Poolbeg Industrial Emissions Licence Review

Electricity Supply Board

Attachment-1-2-Non-Technical Summary

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1 Introduction

Poolbeg installation is situated on the mouth of Dublin Harbour on land that was reclaimed from the sea during the 1960s. The site has a long tradition in the generation of electricity and includes the Poolbeg thermal generating station which operated from the early 70's until the 510 MW station ceased operation on 31st March 2010.

ESB is proposing to develop a 299 MWe nominal capacity F-Class Open Cycle Gas Turbine (OCGT) generating plant at the installation. The key components of the electrical system will be designed for a maximum export load of 297 MW net output (299 MW gross power generation) and will not be rated to exceed this amount. The purpose of the OCGT unit is to provide additional generating capacity during periods of high demand or when weather conditions mean renewable sources cannot meet demand.

Currently, at the site, ESB operates a combined cycle gas turbine (CCGT) plant which has a combined electricity generating capacity of 480 MWe. The CCGT plant is made up of two gas turbines of 155 MWe each, and a steam turbine of 170 MWe. In cold air conditions the CCGT output can rise to 510 MWe.

A 65 MWe (megawatts electrical) of flexible thermal generation ("Poolbeg Flexgen") and a 75 MW Battery Energy Storage System ("Poolbeg BESS") are currently under construction at the installation, both of which are authorised to operate under the existing licence (P0577-04).

The three generating plants (CCGT, FlexGen and OCGT) will be fired on natural gas supplied from the national gas network or on gas oil supplied by the National Oil Reserves Agency (NORA) from a tank farm, outside the licensed boundary, situated to the east of the CCGT. Gas oil is required as an emergency back-up fuel in accordance with the secondary fuel requirements of the Commission for Regulation of Utilities (CRU).

ESB was originally granted a licence (Reg. No. P0577-01) in April 2002 by the Environmental Protection Agency (EPA) for the installation located at ESB Poolbeg Generating Station, Pigeon House Road, Ringsend, Dublin 4. The licence has been revised on three occasions, with the most recent revision (P0577-04) issued on 26th September 2022.

There are currently 32 employees at the site. Environmental management is fully integrated into all aspects of management at the station. Poolbeg established a formal Environmental Management System in 1996 which was certified to ISO 14001 in 1999 and has been continually certified since then.

2 Purpose of the Proposed Development

The first EU Renewable Energy Directive (2001/77/EC) on the 'Promotion of electricity produced from renewable energy sources in the internal electricity market' was adopted in 2001. This was replaced with the Renewables Directive (2009/28/EC) which has the following two key targets:

- A reduction of 20% in greenhouse gases by 2020 (below 1990 levels); and
- 20% of the total EU energy (electricity, heat and fuel) consumption to come from renewable sources by 2020.

In 2014, the European Commission's, 'A policy framework for climate and energy in the period from 2020 to 2030', established a framework for future EU energy and climate policies and promoted a common understanding of how to develop those policies after 2020. The Commission proposed that the EU 2030 target for the share of renewable energy consumed in its Member States should be at least 27%.

The 2015 Paris Agreement, as well as technological developments, led to the recast Renewable Energy Directive 2018/2001 (known as RED II). RED II established a binding target of at least 32% of renewable energy for the EU by 2030.

On 29th September 2021, the CRU published a programme of work to increase generation capacity to provide additional stability and resilience to the Irish energy system over the next four or five years. This programme of work was in response to EirGrid's identification of a potential capacity shortfall, if no action is taken, for the following winter periods of 2021/22 to 2025/26, which was set out in EirGrid's updated All Island Generation Capacity Statement 2021. Several key actions were set out in the programme inter alia:

The delivery, through the all -island capacity auctions of over 2,000 MW of enduring flexible gas-fired generation capacity by 2030, to provide for growing demand, replace retiring generators, and support additional penetration of renewables in order to meet our 2030 policy goals. And the development of a policy statement to underpin this capacity.

On 29th June 2022, the CRU published an update on the progress of the programme of work. The T-4 26/27 auction will seek to deliver additional capacity in advance of Winter 26/27 and potentially incentivise the early delivery of existing projects in development.

