific Interest and Ramsar site is located 220m south of the Proposed Development. Portmuck Area of Special Scientific Interest is located 810m east of the Dundressan drilling site. Gobbins Area of Special Scientific Interest is located 2.5km southeast of the Dundressan drilling site. This drilling site is also located 15m from Skernaghan Point Site of Local Nature Conservation Importance.

No adverse effects are predicted upon any statutory or non-statutory site designated for nature conservation importance. A Habitat Regulations Assessment report has been prepared and concludes that no significant effects are likely on any European site.

13 habitat types were encountered within the Proposed Development, ranging from medium (3 no.) and low (5 no.) to negligible (5 no.) ecological value. Mitigation is proposed to create certain habitat types.

Badgers are located in proximity to the Proposed Development. Measures to prevent disturbance to badger are proposed.

Bat surveys carried out to NIEA specifications have indicated that no bat roosts or breeding territories will be impacted by proposals. A pond utilised by bats for foraging will be impacted by proposals, however a pond of greater utility to bats is proposed and will lead to a significant increase in local foraging availability for bats. Lighting proposals will not impact upon bats.

Smooth newt surveys have been carried out and indicated that the species is not present on the proposal site no significant impact upon newts will arise should proposals proceed.

Survey has established fifty two breeding farmland bird territories within the Proposed Development footprint. A total of forty two species were recorded, of which twenty one are classed as birds of conservation concern in Ireland.

Nineteen species of waterbird were recorded from wetland bird survey at the mouth of Larne Lough, including fifteen species classed as birds of conservation concern in

Ireland. Five of these fifteen species are also priority species in Northern Ireland; namely Blackheaded Gull, Curlew, Dunlin, Herring Gull, and Redshank.

Twenty-eight different species of seabird and waterbird were recorded from high and low tide surveys off the coastline of Islandmagee in the marine area surrounding the brine dispersion field, of which twenty five are considered to be of conservation concern in Ireland. Five of these, namely Arctic Skua, Black-headed Gull, Curlew, Herring Gull and Whimbrel are Northern Ireland Priority Species.

Cumulative impacts considered include a high pressure gas connection and a 275kV cable circuit connection to existing transmission infrastructure, both of which are components of the Proposed Development, and the possibility of simultaneous brine discharge associated with the Islandmagee Gas Storage Project.

Mitigation measures have been proposed to ensure no significant effect on the terrestrial flora and fauna resource of the receiving environment. For all ecological receptors, predicted impact magnitudes vary between minor adverse to negligible for most aspects. In the case of semi-natural habitats within the CAES Station site, the predicted impact is moderate adverse and construction of a new pond, grassland and woodland creation are proposed to offset these impacts.

Marine Flora and Fauna

This non-technical summary of the ES outlines the marine and intertidal ecology and nature conservation interests within the ecological zone of influence of the seawater intake and brine discharge sites and their associated pipeline routes in the area around Larne Lough and off Islandmagee.

Studies were undertaken at the two sites and along the marine sections of the pipe routes to document the plants and animals present, to record the different groups of species within these areas and the physical characteristics of the sea shore/sea bed. As impact at the intake pipe will be very limited e.g. a single intake pipe and additionally, and since horizontal directional drilling (HDD) will be used to bring a pipe from the intake point to the Marine Water Intake Site and also to take the brine pipe to the outfall site to the east of Islandmagee, limited sea bed sampling was carried out at the intake location and along the aquatic sections pipe line routes. A greater spatial area was sampled around the discharge site as concerns regarding significant possible impact on the sea bed animals from the brine had been raised.

METHODOLOGY

Designated Sites

Data on Natura 2000 sites (Special Areas of Conservation SACs and Special Protection Areas SPAs), Areas of Special Scientific Interest (ASSIs), Ramsar Sites National Nature Reserves was obtained from the Northern Ireland Environment Agency (NIEA). The Maidens candidate Special Area of Conservation (cSAC) (Site Code: UK0030384) is the only marine related SAC site within 15km of the Proposed Development. All site documents were reviewed and consultation was carried out with NIEA and Department of the Environment (DOE) Marine Division. In addition to consultation with NIEA, data on non-statutory sites were obtained from the DOE Planning NI website, the Larne Area Plan 2010 and the proposed Antrim, Ballymena and Larne Area Plan 2016 Issues Paper.

Surveys

Both sea shore and sea bed surveys were carried out along and in the general area of both the intake and outlet routes by sampling the sea bed from a boat and by photographing the same areas remotely by drop down video and directly by diving. Samples were analysed for the plants and animals present. Except for one species of star fish, the Purple Sunstar, no rare or unusual species were recorded.

Marine Mammal Assessment

A comprehensive desktop review was carried out for the marine mammal assessment. The Irish Whale and Dolphin Group (IWDG) sightings and stranding's database was

accessed and all data relevant to the survey area were compiled and collated. In addition, all seal surveys carried out by or on behalf of NIEA were reviewed as well as all available literature. The study area focused on a radius of 15km from the brine discharge and seawater intake locations and extended into the wider North Channel as species ranges dictated. In Northern Irish waters 17 species of cetaceans have been recorded to date (Gibson, 2011) about 8 of which are consistently observed every year. All cetaceans are listed on Annex IV of the EC Habitats Directive, as species of European interest in need of strict protection and monitoring. The Harbour Porpoise and Bottlenose Dolphin are listed under Annex II as species of European interest whose conservation requires the designation of SACs. These data show that four species have been sighted definitively in the study area during this 5 and a half year period: the Harbour Porpoise, the Bottlenose Dolphin, the Minke Whale and Risso's Dolphin. The remaining sightings during this period could not be identified to species level. The Harbour Porpoise was the most common species recorded (66.2), followed by the Bottlenose Dolphin (27.2%), Minke Whale (0.4%), Risso's Dolphin (0.05% each).

Marine Reptile Assessment

A comprehensive desktop review was carried out for the marine reptile assessment. Stranding's and sightings of marine turtles were reviewed through the annual reports of Marine Environmental Monitoring under the turtle implementation group of the UK marine turtles grouped species action plan. The study area for marine reptiles included the wider North Channel. To date, no turtles have been recorded from the study area.

Fisheries Assessment

A comprehensive desktop review was carried out for the fisheries assessment. This included consultation with fisheries officers in the Department of Agriculture and Rural Development (DARD), the Department of Culture, Arts and Leisure (DCAL) and local fishermen. The study area extended from Glenarm in the north to Black Head in the south and includes the Maidens. In addition, spawning and nursery areas, migratory species, priority species and species that are important as a food source for birds were also included in the assessment.

Impact Assessment

The impact assessment methodology adopted for this study is based on the Chartered Institute of Ecology and Environmental Management Guidelines for Ecological Impact Assessment in the United Kingdom and Guidelines for Ecological Impact Assessment in Britain and Ireland – Marine and Coastal. AQUAFACT's knowledge of intertidal and subtidal ecosystems and experience from similar developments elsewhere played an important role in the impact assessment process.

BASELINE CONDITIONS

Designated Sites

The Maidens candidate Special Area of Conservation (cSAC) (Site Code: UK0030384) is the only marine related SAC site within 15km of the Proposed Development. The qualifying interests of The Maidens cSAC are:

- The Annex I habitat 'Reefs';
- The Annex I habitat 'Sandbanks which are slightly covered by seawater all the time' and the
- Annex II species Grey seal.

