14.0 SUMMARY OF IMPACTS AND MITIGATION MEASURES

14.1 INTRODUCTION

Chapters 5.0 to 13.0 of this EIS assess the likely significant impacts arising from the proposed coastal protection scheme. This section summarises the impacts identified and the suggested mitigation, where necessary, to reduce or eliminate the negative impacts.

Table 14.1 provides a summary of the potential impacts identified within the EIS and identifies the mitigation measures outlined to reduce or eliminate these impacts. The timescale during which the mitigation is appropriate is also outlined, as well as who will be responsible for implementing the mitigation.

14.2 TECHNICAL DIFFICULTIES

The studies involved in undertaking the Environmental Impact Assessment have been undertaken throughout a period spanning more than two years, during which extensive baseline surveying was carried out, during the appropriate season. As a result, there were no technical difficulties encountered during the preparation of this Environmental Impact Statement.

Table 14.1 Summary of Potential Impacts and Proposed Mitigation Measures

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
TERRESTRIAL FLORA, FAUNA AND BIRDS				
Point pollution during construction, leading to degradation of plant habitats and bird feeding resources in Larne Lough.	Best practice construction guidelines and an effective environmental management plan (EMP) shall be drawn up and adhered to by the successful contractor. This plan shall be submitted to the Client Representative and NIEA for approval prior to works. During construction, silty water shall be treated using silt trays/settlement ponds and temporary interceptors and traps will be installed until such time as permanent facilities are constructed. Release of suspended solids to all surface waters will be controlled by interception (e.g. silt traps) and management of site run-off. Any surface water run-off must be treated to ensure that it is free from suspended solids, oil or any other polluting materials. All fuels, lubricants and hydraulic fluids will be kept in secure bunded areas away from watercourses. The bunded area will accommodate 110% of the total capacity of the containers within it. Containers will be properly secured to prevent unauthorised access and misuse. As part of the EMP, an effective spillage procedure will be put in place. Spill kits will be made available and all staff will be properly trained in their correct use. Any waste oils or hydraulic fluids will be collected, stored in appropriate containers and disposed of off site in an appropriate manner. Fuelling and lubrication will not be conducted within 15m of the nearest watercourse. Storage areas, machinery depots and site offices will not be located within 15m of the nearest watercourse Foul drainage from the site offices and facilities will be properly captured and removed to a suitable treatment facility by a licensed waste contractor. Disposal of raw or uncured waste concrete will be controlled to ensure that watercourses or other sensitive areas will not be impacted.	From earliest stages of Construction	These measures will be implemented by the contractor.	Not Significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
Point pollution during operation, leading to degradation of plant habitats and bird feeding resources in Larne Lough.	Surface water runoff and shallow groundwater flows at all sites of above ground facilities will be captured by cutoff drains and treated to remove oils and silt prior to controlled discharge via soakaway. Foul waste from the main gas plant facility will be treated by a correctly designed and sited septic tank or domestic treatment plant. Drainage, interceptors and septic tanks will be correctly maintained by IMSL for the lifetime of the facility.	During Operation	Islandmagee Storage Limited	Not Significant
Point pollution during decommissioning, leading to degradation of plant habitats and bird feeding resources in Larne Lough.	Mitigation measures to be adhered to during decommissioning and reinstatement will be as per during construction.	At end of Project Lifetime	Islandmagee Storage Limited and Decommissioning Contractor	Not Significant
Collision impacts of birds with drill rig, cranes or vent stack.	Cranes and the drill rig will be lit at night for safety reasons. It is suggested that , if possible, lighting at these structures should be blue or green, as these have been shown to disorientate migrating birds considerably less, leading to significantly lower collision risks especially in misty conditions Risk of Collision impact with the vent stack is considered insignificant.	During Construction (cranes and drill rig)	These measures will be implemented by the contractor	Not Significant
Noise and visual disturbance to wintering seabirds during construction of leaching plant and main gas plant facilities	Detailed methodologies of how mitigation of how noise and lighting will be addressed during construction will be included within the Environmental Management Plan prepared by the contractor prior to construction commencing. At a minimum, measures of good working practice for all construction contracts, as detailed in BS5228 (1997), *Noise and Vibration Control on Construction and Open Sites* will be adhered to. Site lighting to be minimal and at low-level sufficient to permit safety of operations. At a minimum, recommendations made within The Institute of Lighting Engineers (ILE) - *Guidance Notes for the reduction of Obtrusive Light* (2005) should be adhered to. The use of flashing, moving, strobe, or blinking lights should be kept to a minimum.	During Construction	These measures will be implemented by the contractor	Not significant
Noise and visual impact on feeding/roosting birds from drilling at wellpad	Modern hydraulic rig to be used, with good standard of in-built noise attenuation. Lighting is necessary for safety, however, it will be focussed in on the site to minimise light spillage. All other site lighting to be minimal and at low-level sufficient to permit safety of operations (see mitigation for gas plant facility above).	During Construction	These measures will be implemented by the contractor	Not Significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
Noise and visual disturbance to foraging seabirds during construction of intake pumping station (if blasting is required).	It is not certain whether blasting will be required at the site of the IPS. Upon completion of the pre-construction ground investigation studies, if it is determined that blasting is required; a detailed methodology will be prepared and submitted with the environmental management plan for approval by the NIEA. If required and where possible, Islandmagee Storage Limited will endeavour to undertake blasting works during the month of September, which will significantly reduce the potential adverse impact on birds. If blasting works are required outside of the month of September, a strategy for mitigation will be agreed with the NIEA ahead of any works commencing.	During Construction	These measures will be implemented by the contractor	Not Significant
Noise and visual disturbance to nine breeding Black Guillemot pairs on Ballylumford jetties during construction	Mitigation measures for reducing noise and visual impact of plant machinery during the construction phase are outlined above for the construction of the main gas plant facility. It is unlikely, given the high level of ambient noise and lighting already present at the power station that any disturbance to breeding Black Guillemots will occur.	During Construction	These measures will be implemented by the contractor	Not Significant
Noise and visual disturbance to foraging seabirds during decommissioning of above ground facilities.	Prior to undertaking planning of any decommissioning works, an ecologist will be contracted to undertake a review of bird use of the scheme area, and undertake further bird count surveys, should these be required. Pollution prevention guidelines will be strictly adhered to, and measures required to minimise construction disturbance to breeding or wintering birds. Noise and visual impact mitigation measures to be adhered to during decommissioning and reinstatement will be as per during construction.	At end of Project Lifetime	Islandmagee Storage Limited and Decommissioning Contractor	Not Significant
Disturbance to birds through loss of approx 3.7ha grassland feeding fields	Loss will be reduced for by ensuring that the re-instated vegetation undertaken at the vent stack and the area surrounding the gas plant facilities is planted with a native species-rich grass mix reflecting the species currently present in this habitat. The mix will be jointly confirmed by a landscape architect and ecologist.	During Construction	These measures will be implemented by the contractor	Not Significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
