

**REPORT OF THE MARINE LICENCE VETTING
COMMITTEE (MLVC)**

ON

**THE APPLICATIONS SUBMITTED BY SHANNON LNG
LTD. IN RESPECT OF FORESHORE CONSENTS
RELATED TO THE DEVELOPMENT OF A LIQUIFIED
NATURAL GAS (LNG) TERMINAL IN THE SHANNON
ESTUARY**

A presentation was made to the Committee by Capt. Alan Coughlan, Harbour Master, Shannon Foynes Port Company on the report of the quantitative risk assessment of the marine safety aspects of the project, which was commissioned by the Port Company.

Executive Summary

This report relates to the proposed development by Shannon LNG Ltd of a liquefied natural gas (LNG) regasification terminal on a site on the southern shore of the Shannon Estuary between Tarbert and Ballylongford in Co.Kerry.

The proposed development will consist of an LNG jetty, up to 4 storage tanks, pumps, a regasification system and associated facilities. Construction of the facility will allow for the importation of LNG by ship, transfer and storage of LNG on land and the regasification of LNG for export from the site via the Bord Gais Eireann gas network.

Works on the foreshore will involve the construction of:

- An LNG jetty that will be used for mooring and offloading one LNG ship at a time
- A materials jetty - Certain construction materials may be delivered to the site by sea and this will require the construction of a materials handling jetty.
- A seawater intake and outfall required to circulate seawater through heat exchangers for use in the process of warming the LNG and converting it from a liquid to a gas
- A drainage outfall to discharge surface water, groundwater, treated foul water and used firewater from the proposed development.

It is anticipated that the construction of the LNG jetty, seawater intake and outfall as well as the materials jetty, if required, will be carried out at the same time. It is estimated that these construction works will take approximately 30 months to complete. It is estimated that works on the foreshore related to the construction of the drainage outfall will take approximately 4 – 8 weeks to complete.

The Marine Licence Vetting Committee (MLVC) has considered the environmental implications of the proposed works on the foreshore in the light of the applications for Foreshore permits made to the Department of Agriculture, Fisheries and Food

On the basis of its considerations of the MLVC recommends that the proposed works on the foreshore be given the relevant statutory permissions subject to a number of conditions.

Introduction

Shannon LNG Ltd proposes to construct a liquefied natural gas (LNG) regasification terminal on a site on the southern shore of the Shannon Estuary between Tarbert and Ballylongford in Co.Kerry.

The proposed development will consist of an LNG jetty, up to 4 storage tanks, pumps, a regasification system and associated facilities. Construction of the facility will allow for the importation of LNG by ship, transfer and storage of LNG on land and the regasification of LNG for export from the site via the Bord Gais Eireann gas network.

It is anticipated that the construction of the LNG jetty, seawater intake and outfall as well as the materials jetty, if required, will be carried out at the same time. It is estimated that these construction works will take approximately 30 months to complete. It is estimated that works on the foreshore related to the construction of the drainage outfall will take approximately 4 – 8 weeks to complete.

Legislative Framework and Statutory Permissions Required

The construction and operation of the LNG terminal requires a number of permits and consents, including

- Approval from An Bord Pleanála under the Planning and Development (Strategic Infrastructure) Act 2006. On 31st March 2008, following an oral hearing, Planning Permission for the facility was granted, subject to 40 Conditions. Subsequently, on 17th February 2009, following an oral hearing, Planning Permission for the gas pipeline from the terminal to the existing natural gas network was granted, subject to 17 Conditions
- Approval from the Minister for Agriculture, Fisheries and Food under the Foreshore Acts, 1933 to 1998
- A licence for the operation of the LNG terminal from the Commission for Energy Regulation (CER)
- An Integrated Pollution Prevention Control (IPPC) licence from the EPA.
- A Greenhouse Gas Emissions permit from the EPA.