The common seal and harbour porpoise are additional features of the site.

A description of these qualifying interests has been extracted from the sites conservation objectives document (NIEA, 2011).

Reef

Many of the reef habitats and species are rare, and some are only found in The Maidens, Rathlin and the Firth of Lorne. The presence of these rare species is probably largely because of topography and proximity to deep water creating tidal conditions not found elsewhere in Northern Ireland. The many islets, emergent rocks and submerged pinnacles result in the presence of a wide range of hydrographic conditions, ranging from areas exposed to the full force of a 4 knot tidal stream (such as the Highlandman Rock), to more sheltered areas protected from the main tidal flow by East and West Maiden.

Sandbank

The maerl bed near the Sheafing Rock to the south of The Maidens represents a good example of this habitat, and is an important sub-feature of Annex I sandbank.

Grey seals

Like Annex I sandbank, Annex II Grey seals are not the primary feature of The Maidens proposed SAC. However, these relatively remote rocks, islands and the waters surrounding them in the North Channel may be important for providing haul-out sites and foraging areas, with up to 70 grey seals recorded.

The Maidens cSAC is located c. 1.16km north of the brine discharge pipe and c. 3.31km from the seawater intake pipe. The Maidens is also designated as an ASSI (Site Code: ASSI320).

Strangford Lough is designated as an SAC (Site Code: UK0016618). It is located c. 60km to the south of the brine discharge located and is included here due to the fact that the Harbour seal is an Annex II species present as a qualifying feature (but not a primary reason for site selection). Harbour seals have the potential to travel and forage up to 50km from their base (Hayden & Harrington, 2000) and therefore while low in numbers some may occur in the area of the brine discharge on occasion. For the same reason,

the Murlough cSAC (Site Code: UK0016612) is also included here. It is located c. 70km south of the brine discharge.

The Skerries and Causeway cSAC (Site Code: UK0030383) is located c. 60km northwest of the Proposed Development site and is included here as the Harbour porpoise is an Annex II species present as a qualifying feature (but not a primary reason for site selection). Harbour porpoise from this cSAC, while low in numbers, have the potential to travel to the Proposed Development site.

There is a Special Protection Area (SPA) for birds located along the shoreline of Larne Lough (Larne Lough SPA, Site Code: UK9020042) and a second within the lough (Swan Island SPA (Site Code: UK9020041). These are also designated as a Ramsar site (Site Code: UK12013), an Important Bird Area (IBA, Site Code: UK 277) and an ASSI (Site Code: ASSI 106). Swan Island SPA is also designated as a National Nature Reserve. A third SPA is proposed principally for foraging terns, wintering red-throated divers and rafting Manx shearwaters and it provisionally covers all of the waters shown in Figure 8.9. As birds are dealt with in Section 11: Flora and Fauna they are not discussed any further here.

There are five other ASSIs within 15km of the Proposed Development. They are:

- Little Deer Park (ASSI323);
- Minnis (ASSI337);
- Waterloo (ASSI084);
- Portmuck (ASSI177);
- The Gobbins (ASSI283) and
- Cloghfin Port (ASSI301)

Non-statutory Sites

The Larne Area Plan 2010 identifies Sites of Local Nature Conservation Importance (SLNCIs) which are not designated by statute. North Glynn Gut (SLCNI No. 34a) and South Glynn Gut (SLCNI No. 34b) are a series of lagoons located between the A2 and the railway line at Glynn and are designated for their open water. North Glynn Gut (No. 34a) is located within Larne Lough SPA and Ramsar Site. The Ballycarry Estuary (SLNCI No. 34d) is located in the southern part of Larne Lough and is designated for its estuarine waters. It flows into the Larne Lough SPA and Ramsar site. The Isle of Muck (SLNCI No. 35) and the Islandmagee Cliffs (Gobbins) (SLNCI No. 36) are both located along the outer coastline of the Islandmagee peninsula and are designated for their seabirds. Skernaghan Point (SLNCI No. 33) also located on Islandmagee is designated for its flora and geology.

Figure 8.4 below shows the different types of habitats recorded along the route of the intake pipe.

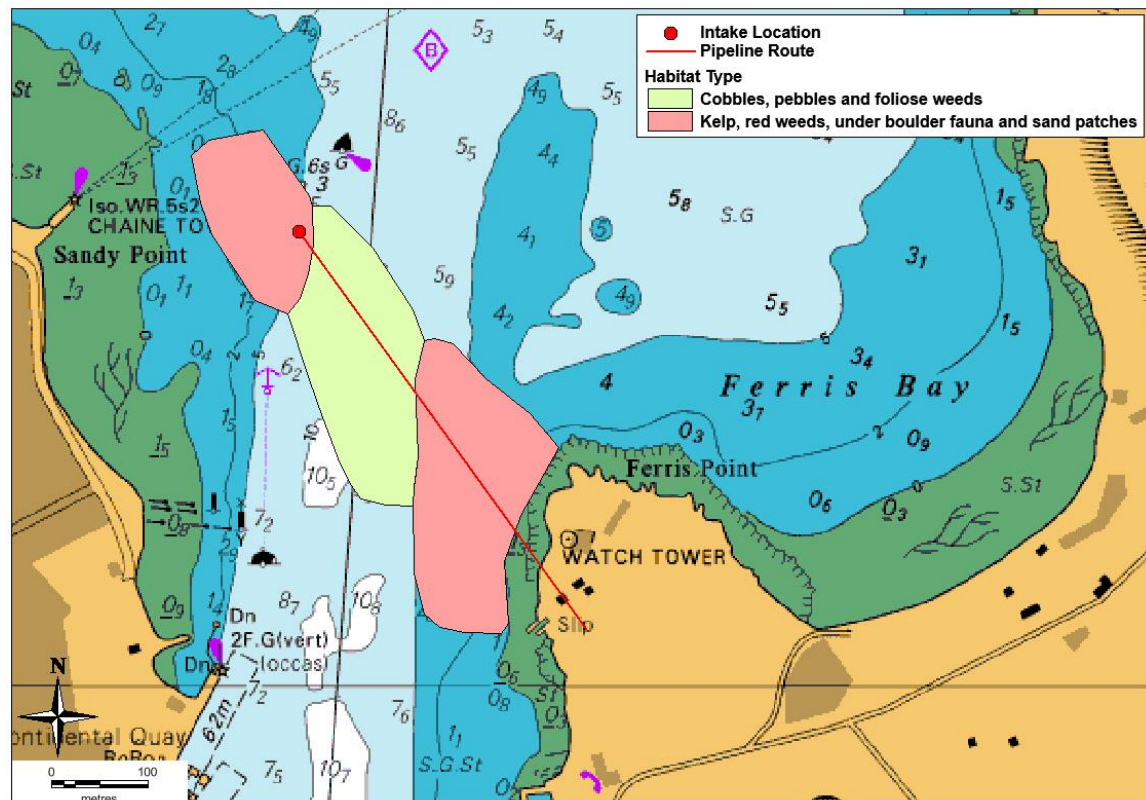


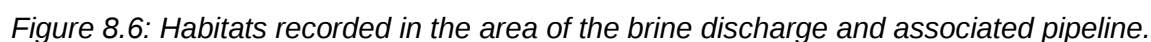
Figure 8.4: Habitat type in the area of the intake location and associated pipeline.