Physical disturbance to sea birds from change in prey distribution due to brine discharge from outfall Disturbance to foraging seabirds during construction from changes in fish abundance due to brine emissions at IPS	Brine outfall pipe will have high pressure dispersion nozzle fitted to add turbulence to brine discharge which will enhance the mixing and rapid dilution of the brine (further detail in Chapter 9.0 "*Coastal Processes".* Residual impacts to local fish populations which are potential prey items to terns, will not be significant.	During operation of brine outfall	These measures have been implemented in the design. Pre-construction and operational monitoring of water quality by IMSL in conjunction with the NIEA will ensure that the successful brine dispersion predicted by the dispersal model is achieved in reality.	Not Significant
Closure of subsidiary Badger sett & temporary exclusion of outlier sett prior to digging of 1.6m deep trench for sea water and brine pipelines	Consultation with NIEA Natural Heritage has confirmed that due to the presence of a main sett within the locality of the setts to be disturbed, the subsidiary sett may be closed, and the outlier sett temporarily excluded. These actions may be undertaken under the terms of a derogation license granted by NIEA prior to commencement of construction, should the application be approved.	During construction	Licensed Badger Specialist	Not Significant
Potential disturbance or death of bats in case of semi-mature tree removal for Leaching Plant	Whilst it is not proposed as part of this application to remove any semi-mature trees within woodland to the rear of the leaching plant, as a precautionary measure, the following is proposed: In the event that removal of semi-mature trees within the woodland to the rear of the proposed leaching plant is necessary, bat surveys will be undertaken prior to any works. The Wildlife Officer of NIEA will be consulted in this matter.	During construction	Licensed Bat Specialist	Not Significant
Loss of two small populations of nationally protected Primrose *Primula vulgaris*	Whilst Primrose is scheduled to the Wildlife Order, this protection is provided to prevent unauthorized picking, selling or cultivating of the plant. Loss of these two populations is not significant, however the primroses are mainly found within dykes or hedges at field boundaries. Where possible, removal of dykes and hedges will be avoided within the construction methodology and where removal of hedges/dykes is unavoidable, the working width has been reduced.	During construction	These measures will be implemented by the contractor	Not Significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
Loss of 1.1 ha of neutral semi-improved grassland habitat beneath the footprint of the gas plant facility	The permanent loss of 1.1ha of semi-improved grassland beneath the footprint of the gas plant facility cannot be fully mitigated against. However, the reinstated vegetation undertaken at the vent stack and surrounding the gas plant facilities will be planted with a native species-rich grass mix reflecting the species currently present in this habitat as a compensatory measure. The mix will be jointly confirmed by a landscape architect and ecologist.	During construction (reinstatement phase)	These measures will be implemented by the contractor upon reinstatement	Significant
Loss of 0.1ha neutral flush on sites of vent stack and gas plant facility	No mitigation proposed, as affected area is extremely small, localised and not possible to reinstate.	During construction (reinstatement phase)	These measures will be implemented by the contractor	Not significant
Degradation of habitats through spread of non-native hedge species *Sympharicarpos alba*	All reinstatement to use native species for re-vegetation	During construction (reinstatement phase)	These measures will be implemented by the contractor	Not significant
Loss of ca. 0.02 ha of neutral semi-improved grassland habitat for the IPS at Castle Robin Bay	The reinstated vegetation around the intake pumping station will be planted with a native species-rich grass mix reflecting the species currently present in this habitat. The mix will be jointly confirmed by a landscape architect and ecologist.	During construction (reinstatement phase)	These measures will be implemented by the contractor	Not significant
Loss of scrub and semi-mature Broad-leaved woodland habitat along SSP	Mature tree loss will be minimised. Compensatory planting will be undertaken for every tree lost. Where possible, Sycamore will be removed instead of Ash.	During construction (reinstatement phase)	These measures will be implemented by the contractor	Not significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
Habitat Loss, fragmentation and disturbance of 9 farmland breeding territories including one Amber-listed Linnet territory at site of gas plant facility, vent stack and sea water intake pumping station.	The permanent habitat loss, fragmentation and disturbance of 9 farmland breeding territories including one Amber-listed Linnet territory at site of gas plant facility, vent stack and sea water intake pumping station cannot be fully mitigated against Construction and removal of any vegetation will be undertaken outside the bird breeding season in line with national legislation. It is proposed that 18 Bird nest boxes shall be erected within newly planted and/or existing semi-mature trees on the fringes of the gas plant facility, vent and intake pumping station sites to provide a positive biodiversity gain for tree-nesting birds as a compensatory measure. Nest boxes should be erected on a level section of upper bark (2m+) and positioned so there is a clear flight path unobstructed by foliage or branches. The boxes should be north or east-facing, and tilted slightly forwards to avoid rainfall.	During construction	These measures will be implemented by the contractor	Significant
Loss of invertebrate breeding habitat	Planting of native species-rich nectar-rich flower borders on fringes of all built elements will provide invertebrate feeding and breeding sites to replace those lost due to habitat removal	During construction (reinstatement phase)	These measures will be implemented by the contractor	Not significant
Physical disturbance to small mammals during construction	Loss of woody vegetation will be minimised to help reduce the impact on faunal species from noise disturbance during both the construction and operational phases of the scheme (avoidance of impact). The physical disturbance of fauna from on-site activity will be minimised by restricting site activities to clearly designated construction areas	During construction	These measures will be implemented by the contractor	Not significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
MARINE FLORA, FAUNA, MAMMALS AND FISHERIES				
Reduction in the diversity and biomass of infaunal and epifaunal species.	Two main mitigation measures are recommended for the proposal, (i) a diffuser outlet designed to maximise mixing and dilution of the effluent within the shortest distance from the outfall and (ii) a gradual ramp-up in the discharge. Optimal mixing reduces the chances of organisms being exposed to excessively high salinity levels, even for a short period, thus minimising the near-field impacts. A gradual increase in ambient salinity will allow time for organisms that might otherwise succumb to osmotic shock, to acclimate to increased salinity. Ideally also, the discharge should begin in late autumn/early winter if feasible, i.e. still be quite low for the first spring /early summer invertebrate spawning and then take a further 9 months before full discharge concentrations would have been achieved.	During construction (leaching phase)	These measures have been implemented in the scheme's design. Real time monitoring of the brine discharge will be the responsibility of Islandmagee Storage Limited, by agreement with and under the supervision of the NIEA	Locally severe impact, but of limited duration.
Impingement at sea water intake	The design of the abstraction system will be important to minimise the level of impingement by fish and invertebrate organisms. In order to facilitate fish taking avoiding action the total area of fine screens area should be many times greater than the combined cross-section area of the 2 abstraction pipes. The screens should also be placed at sufficient distance from the pipes to ensure an even flow over their complete area which will minimise flow velocity at any point.	Prior to commencing leaching	These measures have been implemented in the scheme's design.	Not Significant
Impact of sea water intake and brine outfall construction activities on marine mammals Disturbance to marine mammals from changes in fish abundance due to brine emissions	Both seals and cetaceans are known to be sensitive to underwater noise and vibrations in the seabed. At this stage of the preliminary design, it is not certain whether blasting will be required at the site of the Sea Water Intake pumping station. Upon completion of the pre-construction ground investigation studies, if it is determined that blasting is required; a detailed methodology will be prepared and submitted with the environmental management plan for approval by the NIEA. Mitigation for the brine discharge has already been outlined above.	Prior to commencing construction	These measures will be implemented by the contractor	Not Significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