Foreshore Permit Applications and Public Consultation

In April 2008 Shannon LNG Ltd submitted applications, accompanied by an Environmental Impact Statement, to the Minister for Agriculture, Fisheries and Food, for Foreshore permits in respect of

- **LNG jetty** – the jetty will include the construction of a 345m long pipeline support and roadway trestle and platform structure with mooring and fender dolphins to facilitate berthing and unloading of LNG vessels. The unloading platform will be supported on 914mm diameter steel piles at 7.5m centres driven into the seabed. An additional row of piles will be provided along the berthing face to support the weight of the loading arms and platform. The jetty will be used for mooring and offloading one ship at a time. The jetty is designed to take ships with a capacity of up to 265,000m³. It is anticipated that initially approximately 50 ships per year would offload LNG at the site. Ultimately it is anticipated that approximately 125 ships per year would berth at the jetty and offload LNG.
- **Materials jetty** – Certain construction materials may be delivered to the site by sea and this will require the construction of a materials handling jetty. This will involve the construction of a 200m long access and roadway trestle and platform structure. The jetty will be supported on steel piles driven into the seabed.
- **Seawater intake and outfall** – A seawater intake and outfall system is required to circulate seawater through heat exchangers for use in the process of warming the LNG and converting it from a liquid to a gas. The seawater will be taken from the Shannon estuary at an intake located approximately half-way along the LNG jetty. A pump-house will be located at the seawater intake on the jetty. The incoming seawater will pass through screens to remove debris and will then be pumped through pipelines along the jetty, passing through the heat exchangers, and then back along the jetty to an outfall located near the end of the jetty, approximately 100m seaward of the intake location. It is intended to install 3 No. 4,000m³/hr pumps initially to circulate up to 12,000m³/hr of seawater, for the initial peak vaporisation capacity of 17 million Sm³ /day, with 2 No. spare bays for expansion to accommodate similar sized pumps to be able to vaporise 28.3 million Sm³ /day. The maximum capacity of the pumps will be circa 20,000m³/hr, equivalent to 5.6m³/sec, utilizing all 5 pumps. The outfall will consist of a large concrete box extending below the surface and designed to diffuse cold returning seawater. The temperature of the returning seawater will range from -1°C and +1°C.
- **Drainage outfall** – The drainage outfall is needed to discharge surface water, groundwater, treated foul water and used firewater from the proposed development.

Public Consultation

On 26th November 2008 Shannon LNG published a Public Notice indicating its intention to seek permission for the above works. The Public Notice was published in both the “Irish Independent” national newspaper and “The Kerryman” newspaper on 26th November 2008. The public consultation period, during which written submission on the proposed development were invited, ended on 31st December 2008.

A total of 4 submissions were received during statutory public consultation period.

Consultee	Observation
Mr. David O'Callaghan	Due to predicted sea level rise by end of century proposed site for LNG Terminal is unsuitable. In any event such a terminal should be at least 20 kilometres offshore.
Kilcolgan Residents Association	No marine risk assessment of an LNG spill on water No marine risk assessment of an LNG accident from ships travelling in the Shannon estuary No Strategic Environmental Assessment of the creation of an Energy Hub on the southern shore of the Shannon estuary Request that Minister holds a public inquiry in regard to making for foreshore lease(s) Construction of LNG terminal will have negative effects on the development of lands and waters further to the west and east due to exclusion zones which should be implemented on safety grounds
An Taisce	Concerns in relation to the LNG jetty – no comprehensive risk assessment of impact of spill of LNG during offloading Concerns in relation to seawater intake and outlet – impact of anti-foulant agent
Steve Goldthorpe Energy Analyst Ltd.	Project is unnecessary and not in the best interests of the Republic of Ireland

.The MLVC note that An Bord Pleanala considered that, subject to compliance with the specific conditions

- *the proposed development would not seriously injure the amenities of the area or of property in the vicinity, would not be prejudicial to public health or safety and would be acceptable in terms of traffic safety and convenience. The proposed development would, therefore, not have significant effects on the environment and would be in accordance with the proper planning and sustainable development of the area.*

Based on the above the MLVC did not consider further the planning issues raised in the public submissions including

- the sitting of the terminal offshore,
- impacts on the development of lands and waters to the west and east of the terminal site,
- need for the project.