Figure 8.5 below shows the type of shoreline under which the disposal route will travel on its way to the disposal location.



Figure 8.5: Panoramic view of the shoreline along the brine discharge route.

Figure 8.6 shows the different types of habitat recorded along the seabed under which the disposal pipe will run on its way to the disposal site.



The coastline in the vicinity of the Proposed Development supports an important year-round fishery for lobster and crab and a seasonal fishery for scallop. There is no commercial fishery for fin-fish in the region. The North Channel is also an important spawning and nursery area for a number of species. Parts of Larne Lough are designated as shellfish waters and aquaculture activity occurs within it. In addition, recreational sea angling occurs in the general area and salmonids migrate through the area travelling to and from local rivers which supports freshwater angling.

POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

The brine will be discharged to sea off Dundressan will be discharged through a pipe which will be directionally drilled under the shoreline and sea bed. The brine plume will

cause an increase in salinity in the locality of the plume. As part of the assessment of the possible impacts of brine being discharged off Islandmagee on the marine environment, a review of other work and findings was carried out. The importance of proper site selection was one of the main issues highlighted in these studies. Given the characteristics of the marine environment at the Islandmagee site e.g. water depths of 23m, high current velocities, high levels of turbulence, the brine plume will quickly dilute and disperse over a small area of the sea bed. This assessment is further substantiated by field studies on communities and species referenced in the review. These studies suggest that the impacts of brine plume discharges are usually spatially restricted to the immediate area around the diffuser. There will be an area of sea bed near the Islandmagee outfall that will be negatively impacted by the release of brine. However, this impact will be spatially limited. Considering that the discharge flow is planned to stop ca four years after commencement, it is anticipated that the sea bed animals will quickly re-colonise the seabed over a relatively short period of time e.g. 2 years post cessation. The brine discharge and associated plume will occur during the solution mining stage of the solution mining phase which is expected to last c. 3 years.

The hydrodynamic modelling of the brine discharge has determined that the brine will reduce in concentration from 260 Practical Salinity Units (PSU) to c. 40PSU within several metres from the discharge outlet. A concentration of 34.8PSU has been selected as a conservative value upon which to assess an impact (based on background concentrations for this part of the North Channel). The hydrodynamic modelling also determined that the dimensions of the plume will be c. 100m in length and c. 30m in width. The modelling shows that the larger increases in salinity only occur for short periods during the tidal cycle and that under all tidal conditions the greatest increase in salinity is observed within the bottom layer and lower mid layer (between 32 and 19m). Concentrations ranging from 34.8 to 40PSU are only experienced within 80m of the outfall (the initial mixing zone). Furthermore, due to the negatively buoyant nature of the solution, salinity concentrations exceeding background levels do not reach the upper 19m of water. In addition, modelling has shown that there will be no noticeable impact on the ambient temperature of the seawater, with an increase in temperature reduced to <0.5°C with c. 15m of the outfall.

It must be remembered that the salinity of much of the area will be tolerated by sessile marine invertebrates and it is really only the area in the immediate vicinity of the plume that will be toxic to such species. Mobile species will move away from the high brine areas. Close to (c. 5m) from the diffuser heads, the smaller sessile species not removed by divers will die but once the de-brining has been completed, they will quickly re-settle on the bare surfaces.

Given the very small area impacted and the minor increases in salinity, the impacts on marine species and habitats is considered to be minor and short term in nature as the brine discharge from the solution mining phase will cease after a c. 3 year period.

With specific regard to specific species, the Purple Sunstar and the Common Skate are both on the Northern Ireland Priority Species. The Purple Sunstar is not a common species in waters around Lough Larne. Prior to any brine release, divers should survey

an area of c. 100 m around the disposal site and collect any specimens of this starfish and remove them to c. 200 m away from the discharge site. It should also be possible for the same divers to remove large sessile or slow moving species also. Monthly checks by divers should be undertaken during the de-brining period to repeat this exercise. Common Skate are known to occur in the area. However, if they sense the brine plume, they will move away from the area. They may also breed locally. When the divers are carrying out the removal of Purple Sunstars, they can also remove and relocate any mermaid's purses they may find.

Noise at the ports of the diffuser will be generated by water flowing out of them and is considered to be too low to have any impact on any species in the area.

The seawater intake will consist of a passive intake screen placed on the seabed connected to a below seabed pipeline that will link to the intake pump house wet well. The intake will have a velocity limit designed to prevent entrainment of fish and other marine life from entering the leaching water system. The total surface area of the inlet screen will be designed such that the seawater velocity at the screen will be a mean of 16 cm/s with a mesh size of 3.175 mms square. The extraction of seawater from coastal and estuarine environments is required for a variety of industrial facilities such as power plants, mining and desalination plants. This extraction of seawater will inevitably remove aquatic organisms from the water body, including fish larvae and macrocrustaceans. Eggs and small larvae will pass through filter screens. Larger fish cannot pass through the intake screens.

Given the very small area impacted and the selection of appropriate sized intakes and screens and the low intake velocity, the impact on marine species and habitats is considered to be minor and short term in nature as the seawater intake will cease after a c. 3 year period as seawater will not be required for the operational phase.

When the drill head breaks out at the seabed, sediments and drilling fluid will be released into the water column. However, given the low volumes involved and the strong current speeds in the area the impacts on marine flora, fauna and habitats is negligible.

Research from the U.K. suggests that there is the potential for seals to be killed by ducted propellers if barges etc. with this propeller type are used in the construction works and perform manoeuvres while either static or moving slowly (i.e. while still operating the propeller/propellers). Examination of seal corpses found in the U.K. (eastern Scotland, north Norfolk and Strangford Lough) has led researchers (Thompson et al., 2010) to believe that the seal had been killed by being drawn through ducted or cowed ship propellers. This type of propeller is common in tugs, construction vessels and construction barges and is used when such vessels are either manoeuvring slowly, or trying to maintain position. This situation could occur for long periods during the construction phase. It should be possible to specify that vessels used by contractors are fitted with grilles or guards to prevent seals being pulled through the ducts.

The hydrodynamic modelling of the brine discharge has determined that there is sufficient distance between the proposed outfall and that proposed by the Infrastrata project so as to have no cumulative impact.

Given the high salt value of the brine, the plume will have a localised impact in the vicinity of the disposal area. Mobile species such as fish, crabs and lobsters will move away from it but sessile species such as anemones will die in the immediate area around the discharge pipe.

Construction of both the intake pipe and disposal pipe will have temporally short and spatially small impacts on the sea bed. Associated noise levels are predicted to be low and small in spatial and temporal extent. Construction noise associated with horizontal drilling will have a longer temporal scale but is predicted to be low.

Impact on water quality arising from construction of the intake and outfall pipes is predicted to be low in temporal and spatial extent. However, water quality at the brine discharge pipe site will be greater temporally i.e. 3 - 4 years and spatially more extensive i.e. tens of square metres.

The impact of collisions with construction activities e.g. vessels is considered low.

Of all the predicted impacts on the marine environment arising from the proposed project listed above, the most significant one is the impact of the brine plume. However, as has been shown in the literature review and in the output of the mathematical model study, the significance of this impact in spatial and temporal terms is considered low.