Impacts on commercial fishing for crustaceans and shellfish through damage to stocks either by mortality or evacuation of the area.	It is recommended that brine dispersion be monitored continuously through the deployment of real-time monitoring devices located on the seabed at several positions throughout the mixing zone (to be agreed with NIEA). In addition it is suggested that, in advance of the commencement of leaching, a trigger level be set for salinity at a pre-determined distance from the outfall. Exceedence of the trigger level would result in a temporary suspension of leaching. The use of sentinel organisms within the mixing zone and at control sites may be effective in monitoring the impact of the brine discharge on commercially important species. Lobster, crab and scallop could be held in pots or alternative devices to monitor mortality rates at various distances from the outfall in comparison to control sites; trigger levels may be based on baseline mortality rates established at the control sites. These experiments may also facilitate a more detailed assessment of organism health in the area surrounding the discharge. The lobster monitoring programme initiated in 2008/09 as part of the gas storage project has yielded valuable baseline data on stocks of lobster and crab species in the area of the proposed outfall and the Co. Antrim coastline extending both north and south. It is recommended that this programme be continued through the leaching phase and beyond in order to detect any impacts in terms of reduced abundance or deterioration in condition. In addition it is suggested that the annual scallop survey carried out by AFBI could be extended to include an area in the more immediate vicinity of the proposed outfall. The V-notching scheme administered through the North Coast Lobster Fishermen's Association appears to have been very effective in the restoration of local stocks. As a compensatory measure additional funding of this initiative through the gas storage project would help to ensure that the programme continues for an extended period. Lobster stocks may also be enhanced through the purchase and release of mature females. Enhancement of king scallop could be considered but this would depend largely on a reliable natural source of scallop spat. Throughout the construction phase of the project and the monitoring programme it will be important to involve stakeholders, in particular participants in the local fishing industry. To this end it is suggested that a fishing industry stakeholder group be established to ensure full engagement with the industry so that fishermen are adequately informed with regard to project progress and information from the monitoring programme as it becomes available.	During construction (leaching phase)	Real time monitoring of the brine discharge will be the responsibility of Islandmagee Storage Limited, by agreement with and under the supervision of the NIEA	Not Significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
AIR AND CLIMATE				
Noise from Construction Activities	An Environmental Management Plan (EMP) will be developed by the contractor during the detailed design phase and will include specific noise mitigation measures tailored to the contractor's construction methodology. There are a number of mitigation measures which are considered appropriate and of good working practice for all construction contracts. These measures are detailed in BS5228 (1997), *Noise and Vibration Control on Construction and Open Sites*, and are summarised below. These guidelines should be adhered to as a minimum to control and limit potential impact to noise sensitive locations. These measures include, but are not limited to: • positioning of static plant as far as possible from residential properties, and utilising available screening by temporary structures, stock piles, etc. • use of well maintained plant, and where possible new plant manufactured under more strict EC guidelines for manufacturers. • substitution of unsuitable plant. • maintenance of silencers and moving components Temporary screening using sandbags, 20mm plywood sheeting or similar dense boarding may be required to reduce impact of static machinery or extensive works close to noise sensitive locations. It would be appropriate to conduct noise monitoring of construction during noisy or extensive works at locations close to residential properties. It is recommended that the contractor should appoint or delegate a 'responsible person' who will be present on site and who will be willing to answer and act upon queries from the local public.	During Construction	These measures will be implemented by the contractor	Not significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
Noise from Operational Activities	The acoustic housings for the gas plant facility must provide adequate attenuation to ensure that the maximum noise level emanating from the installation does not exceed 38 dB L_{Aeq} at the façade of any near sited residential properties. An 86 dB L_{Aeq} cumulative limit at 1m from all plant, operating over 24 hours is recommended. Plant will be designed or screened so as to meet these daytime and night time external noise targets. This will be verified during the F.E.E.D. (front end engineering design) process. It would be appropriate to conduct noise monitoring of the facilities' operation during peak to verify that the plant is in compliance with the noise level recommendations. Measurements should be conducted using a Type 2 or better sound level meter by an appropriately qualified noise consultant.	During Operation (Leaching Phase and Gas Operations)	These measures will be implemented by design and monitored during operation to confirm compliance by an appropriately qualified noise consultant	Not Significant
Vibration from Construction Activities	It is recommended at during critical phases of the works (i.e. close to noise sensitive properties or adjacent to the Ballylumford PRS) that on site tri-axial vibration monitoring is used to ensure the guideline limits are not exceeded. This will ensure a measure of protection is provided for the most proximate properties around the periphery of the site, and advice can be given to reduce the impact where necessary. If excessive levels occur low vibration and noise emitting piling systems are available such as augur and giken systems, and indeed may be used by the selected contractor.	During Construction	These measures will be implemented by the contractor	Not significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
Dust from Construction Activities	A Dust Minimisation Plan will be formulated for the construction phase of the project as part of the EMP. The construction dust minimisation plan should include, at a minimum, the following general dust mitigation measures: • All vehicles and items of plant and equipment must be kept correctly adjusted and maintained. • All plant on site will comply with relevant UK and EC regulations on emissions • Site roads will be regularly cleaned and maintained as appropriate. • Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions (also applies to vehicles delivering material with dust potential). • All vehicles exiting the site will make use of a wheel wash facility prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads. Wheel washes will be self-contained systems that do not require discharge of the wastewater to water bodies. • Public roads outside the site will be regularly inspected for cleanliness, and cleaned as necessary. • Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind and will be located as far from receptors as possible.. • The transport of soils should be undertaken in tarpaulin-covered vehicles. In periods of prolonged dry weather, dust emissions may become a problem during the construction works. These additional dust mitigation measures should be employed as appropriate: • Erection of wind fences to reduce localised windspeeds and allow settlement of particles and prevent erosion on their leeward site; • Using stockpile orientations and shapes that will minimise the windspeed at their surfaces and hence the erosion and generation of ambient dust; • Imposing speed restrictions on site vehicles. Responsibility for dust management should be assigned to a specific member of the project team who will liaise with contractors, suppliers, local residents and the local authority. A complaints procedure will be designed and made available to stakeholders.	During Construction	These measures will be implemented by the contractor	Not significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
MATERIAL ASSETS				