Similarly, the potential impact of anti-foulant on marine life was also not considered by the MLVC as this is a matter for consideration by the EPA as part of the IPPC licencing process.

The request to hold a public inquiry in regard to making for foreshore lease(s) is a policy / administrative issue for consideration by the Minister and is outside the remit of the MLVC.

The issue of the need to conduct an SEA is also outside the remit of this report which is to address the impacts of the proposed activity under the Foreshore Acts, 1933 and 1998.

Site Conservation Status

The proposed development is located within the Lower Shannon candidate Special Area of Conservation (SAC) designated under the E.U. Habitats Directive (Council Directive 92/43/EC). The SAC extends along the Shannon valley from Killaloe to Loop Head/ Kerry Head. The site is a candidate SAC selected for lagoons and alluvial wet woodlands, both habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for floating river vegetation, *Molinia* meadows, estuaries, tidal mudflats, Atlantic salt meadows, Mediterranean salt meadows, *Salicornia* mudflats, sand banks, perennial vegetation of stony banks, sea cliffs, reefs and large shallow inlets and bays all habitats listed on Annex I of the E.U. Habitats Directive.

The site is also selected for the following species listed on Annex II of the same directive – Bottle-nosed Dolphin, Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Atlantic salmon and Otter. There is a resident population of Bottle-nosed Dolphins in the Shannon Estuary. This is the only known resident population of this species in Ireland.

Five species of fish listed on Annex II of the E.U. Habitats Directive are found within the site. These are Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad and Salmon. The three lampreys and Salmon have all been observed spawning in the lower Shannon or its tributaries. Two additional fish of note, listed in the Irish Red Data Book, also occur, namely Smelt (*Osmerus eperlanus*) and Pollan (*Coregonus autumnalis pollan*). Only the former has been observed spawning in the Shannon.

The proposed development site is also located within the River Shannon and River Fergus Special Protection Area (SPA) designated under the EU Birds Directive (Council Directive 79/409/EEC). The estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland. The SPA comprises the entire estuarine habitat west from Limerick City and south from Ennis, extending west as far as Killadysert and Foynes on the north and south shores respectively of the River Shannon. Also included are several areas in the outer Shannon estuary, notably Clonderalaw Bay and Poulmasherry Bay, as well as the intertidal areas on the south shore of the Shannon between Tarbert and Beal Point. The SPA is the most important coastal wetland sites in the country and regularly supports in excess of 50,000 wintering waterfowl.

Overall Assessment of Environmental Impacts Considered By the MLVC

Impacts of the proposed development on the foreshore may arise during both the construction and operational phases and these are considered separately below. A number of principle issues were considered when assessing the foreshore permit applications for this project. and these can be broadly categorised as (i) Benthos, (ii) Fish (iii) Marine Mammals (iv) Archaeology, (v) Safety / Navigation, (v) other matters

Construction Phase

The developers have provided outlines of proposed construction methodologies to be used in respect of each of the 4 elements of the proposed development. Detailed construction methodologies will be provided for approval prior to any works commencing. The MLVC is satisfied that the outline construction methodologies provided are sufficient to understand the nature and extent of potential impacts on the foreshore.

Benthos

During construction of the LNG jetty and materials jetty, if required, disturbance to the seabed will be limited to that resulting from the installation of piles. The majority of the jetty piles will be installed from barges in deep water. The jetty structures themselves, including pile caps, deck segments and pipework, will be constructed from completed sections of the deck and hence will not impact on the foreshore. Disturbance of the seabed will also occur during installation of piles on the foreshore above the mean low water mark as a result of vehicles tracking across the foreshore. Piling may be carried out using “pile walker” technology from completed sections of deck. In this case disturbance to the foreshore will be minimised.

During construction of the seawater intake and outfall disturbance to the seabed will include bed levelling associated with the intake and outfall boxes and the installation of piles.

