

CHAPTER 19

Mitigation and Monitoring

Shannon LNG Limited
August 2021

Shannon Technology and Energy Park
Environmental Impact Assessment Report

Table of Contents

19. Summary of Mitigation and Monitoring Measures 5

Figures

No table of figures entries found.

Tables

Table 19-1 Environmental Impact Assessment Summary including Mitigation and Monitoring Commitments7

19. Summary of Mitigation and Monitoring Measures

19.1 Introduction

This chapter of the EIAR details all of the mitigation and monitoring measures to be implemented during the construction and operation of the Proposed Development. The following environmental mitigation and monitoring measures are an integral element of the planning application. Any further design of the Proposed Development will ensure that there is no material change in terms of significant adverse effects on the environment. Opportunities may also be identified to further reduce the significance of adverse impact and, in some cases, improve the residual impact.

Best practice referred to in this document refer to measures contained in modern guidance documents which set out the practice and procedures for environmental protection during construction and operational phases of a Proposed Development. Where legislation, standards or guidance documents are referred to it should be noted that at the time of construction or operation of the Proposed Development any amendments to these documents are applicable.

Embedded mitigation measures have been incorporated into the design of the Proposed Development throughout the design process. The environmental impact assessment of the Proposed Development, the methodology for which is described in Chapter 01 – Introduction, facilitated the identification of additional mitigation and monitoring measures to prevent or reduce likely significant effects identified in relation to the Proposed Development.

This chapter summarises the impacts assessed, and the mitigation and monitoring measures identified within Chapters 05 to 17 of this EIAR. The summary is presented in Table 19-1. The table also provides measures to be applied and/ or any anticipated residual impacts. The embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the Outline Construction Environmental Management Plan (OCEMP), see Appendix A2-4, Vol. 4. A detailed CEMP will be produced by the successful Contractor prior to the main construction works. The CEMP will detail the Contractor's overall management and administration of the works. The CEMP will also include any commitments included within the statutory approvals.

In addition to the mitigation and monitoring measures outlined in Table 19-1 below, the following combination of general measures and good practice will be implemented:

- Close adherence to the CEMP. The CEMP is designed to minimise any perturbations caused during the construction and is designed to meet best practice guidance and latest legislation. Specific roles, such as the Environmental (Ecological) Clerk of Works (ECoW), will be designated in the CEMP. The plan is to be updated a minimum of every 6 months over the duration of the construction process;
- The site compound will be located away from water courses and the storage of all fuels and potential contaminants on site will be done so in adherence to the mitigation measures outlined within this EIAR;
- Pedestrian access to the foreshore will be maintained throughout the construction period;
- In the construction process, the excavation and grading of all areas will be carried out in a sensitive manner to marry in the new formations with the existing landscape. Sharp ridges or overly steep embankments will be avoided where possible;
- Periodic water quality monitoring will be carried out at points of supply;
- The Proposed development will comply with the requirements of the Industrial Emissions licence, required during operation;

- During the transportation of abnormal loads, a Garda escort may be required. The timing of such transports to the Proposed Development site will be chosen to minimise disruption to other roads users. Hours are subject to agreement with KCC;
- The Contractor will prepare a landscape maintenance plan after the implementation of the Proposed Development. All landscape works will be in an establishment phase for the initial three years. This will include:
 - (a) Weed and litter control including monitoring particularly during the early growing seasons of the landscape maintenance contract;
 - (b) Grass cutting and replacement of failed plants; and
 - (c) compliance with all health and safety standards in particular with regard to maintenance works during the operation phase of the road;
- The contractor will be obliged to put measures in place during the construction phase to ensure that there are no interruptions to existing services. When service suspensions are required during the construction phase, reasonable prior notice will be given to the residents in the area. The disruption to services or outages will be carefully planned so the duration is minimised;
- The OCEMP will set out information on the roles and responsibilities of key individuals, including the environmental management and reporting structure;
- An outline communication strategy will be in place, for example for the implementation of toolbox talks (environmental discussion on issues encountered onsite) by the contractor relating to environmental constraints and procedures to be adhered to onsite;
- An outline emergency response plan and procedure for environmental incidents including accidental spills will be in place; and
- The OCEMP sets out requirements for inspection and auditing, including an outline reporting programme and procedure to be updated by the appointed contractor.

Table 19-1 Environmental Impact Assessment Summary including Mitigation and Monitoring Commitments

Proposed Development Stage	Aspect/ Impact Assessed	Existing Environment/ Receptor Sensitivity	Effect/ Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the OCEMP)	Residual Impact Significance	EIAR Chapter Reference
Construction	Changes to topography – excavation and infilling.	Low	Excavation and reuse of 480,000 m ³ of soil and rock. Permanent, direct, irreversible effect	Neutral	All surplus material will be processed (screened/ crushed) and reused onsite and there is no intention to import soil material to the Proposed Development site. Temporary storage of soil will be carefully managed in such a way as to prevent potential negative impact on the receiving environment. Spoil and temporary stockpiles including stone stockpile areas will be positioned in locations which are distant from the shoreline, drainage systems and retained drainage channels and away from areas subject to flooding, so as not to cause potential runoff to soils. Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust. The OCEMP will outline proposals for the excavation and management of excavated material.	Slight	Chapter 05 – Land and Soils
Construction	Use of natural resources.	Low	Excavation and reuse of 480,000 m ³ of soil and rock. Irreversible effect, Permanent direct impact of neutral quality	Neutral	All excavated material will be reused onsite. Offshore pile arisings will be reused onshore as landscaping material to form a berm on the north-eastern edge of the site, subject to chemical suitability. 26,000 tonnes of aggregate will require to be brought to site from local quarries for the formation of access roads during construction. The source of this fill material will be vetted in relation to the environmental management status and regulatory and legal compliance status of the originating facility and include appropriate chemical testing if derived from recycled fill material. Certain to occur and irreversible, but will be imperceptible within wider environment	Not significant	Chapter 05 – Land and Soils
Construction	Accidental spills and leaks;	High	Adverse impact on soils underlying the	Medium	Spillages are unlikely to occur and, if they occur, will be confined to one-off releases. Hazardous materials	Imperceptible	Chapter 05 – Land and Soils

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	Spillage or leakage of stored oils and fuels; Spillage or leakage of oils and fuels from construction machinery or site vehicles; and Spillage of oil or fuel from refuelling machinery onsite.		Proposed Development site. Direct negative impact of temporary duration		will be controlled via the OCEMP and stored in bunded areas. Low impact on a low sensitivity environment and the significance of the impact is slight. In order to prevent spillages to ground of fuels, and to prevent any consequent soil or groundwater quality impacts, it will be necessary to adopt mitigation measures during the construction phase, which include: <ul style="list-style-type: none"> • Designating a bunded storage areas and handling procedures for all oils, solvents and paints used during construction; • Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles, will take place in a designated area with appropriate facilities; and • Refuelling outside of the designated area will be via a mobile double skinned tank with lockable fittings and an onboard spill kit. 		
Construction	Use of concrete and lime.	Low	Lime and concrete (specifically, the cement component) is highly alkaline and can impact soil quality during piling and building construction. Direct effect of negative nature and temporary duration	Medium	Hazardous materials will be controlled via the OCEMP and stored in bunded areas. A suitable risk assessment for wet concreting will be completed prior to works being carried out, which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil or to the marine environment. Washout of concrete-transporting vehicles will take place at an appropriate facility offsite where possible, alternatively, where washout takes place onsite, it will be carried out in carefully-managed onsite wash out areas. Potential for low impact on a low sensitivity environment and the significance of the impact is slight.	Imperceptible	Chapter 05 – Land and Soils

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Construction	Impact on soil/ geology.	Low	Slight to moderate beneficial effect	Neutral	<p>The opportunity to study and document regional glacial geology through cutting and foundation pit exposures in the glacial deposits and bedrock, which will add to the national records. Shallow soils are therefore considered to have a neutral to favourable effect on the Proposed Development and to be a minor beneficial effect on a low importance soil environment, and the significance of the effect is imperceptible.</p> <p>Unweathered bedrock is expected to provide a competent foundation medium, therefore bedrock quality is therefore considered to have a moderate favourable impact effect on the Proposed Development in a low importance bedrock environment, and the significance of the effect is slight.</p>	Imperceptible to slight	Chapter 05 – Land and Soils
Operational	Accidental spills and leaks.	Medium	<p>Spills during fuelling at diesel fuel tanks for the fire water pumps and generators can in theory discharge to ground.</p> <p>Direct negative impacts of temporary duration given that they will be confined to one off releases.</p>	Medium	<p>All hazardous or water-polluting materials will be handled or stored in a manner to prevent/ minimise potential impact on soil.</p> <p>Secondary containment and spill kits will be provided for other hazardous materials to be stored onsite, such as maintenance oils and cleaning chemicals.</p> <p>Diesel fuel tanks for the fire water pumps and generators will be stored within bunded areas. Fuel will be prevented from entering the soil around the generators, as drainage will be directed to an oil/ water interceptor prior to discharge to the storm water drainage system. In addition, there will be a shut off valve from the generator yard to the external surface water drainage network.</p>	Imperceptible	Chapter 05 – Land and Soils
Operational	Removal of land from agricultural use.	Low	The Proposed Development is located in a	Medium	The removal of agricultural land can be considered to be permanent and the impact is considered negative; however, it is likely to be of low magnitude given the site is located within an agricultural setting where land use is predominantly of agricultural nature.	Slight	Chapter 05 – Land and Soils