Disruption to local road users from construction traffic	A methodology will be discussed with the Local Authority, NI Roads Service and the PSNI once the detailed design phase has been completed and a contractor appointed. This will address the implementation of any traffic management system, vehicular access to various parts of the site (with particular regard to vehicles delivering pipes or oversize equipment), access to the Contractor's site accommodation and any other relevant matters.	During Construction	These measures will be implemented by the contractor	Not Significant
Disruption to local residents during construction of pipeline road crossings	There will be two road crossings and two local access crossings along the pipeline route. Both are likely to be undertaken using trenchless construction methods and are therefore unlikely to cause any disruption to local residents. Before construction of each traffic crossing, a methodology will be discussed with the Local Authority, NI Roads Service and the PSNI in relation to the implementation of any traffic management system, and vehicular access to various parts of the site .	During Construction	These measures will be implemented by the contractor	Not Significant
Creation of new traffic entrance and upgrade of two existing entrances onto Ballylumford Road	Minor improvements to create adequate visibility splays will be provided.	During Construction	These measures will be implemented by the contractor	Not Significant
Contamination of watercourses or water bodies from foul waste from temporary site toilets	During construction, temporary portable toilets will be provided at the construction hubs along the working width of the pipeline routes, at each of the above ground facility construction sites and at the site offices within the temporary construction set down area. These will be emptied regularly by a specialist contractor and disposed off-site in accordance with The Environmental Protection (Duty of Care) Regulation (NI) 2002	During Construction	These measures will be implemented by the contractor	Not Significant
Contamination of watercourses or water bodies from foul waste from operational facility	There is no mechanism for foul and surface water arising from the proposed gas storage facilities to be discharged into a municipal treatment system. Provision for appropriate treatment of foul waste by septic tank or domestic treatment plant will be incorporated within the detailed design of the main gas plant facilities. During the operational phase, the leaching plant, sea water intake and wellpad sites do not have any foul waste disposal requirements. It will be the responsibility of Islandmagee Storage Limited to maintain the septic tanks correctly.	During Operation	These measures will be implemented in the scheme's design and ongoing maintenance will be the responsibility of Islandmagee Storage Limited	Not Significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
Contamination of watercourses or water bodies during operation, from untreated runoff	Surface water runoff and shallow groundwater flows at all sites of above ground facilities will be captured by cutoff drains and treated to remove oils and silt prior to controlled discharge via soakaway. Foul waste from the main gas plant facility will be treated by a correctly designed and sited septic tank or domestic treatment plant. Drainage, interceptors and septic tanks will be correctly maintained by Islandmagee Storage Limited for the lifetime of the facility.	During Operation	These measures will be implemented in the scheme's design and ongoing maintenance will be the responsibility of Islandmagee Storage Limited	Not Significant
Overloading of electricity transmission network from high power demand plant such as leaching pumps and compressors during operation	All of the pumping equipment will be frequency controlled and will be capable of "soft starting" to gradually build up the load on the electricity network.	During Operation	These measures will be implemented in the scheme's design by the design engineers.	Not Significant
Potential for harmonic currents spilled into the transmission network to cause resonance	Harmonic analysis will be undertaken to make sure that any harmonic currents spilled into the transmission network do not cause resonance.	During Operation	These measures will be implemented in the scheme's design by the design engineers.	Not Significant
Potential for damage to (redundant) heavy fuel oil pipeline which runs between Ballylumford and Kilroot power stations	To avoid causing damage to the HFO pipeline, as with the other sub-surface infrastructure, sub surface imaging will be undertaken prior to construction and the precise location of the pipeline will be identified. Its location will be clearly marked on the site and reinforcing slabs will be cast and placed over the pipeline where plant machinery is required to cross it.	During Construction	These measures will be implemented by the contractor	Not Significant
COASTAL PROCESSES				
Potential for increased suspended sediment during construction of the brine outfall and sea water intake	The brine outfall and the inlet pipes for the sea water intake will be constructed by horizontal directional drilling, rather than by conventional trenching. This will reduce the discharge of suspended sediment into the water column to a single, short term discharge of drilling mud and cuttings. The cuttings will settle within a few metres of the breakout point and the bentonite clay held in suspension within the drilling mud will be rapidly dispersed.	During Construction	These measures have been implemented in the scheme's design.	Not Significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
Potential for brine discharge to settle onto seabed or attach to the shore and create a hypersaline environment	The brine, even at 10°C above ambient, will be more dense than the surrounding seawater, thus, without mitigation there will be a tendency for the brine plume to sink. The outfall will discharge the brine at high pressure through a purpose built diffuser structure which will enhance the mixing of the brine. The diffuser will have 3 ports of 0.2m diameter at 20m centres which is designed to jet the brine up into the water column. The eddying in the water column will mix the brine and seawater as the tidal currents flow across the outfall area. This process will be further enhanced by the turbulence generated by the flow around the diffuser protection structures. A programme of monitoring will be agreed with the NIEA which will likely include real time salinity measuring at sites remote from the discharge . This will be able to confirm that the actual salinity is in line with the predicted salinities within Chapter 9.0 of the EIS. In the unlikely event that measured salinities prove to be unacceptably in excess of those predicted in the model, leaching will be suspended and a strategy for mitigation will be agreed with the NIEA. This may involve decreasing the peak flow of the discharge or phasing the discharge in accordance with the tides.	During Operation	These measures will be implemented in the scheme's design. Real time monitoring of the brine discharge will be the responsibility of Islandmagee Storage Limited, by agreement with and under the supervision of the NIEA	Not Significant
Potential for unacceptable increase in turbidity from brine outfall	The caverns are designed so that insolubles within the salt layer itself settle out of suspension and are collected within a sump in the base of the cavern. The contents of the sump will remain inside the cavern for the duration of the cavern lifetime. Tanks at the surface also allow for further settlement and removal of suspended sediments.	During operation	These measures will be implemented in the scheme's design. Real time monitoring of the brine discharge will be the responsibility of Islandmagee Storage Limited, by agreement with and under the supervision of the NIEA	Not Significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
CULTURAL HERITAGE				
Potential that ground works associated with the construction of the above ground facilities and infrastructure and the trenching associated with laying the sea water and brine pipelines could severely impact upon any previously unrecorded sub-surface archaeological features or artefacts that may exist.	The site has been purposely chosen to have as much of its footprint as possible within areas which have been previously built up from original ground levels, or are brownfield sites. This reduces the potential that the original ground surface, and any artefacts buried within it, are undisturbed. Where disturbance of the original ground surface is unavoidable, archaeological mitigation will be employed in the form of archaeological monitoring of topsoil stripping. This top soil stripping must be carried out by a backacting machine equipped with a toothless bucket which is under the constant supervision of a suitably qualified archaeologist under licence to NIEA:Built Heritage. Should archaeological deposits or artefacts be present, the licensed archaeologist will be responsible for communicating this to the client or appointed representative, as well as to the NIEA: Built Heritage. A sample of the archaeological deposits identified at this stage may need to be further investigated by manual excavation and recording, discussed and agreed with the relevant representative of NIEA: Built Heritage and may be subject to a separate archaeological methodology.	During Construction	These measures will be implemented by the contractor with the assistance of a suitably qualified archaeologist	Not Significant