It is proposed to use any suitable excavated material and spoil from pile installation in the earthworks or landscaping onshore. If not suitable for reuse it is proposed to dispose of the material to landfill or at sea. Disposal at sea would require a separate Dumping at Sea permit under the Dumping at Sea Acts, 1996 and 2004.

The disturbance to the seabed during the construction phase of the project will result in the removal of benthic species around the construction footprint of the jetties. This action will not result in the permanent removal of species from the site and those areas not directly beneath a piling will recover in time (1-2 recruitment cycles). In addition, data presented in the EIS showed that there were no uncommon, rare or protected marine benthic species found at the proposed development site. The area has naturally high

levels of silt loading and any increased loading as a consequence of the construction activities will have a minimal impact on the system and will be short lived. The MLVC is satisfied that the overall impacts of the construction of the jetties on the benthos will not be significant.

During construction of the drainage outfall disturbance to the seabed will include excavation of a trench across the shoreline, temporary storage of excavated material, installation of the outfall pipe and reinstatement of the foreshore. There will be permanent loss of species along the route of the outfall pipeline. Data presented in the EIS showed that there were no uncommon, rare or protected marine benthic species found at the proposed development site. The MLVC is satisfied that the impact sensitivity of the foreshore area along the route of the outfall pipeline is low and that the overall impacts of the construction of outfall will not be significant.

Fish

The initial EIS document provides no information on fish community composition and structure in the footprint or environs of the proposed shore-linked structures or in the area of water intake and discharge. There is comment on listed Habitats Directive species and Red Data Book species. This is appropriate as many of these species are migratory, being anadromous or catadromous, and may have migration or passage routes adjacent to water entrainment areas.

In the absence of detailed baseline data on fish communities in the area of the proposed development the MLVC recommends that a survey of marine fish community composition and abundance in the overall marine aquatic footprint of the development should be undertaken prior to commencement of any works. The sampling season, sampling methods and reporting of results should be agreed with the Central Fisheries Board

Marine mammals

As mentioned above there is a resident population of Bottle-nosed Dolphin in the Shannon Estuary and this is the only known resident population of this species in Ireland. Data presented in the EIS showed that bottlenose dolphins are present in the vicinity of the development site; however there is no evidence that the site is used for foraging. It is believed that the dolphins only use the site for short period, probably while they pass through.

While the exact method of piling has yet to be determined the piling activity has the potential to cause acoustic disturbance to marine mammals, including dolphins. The MLVC notes Condition No. 16 of An Bord Pleanála's Planning Permission which states that:

- *The developer shall employ suitably qualified marine mammal observers for the duration of sub-tidal piling and on-shore blasting. Commencement of piling or blasting shall be delayed if the marine mammal observers note dolphins within 500 metres of the site within 20 minutes of the planned commencement of works. No action shall be necessary if a dolphin approaches once operations have commenced. A log of the marine mammal observer operations shall be submitted to the planning authority, following completion of these works.*

The MLVC is satisfied that strict adherence by the developer to this specific condition will ensure that acoustic disturbance to marine mammals will be minimised.

In addition, the MLVC recommends that blasting on the foreshore should not be permitted.

Archaeology

The EIS contains details of inter-tidal and subtidal archaeological investigations in the proposed development area. The inter-tidal survey did not indicate any archaeological features. The sub-tidal side-scan sonar investigation indicated one anomaly of potential archaeological significance situated some 200m east of the proposed development. In order to avoid impact on this feature the developers have proposed a 50m seabed impact exclusion zone around the feature during the construction phase.

The construction work will include extraction of sediments e.g. during piling operations and this material may have cultural heritage-bearing potential. In the EIS the developers have committed to consultation with DEHLG regarding the establishment of the requirements for and methods of archaeological monitoring.

Based on a submission from DEHLG the MLVC recommend that the developers engage the services of a suitably qualified archaeologist to monitor all ground disturbance works and pile drilling works.