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			603 acre landbank that is zoned for industrial development and will cover a development area of 41 ha (excluding the offshore elements) of the overall site. The total hardstanding area is estimated to cover 14 ha, with the remainder unsurfaced, landscaped or attenuation ponds. The removal of land from agricultural or other potential beneficial uses is considered a permanent, direct, negative impact.				
Construction	Dewatering due to cuttings.	Low	Cut faces into bedrock will lead to seepage of groundwater into platform localised dewatering of the bedrock within 10 to 50 m of the cut faces. Permanent, direct, irreversible moderate effect	Neutral	Localised dewatering of the bedrock within 10 to 50 m of the cut faces of the excavation is anticipated, however, as all groundwater in the bedrock aquifer in this area is flowing towards the Shannon Estuary under baseline conditions, the interception and discharge of groundwater discharging to the excavated platform area of the Proposed Development will not lead to a net change to the quantities of groundwater ultimately discharging to the Shannon Estuary from this portion of the Proposed Development site. Groundwater seepage from cut faces will be managed via the Proposed Development site drainage systems	Imperceptible	Chapter 06 – Water

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					in such a way as to prevent potential negative impact on the receiving environment The OCEMP will outline proposals for the control and monitoring of groundwater seepages from the cut faces of the platform area.		
Construction	Sedimentation (suspended solids).	Extremely high	Runoff containing large amounts of suspended solids from site stripping, earthworks and material stockpiles can potentially adversely impact on surface water. Temporary small adverse effect to an medium extremely high sensitivity surface water environment.	Significant	Surface water runoff from working areas will not be allowed to discharge directly to the local watercourses. To achieve this, the drainage system, settlement ponds and surface water outfall will be constructed prior to the commencement of major site works. Spoil and temporary stockpiles will be positioned in locations which are distant from drainage systems and retained drainage channels, away from areas subject to flooding. Runoff from spoil heaps will be prevented from entering watercourses by diverting it through onsite settlement ponds and removing material as soon as possible to designated storage areas. Control of runoff from construction activities will be managed under the OCEMP therefore runoff containing large amounts of suspended solids is considered unlikely to occur and, shall it occur, is likely to be rare and short-term.	Imperceptible	Chapter 06 – Water
Construction	Accidental spills and leaks: <ul style="list-style-type: none"> Use and storage of liquid chemicals; Spillage or leakage of oils and fuels from construction machinery 	Extremely high	Adverse effect on fish, aquatic flora and invertebrate communities. the Proposed Development. Direct negative small effect of temporary duration.	Significant	In order to prevent spillages to ground of fuels or other chemicals, and to prevent any consequent soil or groundwater quality impacts, it will be necessary to adopt mitigation measures during the construction phase, which include: <ul style="list-style-type: none"> Designating a bunded storage areas and handling procedures for all oils, solvents and paints used during construction; Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles, will take place in a designated area with appropriate facilities; and 	Imperceptible	Chapter 06 – Water

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	<ul style="list-style-type: none"> or site vehicles; and • Spillage of oil or fuel from refuelling machinery onsite. 				<ul style="list-style-type: none"> • Refuelling outside of the designated area will be via a mobile double skinned tank with lockable fittings and an onboard spill kit. <p>Accidental spillages and leaks will be managed as outlined in the OCEMP and are considered unlikely to occur and, shall they occur, are likely to be a temporary.</p>		
Construction	Use of concrete and lime.	Extremely high	Lime and concrete (specifically, the cement component) is highly alkaline and can impact surface water quality during construction. Direct negative small effect of temporary duration.	Significant	<p>Hazardous materials will be controlled via the measures outlined in the OCEMP and stored in bunded areas.</p> <p>A suitable risk assessment for wet concreting will be completed prior to works being carried out, which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil or to the marine environment.</p> <p>Washout of concrete-transporting vehicles will take place at an appropriate facility offsite where possible, alternatively, where washout takes place onsite, it will be carried out in carefully-managed onsite wash out areas.</p>	Imperceptible	Chapter 06 – Water
Operational	<p>Hazardous materials storage:</p> <ul style="list-style-type: none"> • Diesel; • Chemical odorant; and • Minor quantities of maintenance oils, greases, 	Extremely high	Storage of materials that are potentially hazardous to the aquatic environment. Temporary small adverse effect to an extremely high sensitivity surface water environment.	Significant	<p>The storage of materials hazardous to the aquatic environment during the operational phase will be in secondary contained area and will be controlled in accordance with any IE licence conditions.</p> <p>All hazardous or water-polluting materials will be handled or stored in a manner to prevent/ minimise potential impact on soil.</p> <p>Secondary containment and spill kits will be provided for other hazardous materials to be stored onsite.</p>	Imperceptible	Chapter 06 – Water

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	lubricants, cleaning chemicals, etc.				Potentially hazardous materials will be stored and handled in compliance with the site's IE licence requirements during the operational phase.		
Operational	Accidental spills and leaks.	Extremely high	Spills during handling of fuels and other liquid chemicals can result in discharge to groundwater or the surface water environment. Direct negative small adverse effect of temporary duration.	Significant	<ul style="list-style-type: none"> All hazardous or water-polluting materials will be handled or stored in a manner to prevent/ minimise potential impact on soil. Secondary containment and spill kits will be provided for other hazardous materials to be stored onsite, such as maintenance oils and cleaning chemicals. Diesel fuel tanks for the fire water pumps and generators will be stored within bunded areas. Fuel will be prevented from entering the soil around the generators, as drainage will be directed to an oil/ water interceptor prior to discharge to the storm water drainage system. In addition, there will be a shut off valve from the generator yard to the external surface water drainage network. Potentially hazardous materials will be stored and handled in compliance with the site's IE licence requirements during the operational phase. 	Imperceptible	Chapter 06 – Water
Operational	Flooding and drainage.	Extremely high	Direct discharges to the water environment during the operational phase will consist of: <ul style="list-style-type: none"> Stormwater water runoff from the developed and undeveloped areas of the Proposed Development site; 	Significant	<ul style="list-style-type: none"> The proposed crossings of the watercourses within the Proposed Development along the access road have been adequately sized to have a minimal impact on the existing hydraulic regime in the area draining to the Ralappane Stream, and therefore the Proposed Development has a negligible impact on the existing flood regime in the area. The LNG Terminal and Power Station site will have a constructed stormwater, effluent and sanitary drainage systems capable of handling anticipated effluent volumes and which will incorporate treatment facilities and monitoring equipment appropriate to each effluent stream (including silt 	Imperceptible	Chapter 06 – Water

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			<ul style="list-style-type: none"> Groundwater discharges from cut faces; Foul water from welfare facilities on the Proposed Development site; and Process effluent streams. <p>Small adverse impact effect on an extremely high sensitivity environment.</p>		<ul style="list-style-type: none"> trap, Class 1 hydrocarbon interceptor, a firewater retention facility, package waste water treatment plant and pH adjustment). The site's drainage systems will be operated and monitored in compliance with the site's IE licence requirements during the operational phase. 		
Operational	Combined operational stormwater, sanitary and process effluent discharges to surface water.	Extremely high	Direct discharges to the water environment during the operational combined Surface Water Outfall small adverse impact effect on a medium extremely high sensitivity environment.	Significant	<ul style="list-style-type: none"> The LNG Terminal and Power Station site will have a constructed stormwater, effluent and sanitary drainage systems capable of handling anticipated effluent volumes and which will incorporate treatment facilities and monitoring equipment appropriate to each effluent stream (including silt trap, Class 1 hydrocarbon interceptor, a firewater retention facility, package waste water treatment plant and pH adjustment). The Proposed Development site's drainage systems will be operated and monitored in compliance with the site's IE licence requirements during the operational phase. 	Imperceptible	Chapter 06 – Water
Construction	Piling for offshore construction (suspended solids, concrete use).	Extremely high	Mobilisation of sediment due to installation of steel piles into bedrock to support offshore structures. pH effect due to the use of	Significant	<p>Pile installation will use reverse circulation drilling to minimise loss of drilling spoil and generation of suspended sediment in the marine environment.</p> <p>Follow-on construction work will maximise the use of precast concrete elements, such as pile caps, beams, and deck planks, to minimize in-water construction.</p>	Imperceptible	Chapter 06 – Water