Once the disposal of the brine has been completed and the benthic species have re-colonised the sea bed, there will be no long-term impacts on the marine environment.

The use of directional drilling represents a significant way of minimising impacts of this project on the marine environment off Islandmagee.

It is considered that the regulator will require a comprehensive survey of salinity around and away from the outfall site, before, during and after construction. The sampling locations can be chosen using output from the hydrodynamic model results. These measurements will also allow for the model to be validated. In addition to this, consideration should be given to the types of studies that were carried out at the Aldborough site using sentinel specimens of brown crab and lobster. This type of study could form part of a broader fisheries-focussed post-graduate study on the benthos, commercial species of Crustacea and demersal fish species.

Another topic that would merit monitoring is the recovery of epifaunal taxa around the outfall diffuser once the brine disposal activity had been completed.

Benthic and water quality monitoring sites should be located upstream and downstream of the outfall and also at additional sites inshore and offshore of it.

Soils and Geology

The existing environment of the proposed CAES Station site, pipeline routes and immediate surroundings in terms of geomorphology, drift / overburden geology (soils), bedrock geology and hydrogeology (both near the ground surface and at depth) were assessed by means of desk study, review of historic information and nearby and site specific ground investigations.

The proposed CAES Station site and seawater/brine pipeline routes are located on gently undulating greenfield areas currently used for farming and grazing livestock. The CAES Station site lies within a northwest-southeast oriented valley below a broad southwest facing slope. The lowest point of the valley is approximately 10 mOD in the western corner, rising to a maximum elevation of 68 mOD in the eastern corner of the site. The land generally falls at gradients of between 5 and 18 degrees.

The overburden soils over most of the site comprise glacial till soils (firm to hard sandy gravelly CLAY with cobbles and occasional boulders) with alluvial deposits (soft to firm clay/peaty clay) located in the low lying area / valley floor area of the site and beneath a portion of the Access Road. Made Ground is present on elevated land southwest of the CAES Station site (within the gas pipeline route) where fill was placed from previous construction activities. Bedrock is located close to the ground surface in the north-eastern corner of the station site.

Along the seawater/brine pipeline routes, the overburden is more variable, comprising glacial till, blown sand marine beach deposits of sand and gravel. Made ground is also likely to be present where the pipeline routes are in close proximity to existing roads.

The near surface geology at the CAES Station site comprises shallow basalt of the Antrim Lava Group on the upper north-eastern part of the site and older Mercia Mudstone on the lower lying (southwestern) part of the site. A geophysical survey undertaken at the site indicates the presence of a northwest-southeast oriented fault running through the site separating the two rock types. Along the seawater/brine pipeline routes, the underlying bedrock geology mainly comprises basalt with smaller sections underlain by mudstone and limestone.

The deeper geology beneath the site where the CAES caverns are proposed comprises a sequence of Tertiary basalts (>50m in thickness) over Cretaceous limestone, c.1,300m of Triassic mudstone and sandstone (Mercia Mudstone and Sherwood Sandstone Groups) over 120m thickness of Upper Permian Marls and Anhydrite. The target halite strata for the CAES caverns (indicated by 3D seismic survey interpretation) is located within the Upper Permian Belfast Harbour Formation at a depth of between 1440m and 1480m. Isopach mapping indicates a thickness of between 200m and 240m.

Groundwater across the upper (north-eastern) part of the CAES Station site was not encountered during the ground investigation (i.e. groundwater levels are deeper than 9.5m BGL). However, in the lower lying southwestern portion of the site groundwater appears to be under artesian pressure (i.e. above ground level), with groundwater confined at depth in the mudstone by the overlying impermeable clay and also driven by the head of water within the basalt strata at higher elevations. The topography of the site and groundwater monitoring indicate groundwater flow on the site is from the elevated part of the site in the northeast to the lower lying southwestern part of the site.

The desk study undertaken to determine baseline conditions indicates that there are four Areas of Special Scientific Interest (ASSI) within 2km of the CAES Station site, however these features will not be impacted by the scheme. There are also no groundwater dependant terrestrial habitats or ecosystems within the study area.

There are a number of activities associated with construction and operation of the station that have the potential to impact on the environment with respect to soils, geology and hydrogeology. The methodology for assessing the effects from both construction and operation, and impacts on soils, geology, geomorphology and hydrogeology has been undertaken in accordance with the procedures outlined in the DMRB guidelines.

Development of the site and construction of the station on an area of sloping agricultural grassland that will require significant earthworks with excavations for the CAES Station of up to c.16m depth and excavations of up to c.11m for the Access Road to the well pads. Excavations will be within both basalt and mudstone as well as overburden soils.

Drilling and construction of an appraisal well (to c.1750m depth) and two underground storage caverns (to c. 1680m depth) to the target Permian Halite deposits, will also be required.

The main potential impacts to soils and geology during construction are excavation related noise, vibration and dust together with disposal of a large surplus of excavated material and support of steep excavated soil and rock slopes located within the fault zone. During operation the main potential impact is long term stability of the steepened soil and rock excavated slopes.

The main potential impacts to the underlying bedrock aquifers and hydrogeological environment during construction are the lowering of the groundwater table due to the excavation and resulting groundwater discharge volumes together with removal of the overburden cover and rock exposure over large area. Drilling of the appraisal and production wells may impact the underlying bedrock aquifers if contaminants such as drilling fluids or brine/seawater are released due to loss of well integrity. During operation the main potential impact will be permanent lowering of the groundwater table due to the excavation and resulting groundwater discharge volumes.

A number of mitigation measures are proposed for both the construction and operational phases of the scheme. Most of these are considered embedded mitigation which lie within industry standard methods of construction, compliance with related design

standards, best accepted practice and/or best available technology. Provided these mitigation measures are fully implemented during the construction and operation phases, there will be no significant residual negative impacts on the soil, geology and hydrogeology.

Air Quality and Climate

The assessment considers the impact of the Proposed Development on air quality and climate. The air quality assessment considers potential impacts during the construction and operational phases. The climate section assesses the potential impact on both the macro and micro climate.

In April 2014, Larne Borough Council (now subsumed into Mid and East Antrim District Council) prepared a Progress Report to review and assess air quality of monitored pollutants within the borough. The report concluded that air quality objectives are likely to be met and a more detailed assessment is not required. Therefore the baseline air quality in the area of the Proposed Development is considered good. Pollutant concentrations provided by the Department of Environment, Food and Rural Affairs (DEFRA) for the area are easily in compliance with Air Quality Standards.

In accordance with Institute of Air Quality Management Guidance and taking into consideration the dust emission magnitude and the sensitivity of the area, the site has been classified as low risk for demolition, earthworks, construction and trackout at worst. Nonetheless, mitigation measures will be implemented during the construction phase of all elements of the development to ensure no significant off-site dust impacts.

Based on traffic volumes predicted to be generated during the construction and operational phases of the development, air quality impacts are negligible and no further assessment is required.

In order to ascertain the stack height required to achieve good compliance with the relevant Air Quality Standards for pollutant emissions, an assessment of various stack heights was undertaken. Therefore, 40m is proposed as the stack height for the two gas turbine stacks.