In May 2022, the EC published its REPowerEU Plan (COM/2022/230) that sets its objectives as "*ending the EU's dependence on Russian fossil fuels*", "*tackling the climate crisis*" and "*securing the long-term sustainability, cost effectiveness, and energy supply to the EU*". The key goals in the REPowerEU Plan include:

- diversifying energy imports;
- accelerating a transition from fossil fuels to clean energy;
- saving energy through higher efficiency;
- smart investment; and
- reinforcing preparedness.

The Commission remarked that considerable challenges are ahead with such ambitions. One of which is associated with permitting and planning issues. The Commission places

emphasis on streamlining permitting processes and recognises the need to "*tackle slow and complex permitting for major renewable projects*".

The purpose of the proposed Poolbeg OCGT is to provide additional generating capacity during periods of high demand or when weather conditions mean that renewable energy sources cannot meet demand. This type of power plant is designed to support renewables by operating when electricity demand is higher than average and will facilitate increased renewable energy technologies, such as solar, and wind energy by providing energy to the national electricity grid during periods when the energy available from the renewable technologies is insufficient.

3 Environmental Impact Assessment Report and Planning

A planning application for the Poolbeg OCGT development has been lodged with Dublin City Council (DCC); DCC planning reference no. 3137/23 (Attachment-6-3-3-Planning under consideration). The application was accompanied by an Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS). These reports are submitted as part of this application as following attachments:

- Attachment-6-3-6-NIS December 2022
- Attachment-6-3-1-1-EIAR December 2022_NTS
- Attachment-6-3-1-2-EIAR December 2022_Main
- Attachment-6-3-1-3-EIAR December 2022_Appendices

4 Class of Activity

The installation current operates in accordance with the conditions of the IE Licence (Reg. No. P0577-04), issued by the EPA. The site is currently licensed for the following activities set out in the First Schedule of the EPA Act 1992, as amended:

> **Class 2.1** - Combustion of fuels in installations with a total rated thermal input of 50 MW or more.

The categories as specified in Annex I of the IE Directive are as follows:

> **Category 1.1** - Combustion of fuels in installations with a total rated thermal input of 50 MW or more.

The class of activities remain the same with the addition of the proposed Poolbeg OCGT.

It is also noted that the Poolbeg Generating Station operates in accordance with its Greenhouse Gas (GHG) Emission Permit No. IE-GHG160-10425-2 as issued by the EPA. A review of the GHG permit to include the FlexGen plant is currently being processed by the EPA. A further revision, or a separate new permit, will be required for the proposed OCGT.

5 Best Available Techniques

The applicability and implementation of Best Available Techniques (BAT) listed within the Commission Implementing Decision (EU) 2021/2326 of 30 November 2021, establishing BAT conclusions for large combustions plants (LCP CID), under Directive 2010/75/EU of the European Parliament and of the Council, in relation to the proposed OCGT, is considered in Attachment-4-7-1-LCP. A review of the Poolbeg OCGT has been undertaken to determine the applicability of the horizontal Best Available Techniques Reference (BREF) documents. Full details of which are contained within the BREF attachments (Attachments-4-7-2-BREF). The relevant BREF documents are:

- Energy Efficiency (ENE) BREF (2009)
- Emissions from Storage (EFS) BREF (2006)
- Industrial Cooling Systems (ICS) BREF (2001)

6 Derogation under Section 86A(6) EPA Act 1992 as Amended

Derogation under Section 86A(6) is not being sought for Poolbeg Generating Station, which includes the proposed OCGT development.

7 Description of Activities at Poolbeg Generating Station

7.1 Proposed OCGT

7.1.1 Description of OCGT

The proposed OCGT consists of a gas turbine enclosure and generator enclosure being installed within a building. A simple schematic of the main process at the site is provided below (note: schematic drawing is not to scale and is for illustrative purposes only).