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			concrete in the marine environment. Small adverse effect on an extremely high sensitivity environment.		Any in-situ concrete work would be staged in a manner to prevent concrete from entering the water.		
Operational	FRSU operational discharges to surface water.	Extremely high	Direct discharges to the marine environment during the operational combined surface water outfall. Small adverse impact effect on a medium extremely high sensitivity environment.	Significant	The LNG Terminal and Power Plant site will have a constructed stormwater, effluent and sanitary drainage systems capable of handling anticipated effluent volumes and which will incorporate treatment facilities and monitoring equipment appropriate to each effluent stream (including silt trap, Class 1 hydrocarbon interceptor, a firewater retention facility, package waste water treatment plant and pH adjustment). To reduce the build-up of sediment in the drainage network, trapped inlets will be used at all points of entry and key manholes will have sumps to collect material. A regular maintenance regime, including monitoring, will be put in place to remove any excess build-up of material. The Proposed Development site's drainage systems will be operated and monitored in compliance with the site's IE licence requirements during the operational phase.	Slight	Chapter 06 – Water
Construction	Release of pollutants during construction			Significant	Standard construction best practice mitigation measures to prevent release of sediments, chemical and pollutants during construction (see Chapter 07A and the OCEMP included in Appendix A2-4, Vol. 4).	Not significant	Chapter 07A – Marine Ecology
Construction	Release of spoil during piling			Not Significant	None	Not Significant	Chapter 07A – Marine Ecology
Construction & Operational	Effect of underwater noise on fish			Not Significant	None	Not Significant	Chapter 07A – Marine Ecology

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	Effect of underwater noise on marine mammals			Significant	<p>Chapter 07A summarises standard mitigation required to minimise the risk potential impact to marine mammal species as outlined in DAHG, 2014:</p> <ul style="list-style-type: none"> • Marine mammal observation period of 30 minutes minimum prior to start (or re-start after a break of 30 minutes) of any impact piling and any drilling; • A gap of at least 30 minutes required between last observation of a marine mammal and start of operations; • The observation zone is 1000 m for impact piling and 500 m for drilling (thus impact piling likely to require > 1 marine mammal observer); • Impact piling and drilling can only start in daylight conditions when visual monitoring can take place (i.e. when wind/ wave conditions mean observation is possible: NPWS guidance recommends 'sea conditions for effective visual monitoring by MMOs are WMO Sea State 4 (≈Beaufort Force 4 conditions) or less'; • For any source, including equipment testing, exceeding 170 dB re: 1µPa @1m an appropriate ramp-up procedure (i.e. 'soft-start') must be used. This should be a minimum of 20 minutes and no longer than 40 minutes; • Once piling or drilling has started it can continue into darkness and does not need to stop even if marine mammals are seen in the observation zone (in fact, an MMO is not required once the sound generating activity starts though continued observation can be beneficial for unexpected breaks or down-time as the 30 minute observation period can start immediately; • MMOs must be dedicated to and engaged solely in monitoring an operator's implementation of the NPWS technical guidance. A sufficient number of 	Not Significant	Chapter 07A – Marine Ecology

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					<p>MMO personnel must be assigned to ensure that the role is performed effectively. Avoidance of observer fatigue is essential; and</p> <ul style="list-style-type: none"> Use trained and experienced marine mammal observers – the guidance states this should be a visual observer who has undergone formal marine mammal observation and distance estimation training (JNCC MMO training course or equivalent) and also has a minimum of 6 weeks full-time marine mammal survey experience at sea over a 3-year period in European waters. <p>Additional mitigation measures to be implemented include:</p> <ul style="list-style-type: none"> No simultaneous impact piling (i.e. two rigs operating at the same time); Pile installation will require a combination of techniques including impact piling, vibratory piling and drilling requiring breaks in activity as equipment is changed. Where an activity progresses to a lower sound level activity – i.e. from impact piling to vibratory piling or drilling, and the break between activities is less than 30 minutes a new period of observation is not required, and activities can be considered to be continuous; For any impact piling taking place during August, an additional MMO will be present at Moneypoint to undertake additional observations for mother-young dolphin pairings. There is known presence of neonatal bottlenose dolphin in the estuary between July and September, peaking in August, and though numbers are low there is potential for presence in the region of the Proposed Development. There will be full communication between the Moneypoint MMO and the construction team to ensure no impact piling 		

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					<p>commences until animals have moved away from a 1000 m radius observation zone (ensuring the full width of the estuary is observed in August);</p> <ul style="list-style-type: none"> • Whilst all blasting is land based there will be propagation of sound into the underwater environment. Thus, the standard mitigation measures for blasting will be adopted as a precautionary measure – qualified MMO, a 1000 m observation zone and an observation period of 30 minutes. As only single blasts will take place in each event (not a series), a soft-start is not included; and • The marine mammal monitoring programme, currently being undertaken by the Irish Whale and Dolphin Group (in the vicinity of the project using CPODs) will be continued into the construction phase for the validation of predictions (based on observations from other studies – see impact assessment) that any animals displaced from an area return after the construction activity stops. 		
Construction and Operational	Seabed habitat loss	Low	Not assessed	Not Significant	Negligible loss of habitat pending decommissioning of the development and natural recolonisation of reinstatement of the affected habitat areas.	Not Significant	Chapter 07A – Marine Ecology
Construction and Operational	Introduction of invasive species	Low	Not assessed	Significant	<p>Before and after use, all relevant equipment will be thoroughly cleaned using Virkon Aquatic to guard against the spread of fish viruses, bacteria, fungi, and moulds.</p> <p>All water used in the cleansing, testing or disinfection of structures or machinery shall be rendered safe prior to discharge, particularly any chlorinated water.</p> <p>A post consent verification invasive species survey will be undertaken within the Proposed Development boundary by a competent ecologist.</p>	Not Significant	Chapter 07A – Marine Ecology

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					the appointed Contractor will ensure biosecurity measures are implemented throughout the construction phase to ensure the introduction and translocation of invasive species is prevented. The appointed ECoW will carry out a toolbox talk which will identify invasive species and will also implement biosecurity measures such as the visual inspection of vehicles for evidence of attached plant or animal material prior to entering and leaving the works area. To ensure the spread of invasive species is avoided a 'Check, Clean, Dry' protocol will be undertaken by the appointed ECoW with all equipment, machinery and vehicles entering and leaving the Proposed Development boundary.		
Operational	Vessel physical disturbance and collision injury	Low	Not assessed	Not Significant	None	Not Significant	Chapter 07A – Marine Ecology
Operational	Discharge of treated cooled seawater	Low	Not assessed	Not Significant	None	Not Significant	Chapter 07A – Marine Ecology
Operational	Entrainment and impingement of fauna by the FSRU seawater system	Low	Not assessed	Not Significant	None	Not Significant	Chapter 07A – Marine Ecology
Operational	Discharge of Wastewater and Power Plant Process Heated Water Effluent	Low	Not assessed	Not Significant	None	Not Significant	Chapter 07A – Marine Ecology

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Operational	Accidental large scale oil or LNG spill	Low	Not assessed	Significant	Established protocols to manage the risk of accidental spill and potential environmental impact.	Not Significant	Chapter 07A – Marine Ecology
Construction	General mitigation measures.	Low	Not assessed	Not assessed	<p>An OCEMP has been prepared (included in Appendix A2-4 of Volume 4). The OCEMP contains the construction mitigation measures, which are set out in this EIAR and the NIS. This will have particular emphasis on the protection of habitats and species of the cSAC, SPA and pNHA which adjoin the Proposed Development site.</p> <p>These sites are by definition internationally/ nationally important for their habitats and the species they support. It is essential that all construction staff, including all sub-contracted workers, be notified of the boundaries of these Natura 2000 sites and be made aware that no construction waste of any kind (rubble, soil, etc.) is to be deposited in these protected areas and that care must be taken with liquids or other materials to avoid spillage.</p> <p>Mitigation and monitoring measures (of relevance in respect of any potential ecological effects) will be implemented throughout the project, including the preparation and implementation of detailed method statements. The works will incorporate the relevant elements of the guidelines outlined below:</p> <ul style="list-style-type: none"> • Control of water pollution from construction sites. Guidance for consultants and contractors (C532). CIRIA. Masters-Williams <i>et al</i> (2001) • Control of water pollution from linear construction projects. Technical guidance (C648). CIRIA. Murnane, <i>et al.</i> (2006) <p>All personnel involved with the Proposed Development will receive an onsite induction relating to construction and operations and the environmentally sensitive nature of European sites and to re-emphasise the precautions that are required</p>	Not significant	Chapter 07B – Terrestrial Ecology