The air dispersion model was used to predict the ground level pollutant concentrations at all receptors located in a grid of 6 x 6km. The predicted change in the annual mean NO₂ and PM₁₀ concentrations as a result of the Proposed Development are slight and negligible respectively at the worst-case receptor point. Values would be expected to be less at actual sensitive receptors. The largest predicted increase in NO₂ is 2.7 µg/m³ due to emissions from the CAES Station alone. The largest predicted increase in PM₁₀ is 0.013µg/m³.

The maximum critical load of nitrogen deposition is calculated to be 0.07kgN/ha/yr based on the worst-case predicted GLC of NO₂ of 0.7 µg/m³ at Larne Lough.

The Proposed Development is expected to result in a CO₂ savings of approximately 546,000 tonnes over the 25 year lifetime of the Project. This equates to an average savings of 21,850 tonnes of CO₂ per year. This will have a positive impact on climate.

Electric and Magnetic Field

An assessment of the likely significant radiation impacts associated with Project-CAES Larne, NI as described in Section 5 of the ES has been completed.

Electromagnetic Compatibility

In the case of the Proposed Development and the potential sources that exist, EMI (Electromagnetic Interference) is highly unlikely to have any impact on even the most sensitive equipment at distances of more than 20m. Therefore, the development is unlikely to have any impact on domestic appliances.

Electromagnetic Fields

The Project includes a 275 kV substation and a section of underground cables.

At all locations the magnetic field levels are below the EMF (Electromagnetic Fields) Recommendation/ICNIRP 1998 public limit, including directly above the cables. The closest dwelling to the new section of power cables is 20m for the chosen cable route. At this distance the magnetic field is unlikely to have any impact on domestic appliances.

There will be no significant impact from the Proposed Development from an EMF (Electromagnetic Fields) point of view as the development fully complies with the ICNIRP Guidelines (1998) and the EC EMF recommendation 1999/519/EC.

Terrestrial Water Environment

An assessment of the potential impact of Project-CAES Larne, NI on the terrestrial water environment has been completed. In this context, the terrestrial water environment includes surface watercourses and water bodies. Effects on groundwater are considered within Sections 9 - Soils, Geology and Hydrogeology and effects on Larne Lough and the Irish Sea are discussed in Section 12 Part B Marine Water Quality.

This terrestrial water environment section includes an assessment of the potential for impacts which have the potential to arise as a result of construction and operation phase effects. The assessment addresses whether the site drainage and surface water drainage systems associated with the development adversely impact upon:

- The quality of surface watercourses either through routine runoff or the spillage of hazardous substances;
- The morphology of surface watercourses due to physical or flow interactions;
- or
- The existing local drainage pattern and flood regime.

A suite of standard mitigation measures have been built into the project design with an over-arching requirement for further detailed design at construction stage and any discharges during from site during construction and operation to be agreed in advance with the relevant authorities. Some of the main works associated with the construction phase of the Project which are considered have the potential to impact on the terrestrial water environment are listed below:

- General earthworks and stockpile of soil, with potential for sediment dispersion in surface water run off;
- Disposal of water from excavations, dewatering and pumping;
- High volume movement of construction vehicles;
- Operation and washing of construction vehicles;
- Storage of associated fuels, oils, etc.
- Permanent culverting of watercourse at the northwest of the main station;
- Construction of concrete structures, including foundations; and
- Horizontal directional drilling for the installation of a pipeline, to construct the Geological Storage caverns, within the redline boundary of the site.

The potential for operational phase impacts are considered to be limited to any discharges from site. It is proposed that the main CAES Station site will discharge surface and foul water to a local watercourse northwest of the site. Mitigation measures have been built into the project design, including requirements for discharge consents and consultation with the relevant authorities which reduce the potential for significant impacts.

As part of the assessment all potentially impacted waterbodies and areas which may be subject to flooding were identified. The likelihood of significant impacts to these variety of water features is determined according to standard methodology. There are no terrestrial environment WFD waterbodies located on Islandmagee however the North Channel Coastal WFD Waterbody was identified as being downstream of watercourses which run through the red line boundary of the site. It was assessed that there would be significant effects on local water features including a pond and watercourse which are located northwest of the main CAES Station site. Two areas which may be subject to surface water flooding i.e. not linked to flooding from a watercourse or from the coast, were identified within the assessment however it was assessed that impacts arising from the Proposed Development on flooding were likely to be insignificant.

A number of mitigation measures are outlined at the end of the Terrestrial Environment Chapter which result in an assessment there are no significant residual effects. These include the sensitive design of the culvert over which the permanent access will cross in order to ensure that the physical habitat of the watercourse is replaced and that the culvert is sufficient to carry high flood levels.

Marine Water Quality

An assessment of the potential impact of Project-CAES Larne, NI on the marine water quality in the receiving environment has been completed. Other elements such surface water quality and benthic quality are assessed in Chapter 12 Section A and Chapter 8 Section B respectively.

Water Quality in the receiving environment

The proposed works are located within 'The North Channel' water body (GBNI6NE030) and in close proximity to the 'Larne Lough North' water body (GBNI6NE050) and 'Larne Lough Mid' water body (GBNI6NE060) which is situated southeast of the proposed CAES Station. For the purposes of environmental assessment, these three water bodies are considered the study area. These water bodies are within Hydrometric Area No.205 which is within the North Eastern River Basin District (NERBD).

The EU Water Framework Directive (WFD) establishes a legal framework for the protection, improvement and sustainable management of rivers, lakes, transitional waters (estuaries), coastal waters (to a distance of one nautical mile) and groundwater. The aim of the WFD is to prevent deterioration of the existing status of waters and to ensure that all waters are classified as at least 'good' status (by 2015 in most cases, with all waters achieving good status by 2027 at the latest). A water body must achieve both good 'ecological status' and good 'chemical status' before it can be considered to be at good overall status.

In order to establish the WFD status of receiving water bodies, NIEA have undertaken extensive WFD monitoring within the Larne Lough and the North Channel each year. The overall status of each water body is established from the assessment of Ecological and Chemical Parameters.

The available monitoring information for the water bodies in the immediate vicinity of Project-CAES Larne, NI indicates that:

- The WFD status in vicinity of the proposed sea water intake/ brine outfall (North Channel) has been classified as good.
- The Larne Lough North and Larne Lough Mid water bodies that run adjacent to the proposed site have been classified as being of "Good Ecological Potential" and "Good" respectively.
- Brown's Bay is compliant with all bathing water quality standards. Browns Bay was rated "excellent" in 2012 and 2014 bathing water seasons.
- The pH within the study area is "Neutral" (ph 7.7 to 8).
- The temperature range during time of sampling varied between 9 -10° C however this value can vary between 4-18°C depending on the time of year.
- The salinity range within the Larne Lough and the North Channel is generally between 33 and 35 psu.

- The dissolved oxygen levels are satisfactory and capable of supporting nearly all forms of aquatic life.
- In June 2015, water samples were taken at the proposed intake location at four stages of a spring tide (low tide, mid flood, high tide, mid ebb). Each sample was tested for Heavy Metals, Oils and Greases, PAHs, PCBs, SVOCs, VOCs, Pesticides and Herbicides. The results have detected traces of heavy metals particularly during the mid ebb stage; Arsenic, Boron, Copper, Iron, and Nickel. All metals detected were well below guideline standards as set under the WFD. All other substances were either below the limit of detection or non-detectable.