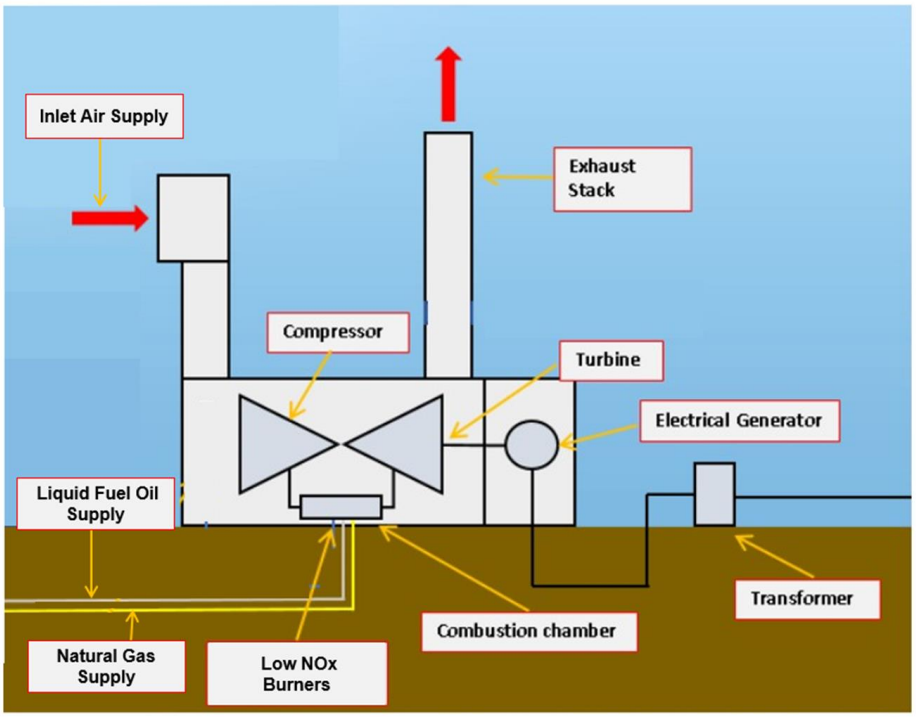

Figure 1: Schematic of Open Cycle Gas Turbine Unit

Poolbeg OCGT will normally be unmanned and will be remotely operated. Regular site visits and inspections will take place to ensure the plant is appropriately managed and maintained. It will contain a protection system and control system for operating the units along with a switchgear enclosure.

The electricity generated will be fed to the site transformer where the voltage is stepped up for transmission into the national grid. This transmission will be via connection to an existing 220 kV Substation within the Poolbeg Generating Station complex.

The OCGT will be available to operate 24-hours per day, seven days per week. However, the operational period for the plant will be non-continuous. It is expected the plant will operate during peak demand periods during the hours of the day when electrical demand is at its highest.

The 299 MWe OCGT development will generally comprise the following key elements:

- The compound (c. 2.5 hectare (ha) secure compound).
- One (1) F-Class OCGT generator in a packaged enclosure.
- Gas turbine generator auxiliaries, including a continuous emissions monitoring system (CEMS) hut, water wash cart, lube oil skid, fin fan coolers, liquid fuel forwarding skid, and fire suppression cabinet.
- One (1) exhaust stack with access ladders/stairways and platforms.
- Associated electrical infrastructure and modules including transformers and other plant.
- Control, Electrical and Building Services modules.

- Electrical connection at 220 kV to an existing ESB Substation within the ESB Poolbeg Generating Station complex.
- Connection to the existing Gas Networks Ireland (GNI) Above Ground Installation (AGI) located outside the licence boundary.
- Gas supply equipment.
- Water supply.
- Fire-fighting systems.
- Gas oil (diesel) treatment facility.
- Welfare and car parking facilities.
- All necessary ancillary works.

The key elements are the gas turbine package and the associated exhaust stack.

7.1.2 OCGT Process

Similar to FlexGen, the proposed OCGT will primarily use natural gas for combustion in a gas turbine that drives a generator to produce electricity. The gas turbine utilises the Brayton thermodynamic cycle, using air as the working fluid. Air at atmospheric pressure enters the gas turbine compressor and is compressed before fuel gas is then added to the combustor. The resulting flue gases are expanded across the turbine to drive the generator. The flue gases then exhaust directly (open cycle) to atmosphere via an exhaust stack. The electricity generated will be fed to the transformer where the voltage is stepped up for transmission into the national grid.

7.2 Licensed FlexGen

7.2.1 Description of FlexGen

Poolbeg FlexGen will normally be unmanned and will be remotely operated. Regular site visits and inspections will take place to ensure the plant is appropriately managed and maintained. It will contain a protection system and control system for operating the units along with a switchgear enclosure.

The electricity generated will be fed to the site transformer where the voltage is stepped up for transmission into the national grid. This transmission will be via connection to an existing 220 kV Substation located within the Poolbeg Generating Station site.