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					<p>as well as the precautionary measures to be implemented. Site managers, foremen and workforce, including all subcontractors, will be suitably trained in pollution risks and preventative measures.</p> <p>All staff and subcontractors have the responsibility to:</p> <ul style="list-style-type: none"> • Work to agreed plans, methods and procedures to eliminate and minimise environmental impacts, • Understand the importance of avoiding pollution onsite, including noise and dust, and how to respond in the event of an incident to avoid or limit environmental impact; • Respond in the event of an incident to avoid or limit environmental impact; • Report all incidents immediately to the project manager and the Environmental (Ecological) Clerk of Works (ECoW); • Monitor the workplace for potential environmental risks and alert the site manager if any are observed; and • Co-operate as required, with site inspections. 		
Construction	Bridge and culvert construction.	Medium	Culverting of two drainage ditches and bridging of Ralappane Stream	Moderate	<p>Bridge construction on the Ralappane Stream will use a single span, pre-cast concrete bridge near the southern boundary of the Proposed Development site. Two drainage ditches within the Proposed Development site will be culverted. In addition to the general measures described above, the following specific mitigation measures will be implemented for crossing of the Ralappane Stream and drainage ditch:</p> <ul style="list-style-type: none"> • Works will comply with The IFI's Guidelines on protection of fisheries during construction works in and adjacent to waters (IFI, 2016) • No instream works will take place. 	Not significant	Chapter 07B – Terrestrial Ecology

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					<ul style="list-style-type: none"> • Appropriate silt control measures such as silt barriers (e.g. straw or silt fence) will be employed where required. • Construction activities will be undertaken during daylight hours only. This will ensure that there is potential for undisturbed fish passage at night. The works will be temporary and will not create a significant long-term barrier to fish movement. • An appropriate native grass seed mix as determined by the ECoW based on ground conditions, will be utilised to re-vegetate any disturbed areas along the bank of the Ralappane Stream; and • Although no Common Frog were observed in drainage ditches within the Proposed Development site boundary, they will be surveyed prior commencement of site works by the ECoW as a precautionary measure. Any Common Frog, if recorded, will be moved to suitable habitat in the wider landscape under licence from NPWS. 		
Construction	Lighting.	Medium	Disturbance and/ or displacement of sensitive fauna	Moderate	<p>Lighting associated with the site works could cause disturbance/ displacement of fauna. If of sufficient intensity and duration, there could be impacts on reproductive success.</p> <p>Site lighting will typically be provided by tower mounted temporary portable construction floodlights. The floodlights will be cowed and angled downwards to minimise spillage to surrounding properties. Lighting mitigation measures will follow Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers (Bat Conservation Ireland, 2010). The following measures will be applied in relation to construction works lighting:</p> <ul style="list-style-type: none"> • Lighting will be provided with the minimum luminosity sufficient for safety and security 	Slight	Chapter 07B – Terrestrial Ecology

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					<p>purposes. Where practicable, precautions will be taken to avoid shadows cast by the site hoarding on surrounding footpaths, roads and amenity areas;</p> <ul style="list-style-type: none"> • Motion sensor lighting and low energy consumption fittings will be installed to reduce usage and energy consumption; and <p>During construction, lighting will be positioned and directed so that it does not to unnecessarily intrude on adjacent ecological receptors and structures used by protected species. The primary area of concern is the potential impact at the cSAC/ SPA boundary, the Ralappane Stream as well as hedgerows, treelines. With the exception of the jetty dock, there will be no directional lighting focused towards these areas and cowling and focusing lights downwards will minimise light spillage.</p>		
Construction	Habitats.	Medium	Removal of habitat	Slight to moderate	<p>The Wildlife Act 1976, as amended, provides that it is an offence to cut, grub, burn or destroy any vegetation on uncultivated land or such growing in any hedge or ditch from 1st March to 31st August. Exemptions include the clearance of vegetation in the course of road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided. Where possible, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided. This will also minimise the potential disturbance of breeding birds outside of the Proposed Development site boundary.</p> <p>Particular care will be taken at the boundary between the Proposed Development site and the cSAC, SPA and pNHA so that construction activities do not cause damage to habitats in this area. These habitats will be securely fenced off early in the construction phase.</p>	Not significant to slight	Chapter 07B – Terrestrial Ecology

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					<p>The fencing will be clearly visible to machine operators.</p> <p>The Ralappane Stream runs from the Proposed Development site through the cSAC and pNHA to the sea, it is important that construction activities do not result in pollution of this watercourse, either through siltation, which interferes with water flow, vegetation growth and aquatic fauna, or pollution (e.g. chemical). Refer to Chapter 06 Section 6.10 for further details on mitigation.</p> <p>Any disturbance to cliff habitat from vehicular access should be minimised and will require a detailed method statement which will be agreed with the NPWS prior to commencement of works</p> <p>To prevent incidental damage by machinery or by the deposition of spoil during site works, hedgerow, tree and scrub vegetation which are located in close proximity to working areas will be clearly marked and fenced off to avoid accidental damage during excavations and site preparation. The ECoW will specify appropriate protective fencing where required.</p> <p>Habitats that are damaged and disturbed will be reinstated and landscaped once construction is complete. Disturbed areas will be seeded or planted using appropriate native grass or species native to the areas where necessary. Natural regeneration of vegetation will also occur.</p> <p>There will be a defined working area which will be fenced off with designated haul routes to prevent inadvertent damage to adjoining habitats.</p> <p>Tree root systems can be damaged during site clearance and groundworks. Materials, especially soil and stones, can prevent air and water circulating to the roots. No materials will be stored within the root protection area/ dripline of trees. The ECoW will specify appropriate protective fencing where required.</p>		

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Construction	Badger.	Medium	Sett removal/ mortality/ injury disturbance and/ displacement	Significant	<p>This will require exclusion of Badgers from subsidiary/ outlier setts, however in both instances both social groups of Badgers would be expected to continue to use their main setts.</p> <p>Badger sett tunnel systems can extend up to approximately 20 m from sett entrances. Therefore, no heavy machinery should be used within 30 m of Badger setts (unless carried out under licence); lighter machinery (generally wheeled vehicles) should not be used within 20 m of a sett entrance; light work, such as digging by hand or scrub clearance should not take place within 10 m of sett entrances.</p> <p>During the breeding season (December to June inclusive), none of the above works should be undertaken within 50 m of active setts nor blasting or pile driving within 150 m of active setts.</p> <p>Affected Badger setts will be clearly marked and the extent of bounds prohibited for vehicles clearly marked by fencing and signage.</p> <p>The most recent surveys show that the two main Badger setts are located outside of the Proposed Development site boundary and the two setts to be directly affected are subsidiary setts. The bait marking survey indicates that the setts are linked as follows:</p> <ul style="list-style-type: none"> • Sett 4 (main sett) is located to the east of the Proposed Development. Sett 1 is located within the Proposed Development site boundary. These setts are used by the same social group. • Sett 3 (main sett) is located to the east of the Proposed Development. Sett 2 is located within the Proposed Development site boundary. These setts are used by the same social group. <p>The presence of alternative setts within the particular social group's territory is required to ensure that excluded Badgers are able to relocate to a suitable</p>	Significant	Chapter 07B – Terrestrial Ecology

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					<p>alternative refuge. The objective is to allow the Badgers to remain within their territory, even though a portion of their current territory may be lost as a result of a particular development. There is a standard methodology which can be utilised to exclude Badgers from setts.</p> <p>A methodology for the exclusion of Badgers from affected setts and displacement of Badgers to artificial setts is outlined in the National Roads Authority Publication Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes (NRA 2005a). Detailed mitigation measures including method statements will be agreed with the NPWS prior to implementation as part of a licence application.</p> <p>Exclusion of Badgers from any currently active sett will only be carried out during the period of July to November (inclusive) in order to avoid the Badger breeding season.</p> <p>In the instance of disused setts or setts verified as inactive, and to prevent their reoccupation, the entrances may be lightly blocked with vegetation and a light application of soil (soft blocking). The purpose of soft-blocking is to confirm that an apparently inactive sett is not occupied by Badgers. If all entrances remain undisturbed for approximately five days, the sett should be destroyed immediately using a mechanical digger, under the supervision of the licensee. Should there be any delay in sett destruction, the soft-blocked entrances should be hard-blocked and the sett destroyed as soon as possible, again under the supervision of the licensee. Hard-blocking is best achieved using buried fencing materials and compacted soil with further fencing materials laid across and firmly fixed to blocked entrances and surrounds</p>		

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					<p>Where field signs or monitoring reveal any suggestion of current or recent Badger activity at any of the sett entrances, the sett requires thorough evacuation procedures.</p> <p>Inactive entrances may be soft and then hard-blocked, as described for inactive setts, but any active entrances should have one-way gates installed (plus proofing around sides of gates as illustrated) to allow Badgers to exit but not to return. The gates should be tied open for three days prior to being set to exclude. Sticks should be placed at arm's length within the gated tunnels to establish if Badgers remain within the sett.</p> <p>Gates should be left installed, with regular inspections, over a minimum period of 21 days (including period with gates tied open) before the sett is deemed inactive. Any activity at all will require the procedures to be repeated or additional measures taken. Gates might be interfered with by other mammals or members of the public - hence the importance of regular exclusion monitoring visits. Sett destruction should commence immediately following the 21-day exclusion period, provided that all Badgers have been excluded.</p> <p>Badgers will often attempt to re-enter setts after a period, and if gates are left in place for any long period, they may attempt to dig around them or even create new entrances and tunnels into the sett system.</p> <p>Where an extensive sett is involved, an alternative method of evacuating Badgers is to erect electric fencing around the sett (ensuring all entrances are included) with one-way Badger-gates installed within the electric fence at points where the fence crosses Badger paths leading to and from the sett. The exclusion should again take place over a minimum</p>		