Potential that works associated with the construction of the offshore brine pipeline and sea water intake could severely impact upon any previously unrecorded sub-surface archaeological features or artefacts that may exist.	The brine outfall and the inlet pipes for the sea water intake will be constructed by horizontal directional drilling, rather than by conventional trenching. This will limit the area where the seabed is disturbed to the site at which the drill breaks through the surface, at the point of intake or discharge. Results of the marine geophysical survey, which was not available at the time of submission, but which will conform to the specifications outlined by the Centre for Maritime Archaeology and will be interpreted by a qualified marine archaeologist will be reported to the Northern Ireland Environment Agency (NIEA). The sea water intake and the brine outfall terminus points will be archaeologically inspected in advance of construction.	Pre-Construction	These measures will be implemented by a fully qualified marine archaeologist	Not Significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
LANDSCAPE AND VISUAL IMPACT				
Potential for the proposed gas storage facility to cause an unacceptable degree of visual impact.	A native woodland planting framework will be created on the side slopes of the plateaus to assist with reduction in visual impact and create an attractive environment within the site to blend it within the agricultural landscape. Species will be native, suitable for an exposed coastal location and reflect those found in adjacent woodland and hedgerows. Planting belts along boundaries will include semi-mature trees to help reduce the scale of the proposal and to introduce it to the surrounding rural landscape. Maintenance of the landscape works will be an integral part of the on-going site management. This will include a defects liability period during which any defective plant material is to be replaced. Litter picking and weed control shall be carefully monitored during the early growing seasons of the landscape maintenance contract. General mitigation measures included within the design of all the above-ground facilities includes: • careful integration of constructed elements with existing elements, such as access tracks and temporary construction areas, etc; • careful grading and reinstatement proposals, indicating screening measures to obtrusive built elements; • appropriate materials and colour of security fencing and ground level buildings (dark green); • high quality of finish to access roads, gates, fences and general site housekeeping designed to complement local styles and materials during the operation phase of the scheme. • Contractors will comply with all health and safety standards, in particular with regard to maintenance • sensitive use of local materials for constructed elements (hardstands, buildings, fences etc);	During Construction (reinstatement) and throughout the lifetime of the facilities.	These measures have been included within the scheme's design and will be implemented by the contractor. Ongoing maintenance of the planting and landscaping around the facilities will be the responsibility of Islandmagee Storage Limited.	Not Significant
Potential for the brine leaching facilities to cause an unacceptable degree of visual impact.	All woodland and trees to be retained will be fenced off prior to construction in accordance with BS:5837 2005 *'Trees in Relation To Construction'*. All existing individual trees and hedgerows will be protected and retained as far as possible. As with the main gas planting facilities, hedge and native trees planting will be undertaken around the perimeter of the facility to reduce the scale of the proposal and to introduce it to the surrounding rural landscape.	During Construction	These measures will be implemented by the contractor	Not Significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
GEOLOGY AND HYDROGEOLOGY				
Potential for borehole drilling operations to impact aquifers	During drilling operations the near-surface layers will be cased to protect any potential aquifer for future use. The surface casing will be set before penetrating any Triassic salt layer allowing any regional fresh water aquifer (for example in the Cretaceous Ulster White Limestone Formation) to be cased off and isolated prior to the potential use of oil based drilling mud in subsequent well section	During Construction	These measures will be implemented by the contractor	Not Significant
Potential for trenching of pipeline routes to impact on soil drainage	At the detailed design stage, land drainage in each field will be carefully inspected and a record prepared. A pre-construction scheme will be developed in discussion with landowners/occupiers for those areas where such a scheme is deemed necessary. This may entail the installation of new header drains to intercept the existing land drainage, which will be cut by the pipeline trench. This serves to maintain the existing drainage system during the construction period whilst minimising the possibility of surface water from entering the working area. During actual construction, all drains encountered during trench digging operation are identified and recorded. An appropriate method of permanent reinstatement will be devised and agreed with the landowner/occupier or agent. Where the pipelines pass under a land drain the usual method of reinstatement is to install a replacement section of drain with a permanent, rigid support carrying it over the filled-in pipe trench. Where necessary, new lateral and header drains are laid to new outfalls to replace drains rendered inoperative by the pipelines.	During Construction and during reinstatement	These measures will be implemented by the contractor	Not Significant
Potential for trenching of pipeline routes to have long term impact on agricultural productivity	The main measure to mitigate soil composition damage is to carry out pipeline construction work when the soil is less susceptible to damage. This is usually the period between April and October. Care will be taken during pipeline spread to ensure that topsoil is stripped and held separately from the subsoil. Reinstatement including spreading of the stored topsoil and reseeding of pastureland is normally carried out within the same year as construction, unless prevented by adverse weather. Where required, reinstatement may include deep cultivation or ripping of the subsoil if it has been significantly compacted, and spreading of the stored topsoil.	During Construction	These measures will be implemented by the contractor	Not Significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
Contamination of watercourses or water bodies from untreated runoff from construction sites.	During construction, silty water shall be treated using silt trays/settlement ponds and temporary interceptors and traps will be installed until such time as permanent facilities are constructed. Release of suspended solids to all surface waters will be controlled by interception (e.g. silt traps) and management of site run-off. Any surface water run-off must be treated to ensure that it is free from suspended solids, oil or any other polluting materials.	During Construction	These measures will be implemented by the contractor	Not Significant
Contamination of watercourses or water bodies from untreated runoff from operational facility.	It is proposed that surface water is managed via a network of drains and carrier pipes which will discharge the water into a series of soakaways located adjacent to the sites Measures to treat the surface water to remove oils and other contaminants and silt in order to comply with the conditions of any discharge consent can be installed in the field immediately upstream of the soakaways. It is thought that approximately 4m of clayey glacial till is present above rock head at the location shown for the soakaways. It will therefore be necessary to extend the soakaways down into the underlying bedrock. Detailed investigation will be required during front end engineering or detailed design to confirm the ground and groundwater conditions and confirm the feasibility of soakaway drainage.	During Construction	These measures will be implemented in the scheme's design. Maintenance of the drainage system will be the responsibility of Islandmagee Storage Limited	Not Significant