FlexGen will be available to operate 24-hours per day, seven days per week. However, the operational period for the plant will be non-continuous. It is expected the plant will operate during peak demand periods during the hours of the day when electrical demand is at its highest.

The 65 MWe FlexGen development will generally comprise the following key elements:

- The compound (c. 1.5 hectare (ha) secure compound).
- One (1) modular aero derivative gas turbine generator in a packaged enclosure.

- Gas turbine generator auxiliaries, including a continuous emissions monitoring system (CEMS) hut, water wash cart, lube oil skid, fin fan coolers, liquid fuel forwarding skid, water injection skid enclosure, and fire suppression cabinet.
- One (1) exhaust stack complete with integrated CO catalyst for emissions control and access ladders/stairways and platforms.
- Associated electrical infrastructure and modules including transformers and other plant.
- Control, Electrical and Building Services modules.
- Electrical connection to an existing 220 kV Substation within the Poolbeg Generating Station site.
- Connection to the existing Gas Networks Ireland (GNI) Above Ground Installation (AGI) located outside the licence boundary.
- Gas supply equipment.
- Water supply, storage and treatment.
- Fire-fighting systems.
- Liquid fuel storage day tank (gas oil) and treatment facility.
- Welfare and car parking facilities.
- All necessary ancillary works.

The key elements are the gas turbine package and the associated exhaust stack.

7.2.2 FlexGen Process

The primary process at Poolbeg FlexGen comprises the combustion of natural gas, in a modular aero derivative turbine, that drives a generator to produce electricity. It will operate with rapid start-up due to the absence of the steam cycle and can provide response capabilities in a timely fashion to support sudden fluctuations in electricity demand.

The aero derivative gas turbine utilises the Brayton cycle. Air at atmospheric pressure enters the compressor and is compressed before fuel gas is then added to the combustor. The resulting gases are expanded across the turbine to drive the generator.

A simple schematic of the main process at the site is provided below (note: schematic drawing is not to scale and is for illustrative purposes only).