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					<p>period of 21 days before sett destruction; this monitoring period would be contingent upon no Badger activity being observed within the fenced area. Fencing may not be practical in many situations due to the topography or the terrain – and can be difficult to install effectively. If no activity is observed, then the sett may be destroyed, under supervision by the licensed wildlife expert.</p> <p>The destruction of a successfully evacuated Badger sett may only be conducted under the supervision of qualified and experienced personnel under licence from the NPWS. The possibility of Badgers remaining within a sett must always be considered; suitable equipment should be available on hand to deal with Badgers within the sett or any Badgers injured during sett destruction.</p> <p>Destruction is usually undertaken with a tracked 12-25 tonne digger, commencing at approximately 25 m from the outer sett entrances and working towards the centre of the sett, cutting approximately 0.5 m slices in a trench to a depth of 2 m. Exposed tunnels may be checked for recent Badger activity, with full attention paid to safety requirements in so doing. The sett should be destroyed from several directions, in the above manner, until only the central core of the sett remains.</p> <p>Once it is ensured that no Badgers remain, the core may then also be destroyed and the entire area back-filled and made safe. Sett excavation should, preferably, be concluded within one working day, as Badgers may re-enter exposed tunnels and entrances.</p> <p>A report detailing evacuation procedures, sett excavation and destruction, and any other relevant issues should be submitted to the NPWS, in fulfilment of usual wildlife licence conditions.</p>		

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					<p>Construction activities within the vicinity of affected setts may commence once these setts have been evacuated and destroyed under licence from the NPWS. Where affected setts do not require destruction, construction works may commence once recommended alternative mitigation measures to address the Badger issues have been complied with. Badger access points will be provided to allow Badgers to access the development area once complete.</p> <p>Monitoring of Badger setts will be carried out during construction works and a five-year post-construction monitoring programme will be implemented.</p>		
Construction	Bats.	High	Disturbance/ displacement	Not significant	<p>During the site works, general mitigation measures for bats will follow the National Road Authority's 'Guidelines for the Treatment of Bats during the Construction of National Road Schemes' NRA (2005c) and 'Bat Mitigation Guidelines for Ireland: Irish Wildlife Manuals, No. 25' (Kelleher, C. & Marnell, F. (2006)). These documents outline the requirements that will be met in the pre-construction (site clearance) stage to minimise negative effects on roosting bats, or prevent avoidable effects resulting from significant alterations to the immediate landscape.</p> <p>A Common Pipistrelle colony was recorded in a farm building southwest of the Proposed Development site. This building will not be affected. No bat roosts were recorded within the site boundary. Mitigation measures will be agreed with the National Parks and Wildlife Service prior to any demolition works and will include the following:</p> <p>Two buildings within the Proposed Development site will be demolished as part of the development. No signs of bats were recorded within these buildings. However as a precautionary measure, the following</p>	Not significant	Chapter 07B – Terrestrial Ecology

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					<p>measures will be implemented prior to and/ or during demolition:</p> <ul style="list-style-type: none"> • In all cases immediately in advance of demolition a bat specialist will undertake an examination of the building. If bats are present at the time of examination it is essential to determine the nature of the roost (i.e. number, species, whether it is a breeding population) as well as its exact location. • If bats are recorded in buildings earmarked for demolition, special mitigation measures to protect bats will be put in place and a license to derogate from the conservation legislation will be sought from the NPWS. • The contractor will take all required measures to ensure works do not harm individuals by altering working methods or timing to avoid bats, if necessary. • If roosting habitat for bats is removed, replacement habitat will be provided. • A number of trees will be removed prior to construction. Although mature trees with the potential of be value as bat roosts are absent from the site, the following precautionary measures will be implemented. • The bat specialist will work with the contractor to ensure that the loss of trees is minimised and that trees earmarked for retention are adequately protected. • Tree-felling will ideally be undertaken in the period September to late October/ early November. During this period bats are capable of flight and may avoid the risks of tree-felling if proper measures are undertaken. • Felled trees will not be mulched immediately. Such trees will be left lying several hours and preferably 		

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					<p>overnight before any further sawing or mulching. This will allow any bats within the tree to emerge and avoid accidental death. The bat specialist will be on-hand during felling operations to inspect felled trees for bats. If bats are seen or heard in a tree that has been felled, work will cease and the local NPWS Conservation Ranger will be contacted.</p> <ul style="list-style-type: none"> • Tree will be retained where possible and no ‘tidying up’ of dead wood and spilt limbs on tree specimens will be undertaken unless necessary for health and safety. • Treelines outside the Proposed Development area but adjacent to it and thus at risk, will be clearly marked by a bat specialist to avoid any inadvertent damage. • During construction directional lighting will be employed to minimise light spill onto adjacent areas. Where practicable during night-time works, there will be no directional lighting focused towards watercourses or boundary habitats and focusing lights downwards will be utilised to minimise light spillage. • If bats are recorded by the bat specialist within any trees no works will proceed without a relevant derogation licence from the NPWS. <p>As noted in 7.5.1.5, lighting mitigation measures will follow Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers (Bat Conservation Ireland, 2010).</p> <p>All mitigation measures including detailed method statements will be agreed with the NPWS prior to commencement of works, which could affect any bat populations onsite.</p>		

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Construction	Otter.	Medium	Disturbance/ displacement	Not significant	<p>No signs of Otter or Otter holts were noted within 150 m of the Proposed Development site. Although Otter were recorded along the Ralappane Stream and to the west of the Proposed Development site. A detailed pre-construction survey will be carried out no more than 10-12 months prior to the commencement of construction works to confirm the absence of Otter holts within 150 m of the site.</p> <p>If Otter holts are recorded at that time, the ECoW will determine the appropriate means of minimising effects i.e. avoidance, moving works, timing of works etc. If required the ecologist will obtain a derogation licence from the NPWS, to facilitate licenced exclusion from the breeding or resting site in accordance with a plan approved by the NPWS.</p> <p>Any holts found to be present will be subject to monitoring and mitigation as set out in the NRA publication Guidelines for the Treatment of Otter prior to the Construction of National Road Schemes (2008). If found to be inactive, exclusion of holts may be carried out during any season. No wheeled or tracked vehicles (of any kind) will be used within 20 m of active, but non-breeding, Otter holts. Light work, such as digging by hand or scrub clearance will also not take place within 15 m of such holts, except under licence. The prohibited working area associated with Otter holts will be fenced and appropriate signage erected. Where breeding females and cubs are present no evacuation procedures of any kind will be undertaken until after the Otters have left the holt, as determined by the ECoW. Breeding may take place at any season, so activity at a holt must be adjudged on a case-by-case basis. On occasion, Otter holts may be directly affected by the scheme. To ensure the welfare of Otters, they must be evacuated from any holts present prior to any construction works commencing. The exclusion process, if required,</p>	Not significant	Chapter 07B – Terrestrial Ecology

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					involves the installation of one-way gates on the entrances to the holt and a monitoring period of 21 days to ensure the Otters have left the holt prior to removal.		
Construction	Common Frog.	Medium	Habitat loss/ mortality/ injury	Moderate	A visual search of the wet grassland habitat to be removed will be carried out in the days prior to commencement of development and any frogs will be removed to alternative wet grassland habitat elsewhere within the landholding. This will be carried out under licence from the NPWS.	Not significant	Chapter 07B – Terrestrial Ecology
Construction	Birds.	Medium	Mortality or injury, Disturbance / displacement Direct loss of breeding/ foraging habitat	Not significant to moderate	As noted in Section 7.75.1.6, where possible, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided. This will also minimise the potential disturbance of breeding birds outside of the Proposed Development site boundary. As a biodiversity enhancement measure ten bird nesting boxes (various types) will be located within the Proposed Development site boundary at locations specified by the ECoW. It is noted that provision of woodland planting and the use of more diverse grassland planting will provide additional nesting and feeding sites for birds, particularly as these habitats mature. A detailed method statement will be drawn up by the ECoW and agreed with the NPWS prior to commencement of works. The method statement will specify the timing of blasting operations and the need, if any, for ecological supervision. As noted in Chapter 07A Section 7.7.2 a soft-start will be required for piling works or any source, including equipment testing, exceeding 170 dB re: 1 µPa @1 m an appropriate ramp-up procedure (i.e. 'soft-start')	Not significant	Chapter 07B – Terrestrial Ecology