The Marine Water Quality chapter of the ES has examined in detail the potential impacts of the Proposed Development on the Marine Water Quality within the receiving waters. Where possible, every effort has been made to eliminate adverse impacts at source, through design or by careful site selection. Where the risk of adverse impact remains, mitigation has been outlined to reduce the significance of the impact to a level which is considered to be of no significance.

Provided the appropriate mitigation measures are fully implemented, Project-CAES Larne, NI is not expected to have an impact on the water quality of the receiving marine waters and will not conflict with the 2021 or 2027 Objectives as set out under the Water Framework Directive.

Noise

A Noise and Vibration Assessment was completed to determine the likely noise and vibration impacts from the Proposed Development at the nearest noise sensitive receptors. This assessment included an appraisal of the likely noise and vibration impacts from the construction phase, an assessment of the construction and operational phase road traffic noise resulting from the Proposed Development and an analysis of operational phase noise associated with the Proposed Development.

As part of the noise and vibration assessment, a detailed baseline noise monitoring survey was completed to determine the noise environment in the vicinity of the Proposed Development site. This noise monitoring survey was used as a basis for determining the likely noise impact associated with the Proposed Development.

The Noise and Vibration Assessment was completed in accordance with all of the relevant noise and vibration guidance documents. These documents have been detailed in the Chapter 13 of the ES.

During the construction phase, there is potential for significant short-term noise impacts at the nearest noise sensitive receptors to the Proposed Development based on worst-case noise predictions if no mitigation measures are in place. A range of noise mitigation measures are included in the ES to ensure that construction noise impacts are reduced to the lowest possible levels and to within acceptable limits in accordance with the relevant noise guidance documents.

During the operational phase, there will be no significant noise impact from the Proposed Development at the nearest properties subject to adherence to the mitigation measures detailed in the ES.

Mitigation measures have been included within the Noise and Vibration chapter of the ES for construction and operational phases to ensure that there is no significant noise impact associated with the Proposed Development.

Cultural Heritage

The Cultural Heritage section of the ES has been prepared by John Cronin & Associates, Buncrana, Co. Donegal. This chapter seeks to assess the cultural heritage impact of the proposed Compressed Air Energy Storage Project at Islandmagee, Co. Antrim (Project-CAES Larne, NI). For purposes of this report, the term 'Cultural Heritage' encompasses the archaeology and built heritage resources and local heritage resources (place names, folklore etc.).

Field Investigations

Filed work as part of the Cultural Heritage Chapter for the ES included archaeological evaluation and field inspection. A programme of archaeological testing/evaluation was undertaken on the HDD site on Ferris Point (July 2014). A number of prehistoric flint finds (mostly dating to the late Mesolithic period) were recovered from this site.

An archaeological inspection of the proposed CAES Station site; marine water intake pipeline and intake station at Ferris Point; brine pipeline and pumping site location at Dundressan was undertaken in April 2015 by two suitably qualified archaeologists. The overall area was assessed in terms of landscape, land use, vegetation cover, presence or lack of archaeological sites and potential for undetected archaeological sites/features.

Recorded Cultural Heritage sites

Cultural heritage sites recorded within approximately 2km of the Proposed Development comprise sites from the prehistoric period right through to the twentieth century. These include: 32 SMR sites (three of which are Scheduled Monuments and one of which is in State Care); 18 Industrial Heritage Record (IHR) sites, six Listed Buildings and one Defence Heritage site. None of these sites will be directly impacted by the proposed works.

A database of known and recorded shipwrecks was reviewed in relation to the proposed Water Intake location and Brine Outfall location. There are no known or recorded wrecks located at these locations.

Potential Impacts

There are no SMR sites, Historic Parks and Gardens, Areas of Significant Archaeological Interest, Listed Buildings, Defence Heritage sites, Industrial Heritage sites or Scheduled Areas located within the [footprint of the various elements of the Proposed Development]. There will be no direct impact to recorded archaeology or cultural heritage sites.

There are no direct operational phase impacts predicted in terms of the cultural heritage resource.

The Proposed Development on Islandmagee will have no predicted cumulative impacts on the cultural heritage resource.

All predicted impacts will be to potential archaeology (i.e. previously unrecorded archaeological features, finds or deposits that may exist sub-surface). Ground stripping operations and ground excavations associated with the construction of elements of the [Proposed Development] may have a direct, negative and permanent effect on sub-surface archaeological remains, should any be found to exist on-site. A programme of archaeological works shall be undertaken for the scheme to mitigate the impact on potential archaeology.

Mitigation

The proposed works within the study area has a high potential to uncover hitherto unrecorded archaeological finds, features and deposits. Mitigation measures shall be devised and implemented to ensure that where archaeological material is shown to exist and cannot be preserved in situ, it shall be preserved by record through full archaeological excavation and recording. A programme of archaeological works shall be undertaken for the scheme, requiring a variety of measures, including (but not limited to) Archaeological monitoring of topsoil stripping and/or Archaeological testing (test trenching) of areas to be developed.

Should archaeological features be identified on site (if preservation in situ is not feasible), a programme of full archaeological excavation and recording should be undertaken. It is advised that where possible, the archaeological programme take place well in advance of main construction works in order to allocate adequate time to evaluate and record any archaeological features that may be revealed.

The archaeological programme shall be undertaken in association with archaeological excavation licence from DoE: HED and will be agreed with DoE: HED in advance.

Landscape and Visual Impact Assessment

A Landscape and Visual Impact Assessment has been undertaken to assess the likely impacts of the Proposed Development on the landscape, in terms of its impact on character and visual amenity within a 10km study area.

The landscape within the study area is principally formed by the Antrim coastline. Larne is the primary settlement within the study area, located to the north-west of Larne Lough. To the west, the study area contains the volcanic formations of the Antrim Plateau. To the south-west, the study area is of more settled, rolling pastoral qualities, including undulating ridgeline farmland. To the north, the coastline is of tourism interest, containing a number of well used beaches and a country park. The project site lies on the sparsely populated promontory of Islandmagee, located east of Larne and divided from the mainland settlement by the narrow inlet of Larne Lough. The project site is partly formed by the Ballycronan valley, behind the existing settlement of Ballylumford. Ballylumford power station, on the north-western shore of the Islandmagee peninsula, is a characteristic visual reference point within a range of views from the surrounding landscape, including its three large chimneys (approximately 125m height).

The assessment within the study area covers a number of landscape designations, including the Antrim Coast and Glens AONB, Islandmagee Area of High Scenic Quality, Undeveloped Coast Special Countryside Area, Parks, Gardens and Demesnes of Special Historic Interest, National Trust properties, scenic driving routes and long distance waymarked walking routes.

The assessment also considers receptors such as settlements, travel routes and recreational attractions where views have the potential to be affected by the Proposed Development. Best practice assessment methods have been applied, combined with professional judgement, considering susceptibility to change, sensitivity and potential magnitude of change resulting from the Proposed Development, to draw conclusions.

The fundamental to the design of the Proposed Development has been the siting and aspect of the building, so as to respect natural contours. An iterative assessment and design process has incorporated embedded mitigation measures which assist in reduced the landscape and visual impacts of the development. These include cut and fill design, retention and strengthening of existing structural vegetation where appropriate, retention of part of the site for agricultural grazing where appropriate, site boundary buffering and sensitive location of the buildings and ancillary infrastructure.