Waste management

During construction activities the potential exists for spillage of contaminants e.g. fuel oil from machinery and general construction waste into the marine environment. The MLVC notes that the developer has committed to the development, implementation and maintenance of a Waste Management Plan. The MLVC recommends that the handling and disposal of all waste material should be detailed in the Waste Management Plan. The MLVC recommends that, where appropriate, the developer comply with the International Convention on the Prevention of Pollution from ships (MARPOL) requirements. The MLVC is satisfied that, with proper management of all waste streams, any potential adverse impacts can be avoided.

Operational Phase

Benthos

There will be a permanent loss of habitat under the footprint of each of the piles and under both the seawater intake and outfall boxes. Data presented in the EIS showed that there were no uncommon, rare or protected marine benthic species found at the proposed development site. The open trestle structure in the subtidal area may also provide a “reef like” habitat providing attachment surfaces for sessile invertebrate marine fauna. The MLVC is satisfied that overall long-term impacts on the benthos will not be significant

Fish

During the operational phase seawater will be pumped from the estuary at a maximum rate of 20,000m³/hr for use in the process of warming the LNG and converting it from a liquid to a gas. This abstraction of seawater has the potential to also result in the entrainment of fish.

Studies on fish drawn into/trapped in power station cooling systems have been undertaken in a number of thermal power stations in Ireland. These have included both Moneypoint and Tarbert on the Shannon Estuary, both of which lie upstream of the proposed development site for LNG.. Both were subject of study in the period 2004 – 06 in the context of salmon smolt impingement, in an ESB-commissioned study undertaken by Central Fisheries Board. A study was also carried out in Tarbert in 2003 by Shannon Regional Fisheries Board. The study carried out by the Central Fisheries Board sampled in the March – May period in each of three years and recorded impingement/entrainment of a total of 27 fish species in the Moneypoint station and 37 species at the Tarbert station. The Tarbert station was found to be capturing three flatfish species – flounder, plaice and dab – over a wide size range, from 7 to 27 cm. The study carried out by the Shannon Regional Fisheries Board was of short duration – 2 weeks in March. Total number of species per day ranged from 5 to 16 over this study and the most seriously impacted species was whiting. Numbers of whiting found in the sumps ranged from 100 to 650 over the seven sampling dates, with a mean number of 350. In addition to the commercially valuable species such as the flatfish and whiting, capture of conservation species also occurred. These captures included smelt and river lamprey. The capture of three individuals of river lamprey over the seven sampling events in the 2003 study points to a vulnerability of this species during its seasonal migrations. This species is found to have both an autumn (August – November) peak as well as a smaller spring peak of movement from the sea into freshwater to spawn. The captures point to a possible migration route adjacent to the shore and this route may be adjacent to the water intake for this station.

These studies indicate that there is vulnerability in terms of :

- Total number of fish species

- Total number of individual fish
- Vulnerability of valuable fish species (commercially or for leisure angling)
- Vulnerability of conservation fish species (Including Habitats Directive and Red Data Book species)

The MLVC notes that the issue of entrainment of fish was considered by An Bord Pleanála and Condition No. 24 of the Planning Permission states:

- *The design of the water intake shall be based on best available technology and shall be submitted to and agreed in writing with the planning authority, prior to commencement of development. A monitoring programme shall be implemented following the commissioning of the water intake over the course of 2 years to provide an estimate of the numbers of impinged and entrained organisms, particularly fish and macro-crustaceans. The results of this monitoring programme shall be submitted to the National Parks and Wildlife Service at 12 monthly intervals and every effort shall be made to facilitate any changes, which may be deemed necessary to reduce the numbers of impinged and entrained organisms*

Given the experience of the Central Fisheries Board and the Shannon Regional Fisheries Board in regard to monitoring the impact of entrainment on fish in the large thermal power stations in the Shannon Estuary, the MLVC notes that it is considered by these agencies that the water intake process, with inevitable impingement impacts, may constitute one of the largest ecological impacts of this project. Furthermore, it is considered that this impact may be substantial and of permanent duration. Given this, the MLVC is of the view that it is essential that these fisheries agencies contribute to the design and development of water intake process that may have least deleterious impact on fish communities. Similarly, the fisheries boards, as appropriate state agencies, should be satisfied as to design of entrainment monitoring programme and are appropriate bodies to receive and comment on findings of the monitoring.