Morphological impact to watercourses	Where rivers, drains and watercourses are encountered, construction methods to be used at watercourses all works will be of such a nature to avoid undue obstruction to the flow of water and will be agreed with the Northern Ireland Environment Agency, Rivers Agency and other relevant authorities. Every precaution will be taken to ensure that backing up in rivers, streams or ditches does not cause flooding of any land, either inside or outside the working width or backing-up of any drainage systems discharging into the concerned watercourse. Upon completion of the works watercourses will be fully reinstated to their original shape, condition and level so as not to affect their flow characteristics.	During Construction	These measures will be implemented by the contractor	Not Significant
Risk of rockfall from steep rock slopes at leaching plant site and intake pumping station site	In order to ensure the safety of personnel working at the leaching plant it is anticipated that rock fall protection netting will be required to cover all exposed rock faces located close to access roads and buildings. The exposed rock faces would normally be inspected by a geotechnical engineer as excavation proceeds and if potentially unstable blocks/wedges of rock are exposed they can either be removed or supported using rock bolts, dowels and netting.	During Construction and During Operation	These measures are included within the scheme design and will be implemented by the contractor	Not Significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
Risk of slope failure at site of main gas plant facilities and vent stack	The majority of the gas plant platform will be hard surfaced or covered with buildings. Although this is beneficial in terms of limiting rates of infiltration into the fill materials used to construct the platform, a comprehensive surface water drainage system will be required to collect and dispose of surface water. It is proposed that surface water is managed via a network of drains and carrier pipes to a point near the access road at the southern end of the platform. From this point, a carrier pipe would be laid to discharge the water into a series of soakaways located within the field to the south east of the site. In order to control surface water run-off and shallow groundwater flows from the area up slope of the proposed gas plant platform, a cut-off drain will be installed to a depth of 3m along the upslope edge of the platform. Local stability of the embankment slopes on the down slope side of the main gas plant platform and cut slopes on the up slope side of the platform will be ensured through the adoption of appropriate reinforcement designs and construction methods/sequencing. Reinforced soil techniques will be used to ensure the stability of the embankment slopes and measures such as soil nailing or buttressing can be used to support the cut slopes. If the ground investigation reveals areas where existing ground conditions are particularly poor, specific measures will need to be designed to ensure the stability of newly formed excavations. Such measures could include the use of embedded retaining walls (e.g. sheet pile walls or contiguous bored pile walls tied back using ground anchors which would enable top-down construction methods to be used, enabling support to be provided as excavation proceeds.	During Construction and During Operation	These measures are included within the scheme design and will be implemented by the contractor	Not Significant
Risk of slope failure at site of wellpad	The wellpad site will be cut/filled to create a level platform, which will result in a cut face measuring 2.25m into the gently sloping hillside. This face will be graded to reduce the visual impact and retained by gabion walls for safety.	During Construction and During Operation	These measures are included within the scheme design and will be implemented by the contractor	Not Significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
Loss of exposure of geologically significant features	A thorough examination of the surface geology visible at the proposed sites has been undertaken. No geological features of significance to the scientific study of the Triassic-Cretaceous or Tertiary successions have been identified in the vicinity of the above ground facilities. The site of the sea water intake pumping station at Castle Robin Bay is not considered to have any exposures of geological significance; however there is a stack feature which is of moderate significance. The construction works associated with the sea water intake pumping station are not anticipated to have any impact on the stack as the works area will be located south west of the stack. It is not currently known what thickness of basalt lies beneath the sea water intake site and whether the sump and/or intake pipelines will extend into the Ulster White Limestone or Hibernian Greensand Formations. Should exposures of limestone or greensand be encountered during excavation, these will be recorded. The seismic mapping of the area and logging of the future caverns' wells, together with other ground investigation studies necessary during the detailed design phase, will be made available to the Geological Survey of Northern Ireland (GSNI) and should provide useful information for future study and enhance the understanding of the geological history of the area.	During Construction	These measures will be implemented by the contractor and by a qualified geologist	Not Significant
Risk of unacceptable subsidence of caverns	The outline design of the caverns has been undertaken using the information available from the Larne-2 borehole and the cavern engineers' experience in designing caverns in similar types of salt. The outline design has predicted rates of cavern convergence based on the available information to ensure that from the rock-mechanical point of view, the values predicted for subsidence in the vicinity for the planned Islandmagee gas storage are not significant. The cavern operation will be safe as far as the surface infrastructure is concerned. However, in order to prepare the final cavern design, core samples taken from the first cavern well will be tested to provide detailed information about the geo-mechanical properties such as strength and deformation as well as creep behaviour of the storage horizon and contiguous strata. From these the detailed design of the caverns and the operating pressure range will be determined for safety ensuring any subsidence is maintained within acceptable limits.	Pre-construction and during construction	These measures have been incorporated into the design.	Not Significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
HUMAN BEINGS				
Risk of scheme impacting on tourism potential of Islandmagee and wider area	The project has been sited within an area that is already industrial in nature, thus not impacting on the attractive, rural character of Islandmagee and its ability to attract tourism. There will be a short term period of visual disturbance as the sea water and brine pipelines are buried which cannot be mitigated beyond ensuring that reinstatement is rapidly and fully undertaken upon completion. The operation of the brine outfall will be limited to a four year period, although additional maintenance leaching may have to be undertaken every 10-15 years. The leaching facilities and the brine outfall have been carefully designed to mitigate against causing excessive turbidity within the water column and to promote rapid dispersal of the brine within the water column (further detail provided above within the Coastal Processes Section). Monitoring will be undertaken to ensure that the predictions held within the EIS on influence of the brine discharge are observed in reality.	During Construction and Operation	These measures have been incorporated into the design. Real time monitoring of the brine discharge will be the responsibility of Islandmagee Storage Limited, by agreement with and under the supervision of the NIEA	Not Significant
General disturbance to residence from construction works, such as noise and additional HGV traffic during the construction period.	Disturbance from construction activity has been mitigated insofar as is possible (refer Air Quality and Material Assets sections above.) Islandmagee Storage Limited will be setting 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, blasting activities or noisy operations. Updates will be provided on the Islandmagee Storage Project website www.islandmageestorage.com but other mechanisms such as a project notice board in a local shop may be established by agreement with the Islandmagee Community Development Association and/or other community representatives. Islandmagee Storage also proposes to implement a telephone hotline at which personnel on site can be reached in order to answer and act upon queries from residents.	Throughout the construction phase.	These measures will be implemented by the contractor and by Islandmagee Storage Limited	Not Significant