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					must be used. This should be a minimum of 20 minutes and no longer than 40 minutes.		
Construction	Biodiversity and landscaping	Low		Slight positive	<p>Details of the landscaping plan for the Proposed Development are included in Figure F2-4 in Volume 3. This includes detailed areas of native woodland and native scrub habitat as well as native grassland planting.</p> <p>The woodland planting mix will be dominated by native species including Scots Pine <i>Pinus sylvestris</i>, Willow, Pedunculate Oak <i>Quercus robur</i> and Sessile Oak <i>Quercus petraea</i>, Alder, Rowan <i>Sorbus</i> spp. and Crab Apple <i>Malus</i> spp. The woodland edge planting mix will include Hazel <i>Corylus</i> spp., Hawthorn, Blackthorn, Elder <i>Sambucus</i> spp. and Holly <i>Ilex</i> spp. The objective of these elements is to create natural, multi-layered woodland habitat which will be of local ecological value and has the potential to support native flora and fauna. A linear strip of woodland along the southern boundary will help to maintain connectivity (east to west) between habitats in the wider landscape.</p> <p>Additional native specimen trees (Willow, Wild Cherry <i>Prunus avium</i>, Rowan, Whitebeam <i>Sorbus subg. Aria</i> and Silver Birch) will be planted on peripheral areas such as the road edge and administration area.</p> <p>As detailed in Figure F2-4 in Volume 3 a native wildflower/ grass mix will be utilised to provide a more diverse sward which is of higher ecological value for invertebrates and birds. Perennial Rye Grass or other vigorous amenity/ agricultural grass species will not be utilised as they tend to over-dominate the sward and reduce overall biodiversity. The final grassland/ wildflower mix for same will be specified by the ECoW based on final ground conditions including alkalinity, fertility and moisture levels.</p>	Slight positive	Chapter 07B – Terrestrial Ecology

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					<p>Based on the seed mix utilised and on prevailing ground conditions, the ECoW will specify the management regime, including weed control and mowing regime, necessary to maximise biodiversity and habitat value.</p> <p>Five insect nesting boxes suitable for Hymenoptera spp. (bees and wasps) will be put in place within the site boundary as a biodiversity enhancement measure.</p>		
Construction	Invasive species	Slight		Not significant	<p>Prior to the commencement of construction works invasive species survey will be undertaken within the Proposed Development boundary by a competent ecologist to determine if invasive species listed under Part 1 of the Third Schedule of S.I No. 477 of 2011 have established in the area in the period between pre-planning and post consent. In the event that invasive species are identified within the works area a site-specific Invasive Species Management Plan will be developed and implemented by a competent specialist on behalf of the Contractor. In addition, in order to comply with Regulations 49 and 50 of the European Communities (Birds and Natural Habitat) Regulations (2011) the appointed Contractor will ensure biosecurity measures are implemented throughout the construction phase to ensure the introduction and translocation of invasive species is prevented. The appointed ECoW will carry out a toolbox talk which will identify invasive species and will also implement biosecurity measures such as the visual inspection of vehicles for evidence of attached plant or animal material prior to entering and leaving the works area.</p>	Not significant	Chapter 07B – Terrestrial Ecology
Operation	General.	Medium	Displacement/ disturbance	Slight	<p>During the operational phase the site environmental management system will address management of potentially contaminating materials such as fuel, lubricating oils, solvent, etc. and ensure such material</p>	Not significant	Chapter 07B – Terrestrial Ecology

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					<p>is appropriately controlled, in accordance with regulatory requirements and industry best practice.</p> <p>The drainage design for the Power Plant will consider the magnitude of the changes in infiltration and runoff characteristics and the significance of potential impacts at the wetland. Further details on operational water management are included in Chapter 06 – Water.</p> <p>Lighting shall be provided in plant areas where safe access and safe conditions for work activities is required at night. Lighting will also be required on the water around the jetty dock to detect spillage and possibly unauthorized craft. The onshore receiving facilities would have area lighting installed on a down angle to cover the LNG Terminal and Power Plant. The terminals will have a level of lighting sufficient to ensure that all ship/ shore interfaces activities can be safely conducted during periods of darkness. Lighting levels will meet national and international engineering standards as a minimum.</p> <p>The principal mitigation measures required for the development in relation to noise concern selection of equipment, sound containment, and acoustic attenuators, in order to achieve the required limits. The predicted noise levels, as outlined in Chapter 09 – Airborne Noise and Groundborne Vibration are considered to be readily technically achievable using standard methods.</p>		
Construction	Dust.	High	Negligible	Slight	<p>Standard practice dust mitigation measures as recommended by the Institute of Air Quality Management and listed in Section 8.6.1 (excluding those that are not practical for this site) and the section 9.2.9 of the OCEMP. These include, but are not limited to:</p> <ul style="list-style-type: none"> • Production of and adherence to a site-specific dust minimisation control plan (AKA Dust Management 	Negligible	Chapter 08 – Air Quality

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					<p>Plan), setting out the control measures to implemented across the site and associated procedures; and</p> <ul style="list-style-type: none"> A proportionate level of dust monitoring relative to the risk of dust impacts, to ascertain the effectiveness of measures included with in the OCEMP and dust minimisation control plan. <p>Dust deposition monitoring will be in place during construction. This could include passive dust deposition monitoring at potential locations shown on Figure 8-5 in Chapter 08 - Air Quality.</p>		
Operation	Site and road traffic emissions.	High	Negligible to Moderate	Negligible to slight adverse	<p>Design embedded mitigation measures including:</p> <ul style="list-style-type: none"> Emission release heights for the largest and most frequent sources of emissions to air have been designed to encourage good dispersion, through height above ground level and height above nearby buildings and structures; The layout of the onshore site maximises distance between the main continuous sources of emissions to air and the nearest air quality sensitive receptors; The layout of the offshore site also provides a good setback distance between sources of emissions to air and the nearest air quality sensitive receptors; Whilst the air quality assessment has assumed continuous operation of the Power Plant throughout the year, in reality the CCGT plant will only operate for the energy demand required at the time; The majority of plant and all continuous and frequently operational plant will be fuelled by natural gas. Liquid fuel will only be used for start-up, maintenance and emergency purposes; and 	Negligible to slight adverse ¹	Chapter 08 – Air Quality

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					<ul style="list-style-type: none"> Start-up and emergency plant will only operate with use of low and ultra-low sulphur liquid fuel. 		
Construction	Construction noise.	Sensitive	Negative	Significant	<p>Scheduling of works such that noisy activities do not occur between 1300- and 1400 on Saturdays, and to comply with noise limits and criteria set out in Chapter 09 during weekdays.</p> <p>Fixed and semi-fixed ancillary plant will be located away from sensitive receptors wherever possible.</p> <p>All plant shall be regularly maintained and shut down when not in use.</p> <p>Approximately three to four long term noise monitoring stations and one to two long term vibration monitors will be set up on the construction site boundary.</p>	Not Significant	Chapter 09 – Airborne Noise and Groundborne Vibration
Construction	Construction vibration.	Sensitive	Neutral	Imperceptible	None required. See below for mitigation measures associated with blasting.	Imperceptible	Chapter 09 – Airborne Noise and Groundborne Vibration
Construction	Construction traffic noise on existing roads.	Sensitive	Negative	Significant	Construction traffic from this and other concurrent development will be coordinated to minimise traffic and site noise impacts where possible.	Significant	Chapter 09 – Airborne Noise and Groundborne Vibration
Construction	Blasting induced noise/ air overpressure.	Sensitive	Negative	Significant	<p>Process management and community liaison including a dedicated Public Liaison Officer. A protocol for community relations with regards to blasting will be adopted such that prior warning of blasting operations is given to members of the public. All noise complaints will be logged and followed up in a prompt fashion by the Liaison Officer.</p> <p>Only single blasts will take place in each event and monitoring will be in place as described in Chapter 09.</p>	Not Significant	Chapter 09 – Airborne Noise and Groundborne Vibration
Construction	Blasting induced vibration.	Sensitive	Negative	Significant	Limiting of Maximum Instantaneous Charge (MIC). It is noted there may be blasting charge limits imposed as a result of the underwater acoustic assessment. If	Not Significant	Chapter 09 – Airborne Noise and

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					these limits differ, the more stringent limit of the two will be adopted.		Groundborne Vibration
Operational	Operational noise.	Sensitive	Negative	Significant	<p>Various forms of mitigation (inc. silencers, plant selection, relocation, barriers enclosures) as detailed in the relevant chapter.</p> <p>Long term monitoring will be undertaken for a period of at least 12 months from the commencement of site operations and again following any subsequent substantive change in site operations. After 12 months the need for long term monitoring will be reviewed with the relevant authority.</p> <p>Short term measurements will take place at the commencement of site operations and again following any subsequent substantive change in site operations. They will then be repeated no less than once a year.</p>	Not Significant	Chapter 09 – Airborne Noise and Groundborne Vibration
Operational	Operational traffic noise on existing roads.	Sensitive	Negative	Not Significant	Best practice measures will be adhered to during operation, including avoiding vehicle idling and adhering to speed limits on internal roads.	Not Significant	Chapter 09 – Airborne Noise and Groundborne Vibration
Construction	Changes to the baseline landscape and views.	Sensitive	Negative	Significant	<p>Visual mitigation measures at construction include the following:</p> <ul style="list-style-type: none"> • Existing tree protection measures during construction shall be carried out in accordance with BS 5837:2012; • Minimise external lighting related to construction works; and • Regular cleaning or public roads to remove any track out and to reduce temporary effects on visual amenity. 	Moderate	Chapter 10 – Landscape and Visual
Operational	Alteration of a view from a viewpoint/ cumulative effective of	Sensitive	Negative	Very Significant	Landscape mitigation measures have been developed in order to screen the lower sections of the proposed range of buildings and the proposed access road to help the integration into the landscape.	Moderate	Chapter 10 – Landscape and Visual