Assessment shows that a large proportion of the study area will not have views of the Proposed Development, due to the screening effects of topography. In addition, site surveys indicate that views will be further screened by tree cover, built forms and other surface features.

In determining the potential significance and nature of landscape and visual effects, assessment has balanced the extent of the site's visually contained valley ridgeline topography with open views from the north, funneled down the valley landform. The extent that the Proposed Development may be perceived to be linked with the existing, prominent power station at Ballylumford has also been considered – although the proposed scheme is smaller and often partially screened by the existing, larger scale structures at Ballylumford.

Assessment of effects on landscape character concludes that direct physical effects would be restricted to within the site application boundary, located within Landscape Character Area A: Islandmagee. There may be some indirect effects from locations surrounding the development, including the wider landscape of Islandmagee and its landscape and seascape setting; however effects are likely to diminish with distance and occur within restricted areas. Effects are considered to be minor, not significant from four of the five LCAs and all SCAs. The wider Islandmagee landscape would likely be subject to moderate-minor, not significant effects, with moderate-major, significant effects limited to the part of the LCA which contains the Proposed Development site and its immediate setting. Visual effects on the nine viewpoints assessed are all considered to be not significant, with significance of effect ranging from moderate, not significant to minor-negligible and not significant. Effects are generally limited by the extent of visibility, and the degree to which the Proposed Development may be perceived to integrate with existing visual elements within the view composition.

Resource and Waste Management

An assessment of the impact of waste generation from the Proposed Development was undertaken. A desktop study was carried out including a review of all relevant legislation, policy and current practice for waste management in Northern Ireland. A description is provided of waste generation during the extraction, excavation, construction and operational phases of the Project.

The assessment addressed all components of the Project including drilling and excavation of geological storage caverns, provision of CAES energy storage and generation facility, Horizontal Directional Drilling (HDD) for the seawater and brine pipelines, provision of access roads and secondary Project components namely provision of electrical transmission line and the gas pipeline.

Waste significance criteria to assess the likely significant environmental effects were developed for the assessment based on professional judgement and experience of environmental impact assessment on similar Projects.

The key project phases in terms of waste generation are the extractive and excavation phases.

Extractive material will be produced from the well drilling of the appraisal and production wells, HDD for the marine portions of the seawater (intake) and brine discharge pipelines and from solution mining of the salt caverns.

The well drilling and HDD will largely comprise drilling mud and rock cuttings covered in drilling muds which are considered to be non-hazardous in nature and suitable for disposal at a non-hazardous facility.

The solution mining will extract saturated brine from the caverns (maximum 750m³/hour) and will typically comprise dissolved salt with some other insoluble deposits which will be removed by cyclonic separators at the surface for disposal offsite at an authorised waste facility.

The Proposed Development will produce excavated material from site preparation works, provision of access roads, saltwater and brine pipelines (surface portions), electricity transmission line, gas pipelines, provision of CAES Station buildings including pumping station at Ferris Point and an attenuation tank. Excavated materials will largely comprise soil and stones with large volumes of rock (basalt and mudstone). Road construction materials, Made Ground and potentially some localised pockets of contamination will be encountered where excavation works take place adjacent to existing roadway.

In summary it is considered that approximately 261,148m³ of excavated and extractive materials will be generated from the Proposed Development over a 3 year construction

period commencing in 2019. This equates to an average of 87,049 m³ of material per calendar year during the excavation phase.

It is intended that approximately 115,219m³ will be reused as part of the Project leaving a surplus of 145,929m³ requiring removal off-site, predominantly to authorised inert waste facilities if suitable beneficial reuse options cannot be identified.

Foul sewage waste from the site will be treated by a Klargestor Unit.

The potential impacts of the Project in terms of waste management prior to implementation of mitigation measures are as follows:

- The impact of extractive waste is expected to be minor, adverse and short-term.
- The impact of excavation waste is expected to be moderate, adverse and short-term.
- The impact of construction waste is expected to be moderate, adverse and short-term.
- The impact of operational waste is expected to be minor, adverse and long-term.

Mitigation measures were proposed to minimise the effect of waste on the environment, reduce the quantity of waste sent for final disposal and to promote sustainable waste management practices.

Following implementation of the mitigation the residual impact of the Project will be as follows:

- The impact of extractive waste is expected to be minor, adverse and short-term.
- The impact of excavation waste is expected to be minor, adverse and short-term.
- The impact of construction waste is expected to be minor, adverse and short-term.
- The impact of operational waste is expected to be negligible.

It is considered that if every effort is made to maximise beneficial reuse and employ effective waste management during the construction and operational phases that there will not be any long-term significant impact on the environment.

Traffic and Transport

The Traffic and Transport chapter of the ES has been prepared by RPS and assesses the potential impacts on the surrounding road network resulting from the traffic generated by the Proposed Development as set out in Section 5 of the ES.

The assessment considers the potential traffic impact for both the construction and operational phases of the development, identifies the haulage route and the abnormal loads route, and identifies appropriate mitigation measures where necessary.

Relevant transport policies were reviewed to establish the transport policies against which the proposals will be assessed.

A Transport Assessment Form (TAF) has been prepared in accordance with the 'Transport Assessment: Guidelines for Development Proposals in Northern Ireland', published by The Planning Service Department for Regional Development in 2006,

Existing Conditions and Traffic Surveys

The extent of road network to be considered was established and the existing conditions have been appraised.

Traffic surveys were carried out between Monday 1 June and Sunday 7 June 2015 to establish the volume and direction of traffic flows, vehicle speeds and percentage of heavy vehicles on the surrounding road network. The traffic flows information and speed surveys have been used to assess the vehicular impact of proposed scheme on the local road network, and have been used to inform the haulage route selection process.

Site Accesses

The Project incorporates 4No vehicular access points to 3 sites:

- The main site:
 - Initial access for Appraisal Drill and Production Phase via Browns Bay Road;
 - &
 - Permanent access on Ballylumford Road;
- The Sea Water Intake Site accessed on Ferris Bay Road;
- The Brine Output Site accessed on Browns Bay Road.

Haulage Route

A Haulage Route Selection Report has been prepared for the Project to determine a feasible route from the strategic road network to the proposed development sites that will be designated as the haulage route for heavy vehicles relating to the construction of the CAES Station site.

RPS carried site visits and drive-throughs of the existing roads to carry out an initial assessment as part of the process to select short listed routes for further assessment. Further drive-throughs, meetings, consultations and desk top studies

were carried out on the short listed routes to select the final haulage route. Vehicular swept path analysis was carried out on the existing junctions using topographical mapping procured for the assessment. 2No areas of localised widening are proposed at the Lough Road/Low Road/Reids Road/Ballystrudder Road Mini-roundabout and at the Ferris Bay Road/Ballylumford Road priority junction to facilitate the movement of the heavy vehicles.

A Gas Storage scheme currently has planning permission and is located close to the proposed CAES Station development scheme. The scheme has a planning condition requiring that traffic management proposals are to be submitted for agreement in writing with the Department in consultation with DRD Transport NI for each construction stage of the scheme. GES will accept the same condition and methodology as applied to the committed Gas Scheme and provide a separate Traffic Management Plan for each construction activity. This allows flexibility for accessing the 4No site accesses associated with the Project, and allows the traffic management proposals to be considered in conjunction with the construction activities from the committed Gas scheme if necessary. This plan will provide the details of the traffic management measures along the haulage route, and define the haulage route to be used at the northern section of the peninsula on a stage by stage basis.