Potential Impact	Proposed Mitigation Measure	Time scale, relative to project, of mitigation implementation	Who will be responsible for implementation	Residual Impact
Lack of significant social or economic benefit to local community from gas storage project	As Islandmagee lacks the infrastructural requirements to supply natural gas to each household the local community will receive few direct benefits from the proposed project. Job opportunities post-construction are also relatively small scale. As a compensatory measure and subject to obtaining full planning permission and funding, Islandmagee Storage Limited proposes to set up a community benefit scheme as part of the overall proposal. The scheme will comprise of a Trust, based around the three themes of Education, Geology and the Environment, which would have an initial investment of £1million on a range of local community projects over the first three years, with a further £50,000 per annum thereafter for a minimum of six years. Consultation with local residents and interest groups has indicated that there is a need for Islandmagee Community Centre to be upgraded. Islandmagee Storage Limited has agreed to assist with funding of the replacement of the Community Centre through the Trust as part of its primary investment phase.	For a period of nine years	Islandmagee Storage Limited and the Islandmagee Project Trust	Significant (positive)

Table 14.2 Interactions

(see text below for brief description of the interactions)

	Terrestrial Flora & Fauna	Underwater Flora & Fauna	Air & Climate	Material Assets	Coastal Processes	Geology & Hydrogeology	Cultural Heritage	Human Beings	Landscape & Visual
Terrestrial Flora & Fauna									
Underwater Flora & Fauna	None								
Air & Climate	A	B							
Material Assets	C	D	E						
Coastal Processes	None	F	None	None					
Geology	None	None	G	H	I				
Cultural Heritage	None	None	J	None	None	None			
Human Beings	None	K	L	M	N	None	None		
Landscape & Visual	None	None	None	None	None	O	None	P	

A Air and Climate (Noise) and Terrestrial Flora and Fauna

Noise and vibration from construction works may impact on Terrestrial Flora and Fauna. Mitigation has been outlined in Table 14.1.

B Air and Climate (Noise) and Underwater Flora and Fauna

If blasting is required to create the sump for the intake pumping station, noise may adversely impact marine mammals. Mitigation has been outlined, should blasting activities are required, in Table 14.1.

C Material Assets and Terrestrial Flora and Fauna

Improper management of foul or storm water drainage may have an adverse impact on terrestrial habitats. Mitigation has been outlined in Table 14.1.