The MLVC recommends that design of the water intake system should be based on Best Environmental Practice and Best Available Technology. The final design should be agreed following consultation with the Central Fisheries Board and the Shannon Regional Fisheries Board and be submitted to the Minister for approval prior to construction taking place.

Cold water thermal plume

The LNG imported to the site by ship will be regasified using heat from the seawater abstracted from the estuary. The heat from the seawater will be transferred to an intermediate fluid, MonoEthyleneGlycol, in heat exchangers located onshore near the end of the LNG jetty. The cooled seawater will be returned to the estuary at an outfall located near the outer end of the jetty. The temperature of the returning seawater will range from -1°C and +1°C.

Computer modelling of the cold water plume showed that, outside a 50m mixing zone, the maximum temperature difference between ambient seawater temperature and the cold water plume was 0.7°C. The MLVC is satisfied that the impacts of the cold water plume will be minor and localised.

The MLVC note, however, that detailed design of the components of the outfall has yet to be completed. Therefore, the MLVC recommends that temporary monitoring of seawater temperature should be undertaken for a minimum of 1 year after the commissioning of the facility to confirm the design assumptions of the seawater outfall.

Safety Considerations

Shannon Foynes Port Company (SFPC) has statutory jurisdiction over all marine activities on the Shannon Estuary, stretching from Kerry Head /Loop Head to Limerick City. A Quantified Risk Assessment of marine operations at the proposed development was commissioned by SFPC and conducted by Marico Marine, in conjunction with Sea Sense Ltd. The methodology included Hazard Identification, Risk Assessment, Risk Control and Future Mitigation and Cost Benefit Analysis.

The overall conclusion was that the level of risk associated with the proposed LNG operations in the Shannon Estuary is acceptable and that such operations may be conducted in safety, subject to the additional risk mitigation measures identified in the report being addressed.

The report recommends a series of mitigation measures including:

- Pilotage and Navigation Measures
- Tug Measures
- Aids to Navigation
- LNG Jetty - Safety Features
- Personnel Competence (Experience and Training Controls)
- Vessel Traffic Services (VTS)

The report also concluded that

“ the risk assessment process cannot demonstrate that LNG Carrier operations may be conducted safely without a comprehensive and effective VTS in operation during the period leading up to and whilst a LNG Carrier is in port.”

The MLVC recommends that all additional risk mitigation measures identified in the Quantified Risk Assessment should be fully addressed prior to facility becoming operational.

The MLVC is satisfied that the Quantified Risk Assessment of marine operations adequately addresses the safety concerns of the proposed activities on the foreshore. The

MLVC notes that the Health and Safety Authority advised An Bord Pleanála, as part of the Board's consideration of the application for planning permission, that on the basis of the information supplied by the Board to the Authority and the information obtained directly from the applicants, and, in particular, the quantitative risk assessment, the Authority did not advise against the granting of planning permission in the context of Major Accident Hazards.

Birds

The proposed works on the foreshore are located within the Lower River Shannon candidate Special Area of Conservation (cSAC) (Site Code 2165), designated under the European Communities (Natural Habitats) Regulations, 1997-2005. Based on a submission from the DEHLG the MLVC recommends that as soon as practical, a monitoring programme shall be instituted to monitor the movement of winter wetland birds along the shore adjacent to the LNG jetties between Ballylongford Bay and Tarbert Bay. This monitoring programme should continue through the construction phase and for a period of three years after the final construction, with monthly surveys from October to March. The results of this monitoring programme should be submitted to the National Parks and Wildlife Service at 12 monthly intervals.

This recommendation is similar to Condition No 21 of the grant of planning permission by An Bord Pleanála.