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	planned development on landscape.				Planting of Ash (<i>Fraxinus elcelsior</i>) is currently prohibited. Plants selected for the landscape treatments will be similar to those found in the existing landscape and appropriate to the local soil types and climatic conditions. These details will be further developed at detailed design.		
Construction	Increased construction traffic flows on the road network resulting in a reduction of the junction capacity and increase to queuing at the junctions.	Low	Negative	Slight	Prior to the construction phase, a section of L1010 is to be upgraded by KCC with the only access to the site to be by way of a new vehicular priority junction off the L1010. The main construction works will start after the L1010 upgrades have been completed. A Construction Traffic Management Plan (CTMP) will be prepared by the appointed contractor and will be agreed in writing with KCC roads department. An outline CTMP has been included within this application Based on the information provided by Sisk, the construction traffic times will be agreed with KCC in advance to avoid coinciding with the peak time associated with Tarbert Comprehensive School.	Slight	Chapter 11 – Traffic and Transport
Operational	Increased operational traffic flows on the road network resulting in a reduction of the junction capacity and increase to queuing at the junctions.	Low	Neutral	Not significant	Junction Analysis undertaken demonstrating existing network has ample capacity for Proposed Development.	Imperceptible	Chapter 11 – Traffic and Transport

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Operational	Potential overspill of car park.	Low	Neutral	Not significant	Car parking provided for the proposed land uses will be agreed with KCC.	Imperceptible	Chapter 11 – Traffic and Transport
Operational	Increased public transport patronage associated with the Proposed Development.	Low	Neutral	Imperceptible	None	Imperceptible	Chapter 11 – Traffic and Transport
Operational	Increased pedestrian movement on the local road network.	Low	Neutral	Imperceptible	None	Imperceptible	Chapter 11 – Traffic and Transport
Operational	Increased cycle movement on local road network.	Low	Neutral	Imperceptible	None	Imperceptible	Chapter 11 – Traffic and Transport
Construction	CHS 4 farm complex/ destruction through groundworks.	Low	Very high	Significant	This asset has already been subject to recording in the form of upstanding building survey to satisfy the condition upon Planning Permission (Condition 32 C 08.PA0002). While this asset would be significantly impacted by the Proposed Development, no further mitigation is required.	Moderate	Chapter 12 – Cultural Heritage
Construction	CHS 5 possible archaeological feature/ destruction through groundworks.	Low	Very high	Significant	Full resolution of all archaeological sites and areas identified during archaeological testing within the scheme boundary would be carried out at the pre-construction phase. All archaeological works (which would be agreed by the Archaeological Consultant and the NMS) would be carried out in compliance with the National Monuments Acts 1930 – 2004 (and Policy and Guidelines on Archaeological Excavation	Moderate	Chapter 12 – Cultural Heritage

Proposed Development Stage	Aspect/ Impact Assessed	Existing Environment/ Receptor Sensitivity	Effect/ Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the OCEMP)	Residual Impact Significance	EIAR Chapter Reference
					(Department of Arts, Heritage Gaeltacht and the Islands, 1999).		
Construction	CHS 6 Well/ destruction through groundworks.	Low	Very high	Significant	It is recommended that a photographic survey and written description of CH6 Well be carried out in advance of groundworks within the vicinity of this asset. It is also recommended that the dismantling of the well be carried out in an orderly fashion under the supervision of a suitably qualified archaeologist.	Moderate	Chapter 12 – Cultural Heritage
Construction	CHS 7 Gun Emplacement/ destruction through groundworks.	Low	Very high	Significant	This asset has already been subject to recording in the form of upstanding building survey to satisfy the condition upon Planning Permission (Condition 32 C 08.PA0002). While this asset will be significantly impacted by the Proposed Development, no further mitigation is required.	Moderate	Chapter 12 – Cultural Heritage
Construction	CHS 15 Well/ destruction through groundworks.	Low	Very high	Significant	This asset has already been subject to recording in the form of upstanding building survey to satisfy the condition upon Planning Permission (Condition 32 C 08.PA0002). While this asset will be significantly impacted by the Proposed Development, no further mitigation is required.	Moderate	Chapter 12 – Cultural Heritage
Construction	Known areas of archaeological potential/ destruction through groundworks.	Low	Very high	Significant	Full resolution of all archaeological sites and areas identified during archaeological testing within the scheme boundary will be carried out at the pre-construction phase. All archaeological works (which will be agreed by the Archaeological Consultant and the NMS) will be carried out in compliance with the National Monuments Acts 1930 – 2004 (and Policy and Guidelines on Archaeological Excavation (Department of Arts, Heritage Gaeltacht and the Islands, 1999).	Moderate	Chapter 12 – Cultural Heritage
Construction	Previously unknown archaeological features/	Low	Very High	Significant	A General Watching Brief (GWB) will be carried out for ground works by a suitably qualified archaeologist in compliance with the National Monuments Acts 1930 – 2004 (and Policy and Guidelines on Archaeological	Moderate	Chapter 12 – Cultural Heritage

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	destruction through groundworks.				Excavation (Department of Arts, Heritage Gaeltacht and the Islands, 1999).		
Construction	CH10 Ringfort (KE003-004).	Low	Very High	Significant	Embedded mitigation in design comprising a buffer zone established around the asset to preserve in situ. The buffer zone will be defined by a permanent fence line.	No effect	Chapter 12 – Cultural Heritage
Construction	Anomaly identified during marine geophysical survey.	Low	Low	Low	Asset is located over 200 m from the Proposed Development construction works. Embedded mitigation in design comprising a 50 m buffer zone established around the asset to prevent incursion during construction.	No effect	Chapter 12 – Cultural Heritage
Construction	Land Use – negative impacts due to loss of agricultural grazing land and on views from Wild Atlantic Way	Low	Slight	Slight	Mitigation and monitoring measures relating to visual impacts are detailed in Chapter 10 – Landscape and Visual Impacts.	Slight	Chapter 13 – Population and Human Health
Construction	Severance.	N/A	Negligible	Imperceptible	Mitigation and monitoring measures relating to construction traffic (e.g. relating to traffic routing) are to be detailed in the Construction Traffic Management Plan prepared by the appointed contractor.	Imperceptible	Chapter 13 – Population and Human Health
Construction	Employment.	N/A	Moderate	Moderate	None required	Moderate	Chapter 13 – Population and Human Health
Construction	Human Health – negative nuisance and noise impacts due to the	N/A	N/A	N/A	Mitigation and monitoring measures are detailed in Chapter 09 – Airbourne Noise and Groundbourne Vibration, Section 9.8.1.	N/A	Chapter 13 – Population and Human Health

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	presence of construction traffic.						
Construction	Human health – positive employment and training impacts.	N/A	N/A	N/A	Ensure opportunities are provided to the local workforce, to increase the Proposed Development's local impact. See Section 2.12 of Chapter 02 – Project Description.	N/A	Chapter 13 – Population and Human Health
Operation	Land Use – negative impacts due to loss of agricultural grazing land and on views from Wild Atlantic Way	Low	Slight	Slight	Mitigation and monitoring measures relating to visual impacts are detailed in Chapter 10 – Landscape and Visual Impacts.	Slight	Chapter 13 – Population and Human Health
Operation	Employment.	N/A	Slight	Slight	None required.	Slight	Chapter 13 – Population and Human Health
Operation	Human health – positive employment and training impacts.	N/A	N/A	N/A	Ensure opportunities are provided to the local workforce, to increase the Proposed Development's local impact.	N/A	Chapter 13 – Population and Human Health
Operation	Human health – generation of GHGs leading to climate change.	N/A	N/A	N/A	Embedded mitigation measures to reduce GHG emissions are set out in Chapter 15 – Climate, Section 15.9.	N/A	Chapter 13 – Population and Human Health

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Operation	Fires following the accidental release of LNG or natural gas into the receiving environment.	Low	Very High	Significant	<p>The key preventative and mitigating measures to prevent major accidents and disasters, are summarised as follows:</p> <ul style="list-style-type: none"> • No LNG storage tanks will be installed onshore, minimising the inventory of LNG; • The natural gas pipelines will have integral isolation valves which can be closed very quickly in an emergency to isolate the inventory and reduce the consequences of an accident; • The FSRU can be safely disconnected from the jetty in the event of adverse weather conditions such as storms; • Fires are the most significant hazards associated with natural gas and therefore the inventory has been minimised to store as little flammable material as possible at the onshore site; • Appropriate segregation distances will be provided onshore between the natural gas systems and other operators, including the Power Plant; and • In the event of a release of LNG, rapid vaporisation and dispersion will result in very limited potential for this material to enter environmental receptors, such as the protected areas encompassing the estuaries, mudflats and other features along the coast. 	Minor adverse	Chapter 14 – Major Accidents and Disasters
Construction	GHG emissions.	High		Minor adverse	<ul style="list-style-type: none"> • Development and implementation of the OCEMP, where measures to reduce GHG emissions are detailed; • Encouragement of green transport options for commuting, installation of energy efficient measures and engage the supply chain to reduce the number of vehicle movements relating to site material. <p>Waste management plan:</p>	Minor adverse	Chapter 15 – Climate