D Material Assets and Underwater Flora and Fauna

Improper management of foul or storm water drainage may have an adverse impact on terrestrial habitats. Mitigation has been outlined in Table 14.1.

E Material Assets and Air and Climate

HGV construction traffic may have potential to adversely impact Air Quality and Noise. Mitigation has been outlined in Table 14.1.

F Coastal Processes and Underwater Flora and Fauna

Discharge of concentrated brine has the potential to have an adverse impact on Marine Flora and Fauna. Mitigation has been outlined in Table 14.1

G Geology and Air and Climate

Outcrops of rock may require noisier equipment, such as rock breakers, to be employed during the construction phase. Mitigation has been outlined in Table 14.1

H Geology and Material Assets

Drainage of the site during the construction phase and operational phase will need to be carefully designed to ensure that aquifers are not adversely impacted and that slope stability is not compromised by shallow groundwater and surface flows. Mitigation has been outlined in Table 14.1

I Geology and Coastal Processes

The brine outfall will be directionally drilled beneath the seabed, rather than by using the conventional trenching construction technique. This will significantly reduce the amount of suspended sediment during the construction phase.

The outfall will discharge a concentrated brine, which will be leached from a salt layer of Permian geological age which is approximately 1500m beneath the surface. The precise mineral composition of the salt must be established by analysis of core samples drilled from an initial borehole before leaching operations commence.

J Cultural Heritage and Air and Climate

Vibration from construction activities may have the potential to adversely impact listed buildings or listed archaeological sites. Mitigation has been outlined in Table 14.1

K Human Beings and Underwater Flora and Fauna

A potential reduction in marine biodiversity may have an adverse impact on local marine tourism, such as whale watching, diving and fishing. Mitigation has been outlined in Table 14.1

L Air and Climate and Human Beings

Construction and Operational noise, vibration and dust may have potential to cause nuisance to nearby residents. Mitigation has been outlined in Table 14.1.

M Material Assets and Human Beings

Additional HGV traffic or road closures may have the potential to disrupt local residents. Mitigation has been outlined in Table 14.1

N Coastal Processes and Human Beings

Discharge of a concentrated brine may have potential to reduce the tourism potential of the area by discolouring the water or negatively impacting bathing water quality. The extent of the perceptible influence of the brine plume has been assessed and there will be no adverse impact on bathing water or marine water quality.

O Landscape and Visual Impact and Geology and Hydrogeology

The excavation of rock within the brine leaching facility and the cut/fill activities at the main gas plant facility and the wellpad site have the potential to create an adverse visual impact. Mitigation has been outlined in Table 14.1

P Landscape and Visual Impact and Human Beings

Construction of the facilities may provide negative changes to the views of residents overlooking the site. Mitigation has been outlined in Table 14.1

14.3 Conclusions

The EIA and Appropriate Assessment have examined in detail the potential impacts of the proposed gas storage scheme at Islandmagee on the sensitive habitats within the receiving area.

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 not significant.

The impact of the discharge of highly concentrated brine into the North Channel as a by-product of the caverns' construction has been extensively modelled and assessed. The location of the brine outfall has been carefully chosen to reduce the impact of its construction by placing at a distance from shore which allows it to be constructed using trenchless technology, thus reducing the amount of disturbance to the seabed during construction. A detailed bathymetric model has been prepared and has been calibrated against field data collected specifically for this purpose in October 2009.

Despite this, there are a number of areas in which residual negative impacts have been identified

- **Terrestrial Flora, Fauna and Birds**
  - the loss of 1.1ha of semi-improved grassland habitat beneath the footprint of the facilities.
  - the disturbance and fragmentation of 9 breeding farmland bird territories beneath the footprint of the facilities.

In both these cases, compensatory measures have been put forward, which will be implemented by Islandmagee Storage Limited to compensate for the loss of these habitats.

- **Marine Flora and Fauna**
  - The predicted reduction in both diversity and biomass of a wide range of marine invertebrates within the brine discharge mixing zone, where maximum salinity is predicted by the dispersion model to exceed 40psu.
  - Smaller, less significant reductions in diversity and biomass are also predicted in the areas where maximum salinity is predicted to be between 38 and 40psu (intermediate zone.

The spatial scale of the potentially severe impact is limited to the area contained within the greater than 40psu maximum salinity contour. This has been demonstrated in the dispersion modelling to be limited to an area within 10metres of the outfall diffuser. Following the cessation of brine discharging, recolonisation and immigration would begin immediately, as the brine should not result in the build up of any residual contamination that would impede recolonisation. Full recovery of most species would occur within 3-4 years, with certain species of bivalve taking slightly longer.

Mitigation to maximise the potential for brine dispersal has been included within the scheme's design. It is suggested that real time monitoring of salinity at a number of points within the predicted plume influence is undertaken throughout the leaching period to ensure that actual salinities experienced are within the limits predicted within the model studies. Threshold limits can be set and wireless telemetry technology will be able to alert the leaching control room instantaneously if unacceptable levels of salinity have been recorded allowing immediate action to be taken.

Impacts on commercial fishing for shellfish and crustaceans through damage to stocks either by mortality or, more likely, by evacuation of the area are expected to be confined to the immediate locality; probably no more than 100m from the outfall.

Throughout the construction phase of the project and the monitoring programme it will be important to involve stakeholders, in particular local residents and participants in the local fishing industry. To this end Islandmagee Storage Limited will be setting 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, blasting activities or noisy operations. Updates will be provided on the Islandmagee Storage Project website www.islandmageestorage.com but other mechanisms such as a project notice board in a local shop may be established by agreement with the Islandmagee Community Development Association and/or other community representatives. A fishing industry stakeholder group will also be established to ensure full engagement with the industry so that fishermen are adequately informed with regard to project progress and information from the monitoring programme as it becomes available.

Islandmagee Storage Limited is confident that the proposed scheme will generate positive benefits to Northern Ireland by securing its energy supplies, reducing the volatility in energy prices (gas and electricity), attracting significant inward investment, creating new jobs, attracting businesses requiring secure supplies, and avoiding the need for future investment in gas transportation infrastructure.. Northern Ireland consumer benefits will also be enhanced through the involvement of Mutual Energy as a shareholder.