Conclusions and Recommendations

The MLVC reviewed both technical and scientific aspects of the documentation supplied by Shannon LNG Ltd. The Committee is satisfied that the purpose and objective of the proposed works on the foreshore are adequately explained. In addition, the committee is satisfied that the environmental information provided is sufficient to make a recommendation on the proposed development.

The MLVC is satisfied that there appear to be no substantive grounds for a refusal, based upon environmental considerations. The MLVC recommends that the Minister issues the necessary Foreshore permits to allow the proposed development to proceed subject to the mitigation measures as set out in the EIS being implemented and compliance with conditions along the following lines:

Recommendations

- Detailed construction method statements for the works on the foreshore should be submitted for approval by the Minister prior to commencement of any works.
- A survey of marine fish community composition and abundance in the overall marine aquatic footprint of the development should be undertaken prior to commencement of any works in order to provide a baseline for further

comparative examination(s). The fish sampling season and sampling methods and reporting of results should be agreed with the Central Fisheries Board.

- The design of the water intake system should be based on Best Environmental Practice and Best Available Technology. The final design should be agreed following consultation with the Central Fisheries Board and the Shannon Regional Fisheries Board and be submitted to the Minister for approval prior to construction taking place.
- The developer should employ suitably qualified marine mammal observers for the duration of sub-tidal piling and on-shore blasting. Commencement of piling or blasting should be delayed if the marine mammal observers note dolphins within 500 metres of the site within 20 minutes of the planned commencement of works. No action shall be necessary if a dolphin approaches once operations have commenced. A log of the marine mammal observer operations should be submitted to the NPWS, following completion of these works.
- Blasting on the foreshore should not be permitted.
- As soon as practical, a monitoring programme should be instituted to monitor the movement of winter wetland birds along the shore adjacent to the LNG jetties between Ballylongford Bay and Tarbert Bay. This monitoring programme should continue through the construction phase and for a period of three years after the final construction, with monthly surveys from October to March. The results of this monitoring programme should be submitted to the National Parks and Wildlife Service at 12 monthly intervals.
- In order to ensure the preservation of potential archaeological sites and features the applicant is required to engage the services of a suitably qualified archaeologist to monitor all ground disturbance works and pile drilling works associated with the construction of the LNG jetty and Materials jetty.
- It is recommended that the archaeologist be licensed under the National Monuments Acts 1930-2004 and that an application for a licence to the Department of Environment Heritage and Local Government should be accompanied by a detailed method statement.
- Should archaeological material be found during the course of monitoring, the archaeologist may have work on the site stopped, pending a decision as to how best to deal with the archaeology. The developer shall be advised by the Department of Environment, Heritage and Local Government with regard to any necessary mitigating action (e.g. preservation *in situ*, dive survey or excavation). The applicant should facilitate the archaeologist in recording any material found.
- Should the need for a dive inspection be required, a suitably qualified underwater archaeologist should be engaged. The archaeologist should have the necessary a dive survey licence in place prior to any underwater inspections being conducted.
- Upon completion of the works, the Department of Environment, Heritage and Local Government should be furnished with a report describing the results of the monitoring.
- All risk mitigation measures identified in the report “Risk Assessment of Marine Operations at the LNG Terminal in the Shannon Estuary” prepared by Marico Marine, in conjunction with Sea Sense Ltd, should be fully implemented prior to the facility becoming operational.

- Monitoring of seawater temperature should be undertaken for a minimum of 1 year after the commissioning of the facility to confirm the design assumptions of the seawater outfall.
- As-constructed drawings should be furnished on completion of the works.
- Copies of Drawing No. C211 should be submitted for all applications and included in the file.
- The applicant should confirm that all areas of access/works on the foreshore are included in the drawings submitted.
- All sectional drawings should include levels of Mean High Water Springs (MHWS) and Mean Low Water Springs (MLWS). Some sectional drawings refer to "MLLW" - the applicant should clarify this term.
- The sectional drawings also state "Chart Datum is 3.0m below ordnance datum Malin Head (Om Chart Datum = 3.0m Malin Head Datum)". The applicant should clarify this statement and amend drawings if necessary.