Adherence to the selected predefined haulage route will become a legally binding obligation for the Contractor as part of the Traffic Management Plan and Construction Environmental Management Plan (CEMP). These Plans are monitored by an Environmental Health Officer whose job it is to ensure the Plans, and hence the haulage routes, are being adhered to.

Abnormal Loads

A Route Access Report for abnormal loads was undertaken to determine a suitable delivery route for the road transport of 13No components associated with the construction of the Project that constitute an abnormal load.

The most onerous components in terms of length, width, height and weight were assessed against the abnormal loads criteria set by TNI and the Police Service of Northern Ireland (PSNI) to select the worse vehicles for assessment.

Consultation was held with TNI Abnormal Loads Department to inform the route selection process.

5 No locations require temporary localised road widening, or strengthening to accept the suitable axle loadings of the abnormal loads as they pass, including a new section of footway along Island Road Lower that TNI have advised will have minimal service cover. The widening occurs in lands controlled by TNI.

Both the haulage vehicles and the abnormal loads require widening works at the Lough Road/Low Road/Reids Road/Ballystrudder Road Mini-roundabout. Therefore the permanent widening works have been designed to accommodate the abnormal loads movements to avoid abortive works at the junction.

Some localised temporary relocation of street furniture will required, packing will be required on Island Road Lower to avoid grounding, and pruning of vegetation

encroaching or overhanging highways land will be required at a number of locations along the route

The abnormal loads will not be moved during peak traffic periods, and are typically not permitted in hours of darkness.

The developer will appoint a specialist freight operator to carry out the abnormal load deliveries. The statutory procedures for the transport of abnormal loads are well established and very familiar to specialist freight operators, who will liaise with Transport NI, PSNI and Local Councils to agree the detailing of the deliveries.

Network Traffic Flows

Existing, Base and Proposed traffic flows for the surrounding road network have been prepared for the worst case construction month (September 2020), the Year of Opening (2022) and 15 years after the year of opening (2037). 24 Hour and 18 Hours flows have been provided, and the scenarios have been considered with and without the committed Gas Storage scheme. These traffic flows have been used in the Air Quality and Noise assessment for the scheme.

Traffic Generation – Construction

An assessment has been carried out on the expected levels of traffic generated by each construction activity at each of the proposed development's sites.

The largest construction traffic generator will be the construction of the main site which will take place over 3 year period from 2019-2021.

The weekday operational hours on the main site are 0700-1900 on a weekday and 0800-1500 on a Saturday. During worst case construction month, September 2020, 72 staff vehicles will arrive per hour between 0600-0900 and 72 staff vehicles will depart per hour between 1700-2000. 126 construction vehicle movements will occur over the 12 hour working day, which equates to 10 or 11 construction vehicle movements per hour, or approximately 5 or 6 construction vehicles arriving to and departing from the site per hour throughout the working day.

The mitigation measures summarised below will ensure that the temporary construction traffic generated by the CAES Station development scheme will not have a material impact on the operation of the surrounding road network:

- The construction traffic is temporary. It will occur over a 5 year period, and the worst case has been assessed for robustness. Once the construction is complete and the CAES Development scheme is operational in 2022, the generated traffic for the permanent scenario is very low.
- As described above, a Traffic Management Plan will be submitted and agreed with DRD Transport NI for each construction activity. This allows the traffic management proposals to be considered in conjunction with the construction activities from the committed Gas scheme. This plan will provide the details of the traffic management measures along the predefined haulage route, and define the haulage route to be used at the northern section of the peninsula on a stage by stage basis. 2No areas of localised widening along the selected haulage route are proposed to facilitate the movement of the heavy vehicles.

Adherence to the selected haulage route will become a legally binding obligation for the Contractor as part of the Traffic Management Plan and Construction Environmental Management Plan (CEMP).

- To contain the construction traffic to these levels the release of excavated materials from the site will be staged. This will require management of the materials and stockpiling on site and has a detrimental impact on the duration of the construction programme, the retention of staffing levels and the costs. This should be viewed as a significant mitigation measure being offered by the applicant to contain the construction vehicles to approximately 5 or 6 construction vehicles arriving to and departing from the site per hour throughout the working day.
- Even when the worst case construction traffic figures for the proposed Project are considered, and if the possibility arises of the construction of the committed Gas Storage scheme overlapping with the construction of the CAES Station Development scheme, the resultant two-way traffic flows on the surrounding road network remain relatively low. For context purposes, the proposed flows utilise a small percentage, less than 2.5%, of the theoretical available road capacity.
- Existing peak traffic flows on Browns Bay Road occur on a Sunday which is attributable to tourists visiting the local area, particularly Browns Bay. The construction of the main site will be closed on a Saturday afternoon and a Sunday, minimising the interaction between construction related vehicles and tourists.

Traffic Generation - When the CAES Station Development scheme is Complete and Operational

Once the Project is complete and operational, there will be approximately 32 staff on site per day, split between three shift patterns over a 24hr working period:

- Morning shift 0800-1700 (14 staff);
- Evening shift 1700-0000 (10 staff); and
- Night shift 0000-0800 (8 staff).

It has therefore been assumed that 32 vehicles per day will be arriving and departing at the site access on Ballylumford Road. The percentage impact on the 2-way traffic flows shows that the traffic generated by the Project result in a percentage impact of less than 10% in relation to the increase in traffic flows throughout the surrounding road network, even with the Gas Storage scheme complete and operational. It is therefore concluded that the increase in traffic flows associated with the Project when complete and operational will not have a material impact on the operation of the surrounding road network.

Service Management Plan (SMP)

A SMP has been provided for the proposed CAES Station site when complete and operational. The SMP includes details of service vehicles and swept path analysis of the largest vehicles that will use the site access and permanent access on Ballylumford Road.

The first entry barrier on the access road is set back c20m from the carriageway edge to ensure a service vehicle doesn't need to stop or wait on the adopted road for entry to the site. The SMP demonstrates that delivery vehicles can enter the access road in forward gear, are able to turn within the site curtilage, and can exit the access road again in forward gear. The SMP shows that a vehicle that is refused entry to the main site can turn in a proposed turning head located next to the main entry barrier, and can exit the access road in forward gear, therefore demonstrating that servicing to the site will not impact on the adopted road network.

Conclusion

It has been demonstrated that proposed controls and mitigation measures will ensure that the temporary construction traffic generated by the Project will not have a material impact on the operation of the surrounding road network.

Once the construction is complete and the Project is operational in 2022, the generated traffic for the permanent scenario for staff, visitors and routine servicing is very low and will also not impact on the operation of the surrounding road network.

Conclusion

GES has undertaken a full environmental impact assessment of the Proposed Development and its likely effects on the environment have been assessed. This process has included consideration of human beings, marine and terrestrial ecology, soils and geology, air quality, electric and magnetic fields, marine and terrestrial water quality, noise and vibration, cultural heritage, landscape and visual, resource waste management and traffic and transport impacts.

The process of assessing environmental impacts within the EIA is reported on in full within the ES. In summary it has been determined that marine, landscape, visual, noise, water, cultural heritage, ecology, geology, soils, traffic, transport and general construction impacts require the application of mitigation measures, which are reported in the ES.