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					<ul style="list-style-type: none"> Maximising reuse and recycling of waste, i.e. reuse of excavated soil where possible; and Using locally sourced materials, using Ground Granulated Blast Furnace See Section 2.4.1 of Chapter 02 – Project Description. 		
Construction	In-combination climate change Impacts.	Not assessed/ Not applicable		Not assessed- No Significance	<ul style="list-style-type: none"> Development and implementation of the OCEMP, where measures to reduce impacts to sensitive receptors are detailed; Undertaking construction works with all legal, regulatory and licence conditions. See Section 2.4.1 of Chapter 02 – Project Description. 	Not assessed – No Significance	Chapter 15 – Climate
Construction	Climate change resilience.	Not assessed/ Not applicable		Not assessed- No Significance	<ul style="list-style-type: none"> Development and implementation of the OCEMP, where measures to protect construction assets and materials are detailed; Ensure an outline emergency response plan and procedure for environmental incidents such as flooding or storms are in place; Storage of topsoil and other construction materials to protect against high rainfall and flooding events, or sea level rise; Suitable storage and bunding of pollutants to protect from high rainfall events or sea level rise; Laydown and welfare areas will be laid with permeable membranes to protect the Proposed Development site from high rainfall and flooding events or sea level rise; and Undertaking construction works within all legal, regulatory and licence conditions. 	Not assessed – No Significance	Chapter 15 – Climate
Operational	GHG emissions.	High	<ul style="list-style-type: none"> The Proposed Development will diversify 	Major adverse	<ul style="list-style-type: none"> Expected reduced operating hours over the life of the Power Plant; Only 2 of 3 generators (CTG1, CTG2, & CTG3) will be in operation at any point in time; 	Major adverse	Chapter 15 – Climate

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			<p>the supply of natural gas and electricity to the Irish market. It does not in itself increase demand for natural gas or electricity.</p>	<ul style="list-style-type: none"> As the use of coal and peat for electricity generation will cease by 2025 under the 2019 Climate Action Plan, natural gas has been identified in the Climate Action Plan, and the National Energy and Climate Plan, as the only remaining dispatchable power source 	<ul style="list-style-type: none"> Diesel Firewater Pump is operated in emergency only and will not be running during normal operations; Black Start Diesel Generator used for initial start-up only and would not be running during normal operations; Auxiliary Boiler is only operated when all CTG/ HRSG Trains are not in operation to facilitate a unit start; The Proposed Development will operate in the EU ETS scheme, with an EU-wide cap currently reducing by 2.2% annually. Sufficient allowances to cover an installation's annual emissions must be surrendered each year. Power generators are not eligible for any free allocation of allowances, so all allowances to cover the direct emissions from the Proposed Development must be purchased at auction; In a 'business as usual' scenario, where the Proposed Development is not progressed, this demand would be met by alternative, and potentially more carbon intensive power suppliers; The efficiency of the Power Plant combined with its ability to operate at a low minimum generation capacity means that the Power Plant will be dispatched ahead of a less efficient OCGT power plant as it will provide lower direct emissions; The proposed Power Plant will not operate at 100% capacity all year round; As the level of renewable generation on the system at any one time increases, thermal power plant has their dispatch quantities decreased by EirGrid to facilitate the output of the renewable power plants. However, a certain number of dispatchable plants must remain on the system to 		

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			capable of providing significant security of electricity supply when wind sources are insufficient.		<p>provide the services mentioned above. 'Positioning' is when the grid operator keeps a power plant running so as to be on standby to provide these services to the grid operators in real time. This is a vital process for grid stability; however, with inflexible power plants it can lead to larger than necessary power plants being positioned. This causes increased emissions, increased curtailment of renewables (to make room for the positioned Power Plant) and increased costs;</p> <ul style="list-style-type: none"> • The ability of the Power Plant to operate at a 50% blend of hydrogen by design, offers the potential for the Power Plant to become even more efficient in emission terms over the period to 2050 as and when the required policies and supply chains for hydrogen are implemented; and • The Proposed Development has a unique location and flexible design that can easily transition to alternative low carbon fuels, subject to future planning applications once the technology and public policies are established. • See Section 2.4.1 of Chapter 02 – Project Description. 		
Operational	In-combination climate change impacts.	Assessed by other disciplines		No significance	<ul style="list-style-type: none"> • Detailed within other discipline assessments; and • Undertaking operations within all legal, regulatory and licence conditions. • See Section 2.4.2 of Chapter 02 – Project Description. 	No significance	Chapter 15 – Climate
Operational	Climate change resilience.	Not assessed/ Not applicable		No significance	<ul style="list-style-type: none"> • Electrical connections will be buried underground, insulating against overheating in times of heatwaves; • The Proposed Development will be designed with any specific drainage terms and conditions of the IE licensed, as determined by the EPA and 	No significance	Chapter 15 – Climate

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					<p>associated planning conditions, to protect again high rainfall events or sea level rise; and</p> <ul style="list-style-type: none"> • Undertaking operations with all legal, regulatory and licence conditions. • See Section 2.4.2 of Chapter 02 – Project Description. 		
Construction	Non-hazardous waste.	Waste facility	N/A	Slight	The following best practice measures would be implemented to manage the CDW produced by the Proposed Development:	Slight	Chapter 16 – Waste
Construction	CDW waste arisings.	Waste facility	N/A	Not Significant	<ul style="list-style-type: none"> • EU, National and Irish policy and legislation require the waste hierarchy (Figure 16-1) to be applied to all waste arisings. Widely implemented best practice is to adopt a Site Waste Management Plan (SWMP) to reduce the amount of waste generated and follow the waste hierarchy in for far as practicable. A SWMP would be developed and implemented for the Proposed Development and include the following details: 	Not Significant	Chapter 16 – Waste
Operation	Ballast water.	Shannon Estuary and waste facilities	N/A	Not Significant		Not Significant	Chapter 16 – Waste
Operation	Non-hazardous and hazardous waste.	Waste facility	N/A	Not Significant	<ul style="list-style-type: none"> – Statutory requirements, the Applicant's corporate requirements and mitigation and monitoring measures defined within this EIAR where applicable to waste management; – Waste types and procedures for classification, segregation, containment, storage, transportation and disposal. This would include details on the measures to prevent impacts to the receiving environment. The Contractor would apply the principles of the 'Waste Hierarchy' (Prevention, Preparing for Re-use, Recycling, Other Recovery, Disposal) to minimise waste generation, maximise re-use of site-won materials onsite and minimise the need for disposal of waste. Where re-use is not possible onsite, alternative re-use and 	Not Significant	Chapter 16 – Waste

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					<p>recycling options would be sought offsite with the final disposal option;</p> <ul style="list-style-type: none"> ▪ Roles and responsibilities; ▪ Training requirements; ▪ Waste handling procedures; ▪ Waste compound maintenance measures; ▪ Emergency planning and response; ▪ Monitoring, reporting and document control procedures; and ▪ Corrective action process. <ul style="list-style-type: none"> • As part of the document control procedures, a comprehensive docketing system (including waste transfer notes) would be detailed in the SWMP. The documentation to be maintained in relation to waste material removed from the site will include the following: <ul style="list-style-type: none"> – The names of the agent(s) and the transporter(s) of the wastes; – The name(s) of the person(s) responsible for the ultimate treatment of the wastes; – The ultimate destination(s) of the wastes; – Written confirmation of the acceptance and treatment of the hazardous waste consignments; – The tonnages and List of Wastes (LoW) code for the waste materials; – Details of each individual consignment dispatched from the Proposed Development site; <ul style="list-style-type: none"> ▪ Description of waste (cell number/ AEC number, stockpile number or origin of waste) ▪ Date and time of dispatch from the Proposed Development site 		

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					<ul style="list-style-type: none"> ▪ Name of haulage company ▪ Details of contractor and haulier docket numbers ▪ Vehicle registration number and driver name ▪ Volume/ weight of waste removed ▪ Name of waste receiving facility ▪ Date and time of arrival at waste receiving facility – Details of any rejected consignments; – Waste transfer forms for hazardous wastes transferred from the Proposed Development site (stamped at receiving facility); and – The transfrontier shipment of waste forms (where exported). <p>The SWMP would include procedures for monitoring the overall CDW recovery rate.</p> <p>Ballast water will be dealt with in line with the IMO ballast water management convention (see also Chapter 07 Biodiversity).</p>		

¹ Moderate adverse impact predicted at 2 of 48 air quality sensitive receptors. At those 2 locations, there is no risk of an exceedance of an air quality standard or Environmental Assessment Level.