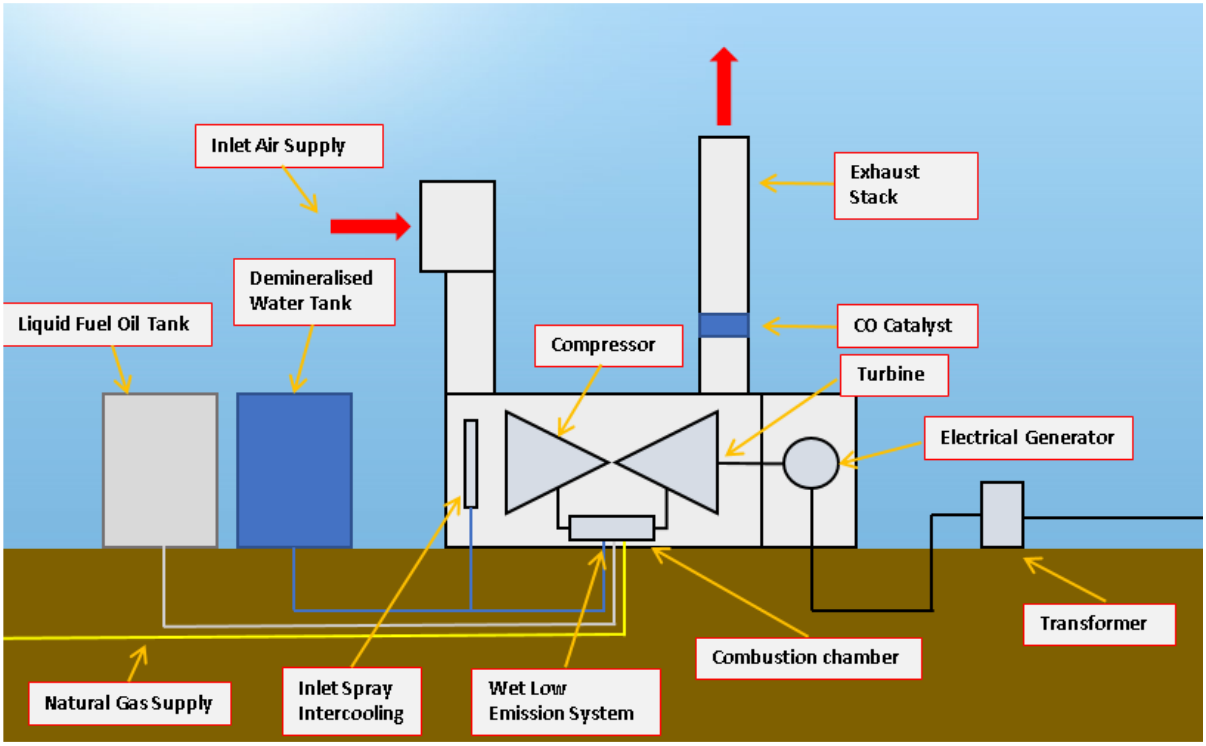

Figure 2: Schematic of FlexGen unit

7.3 Existing CCGT

7.3.1 Description of CCGT

Poolbeg CCGT station consists of a combined cycle generating plant made up of gas-turbine/heat-recovery-steam-generator/steam-turbine plant which can generate electricity 24 hours per day, 365 days per year, if available in combined cycle or open cycle mode.

Poolbeg CCGT runs as required by the National Grid and within the I-SEM (Integrated Single Electricity Market).

The main plant components consist of the following:

Two gas turbines	Two heat recovery steam generators
Oil and gas firing systems	Flue gas main and bypass chimneys
Water treatment plant	Chemical dosing system
Steam turbine and feedheaters	Condenser and cooling water system
Electrochlorination system	Auxiliary cooling systems
Extraction, boiler feed & circulating pumps	Three air-cooled generators

The total capacity of the combined cycle is 480 MW. The gas turbines can generate independently if needed (open cycle mode), having a capacity of 155 MW (x 2) each and the steam turbine has a capacity of 170 MW.

7.3.2 CCGT Process

Air is heated in the gas or oil-fired combustion chambers for use in the gas turbines to drive the electrical generators. This is the open cycle portion of the combined cycle.

Water is heated in the heat recovery steam generators (HRSGs) by the hot exhaust air/combustion gas from the gas turbines, to be turned to superheated steam for use in the steam turbine to drive another electrical generator. This is the closed cycle portion of the combined cycle.

Open Cycle

The air for combustion is drawn from the atmosphere and compressed to a very high pressure by a compressor driven directly by the gas turbine. The air is mixed with the fuel in the burners and ignited in the combustion chamber to produce a hot gaseous working fluid.

The high-pressure gas, produced in the combustion chamber, enters the gas turbine, where it is expanded by the heat energy it contains.

The expansion of the gas results in a reaction against the blades of the turbine, so converting the heat energy of the fluid to mechanical turning energy in the turbine shaft.

As a result, the turbine drives its air compressor and an air-cooled generator sending electrical power to the nation-wide transmission grid.

The fully expanded gas, though cooler than it was entering the gas turbine, is still at a high temperature. Ordinarily, it is sent to the heat recovery steam generator for further energy extraction, after which it is discharged at low temperature to the atmosphere. The gas carries away the unavailable, low-grade heat remaining in itself, which cannot be converted into high-grade electrical energy and discharges it to the atmosphere. In exceptional circumstances it may be discharged at an elevated temperature, directly to atmosphere without further energy extraction. This part of the system is an open circuit through which air passes to be heated, expanded and discharged back to the atmosphere.

The air and combustion gases constitute the medium by which chemical energy in the fuel, released by combustion with some of the air, is conveyed as heat energy to the gas turbine, where it is converted to mechanical energy to drive its own air compressor and the generator, which finally produces electrical energy.

Closed Cycle

This part of the combined cycle is essentially a boiler and steam-turbine plant. The water circulating in this closed steam cycle is raised to steam and superheated in the various stages of economiser, evaporator and superheater tubes in the HRSG, by the exchange of heat from the hot exhaust gases of the gas turbine. Steam temperature control is achieved by the injection of water between superheaters.

The exhaust gas, from which all useful heat has by then been extracted, is discharged to atmosphere under its own pressure and some small natural draught of the chimneys.

The steam, generated and superheated in the HRSG from water pumped in at high pressure, is piped to the steam turbine, where it is expanded by the heat energy it contains in the High Pressure and the Low-Pressure Cylinders of the turbine.

The expansion of the steam results in a reaction against the blades of the turbine, so converting the heat energy of the steam to mechanical turning energy in the turbine shaft. As a result, the turbine drives an air-cooled generator sending electrical power to the nation-wide transmission grid.

The fully expanded steam is condensed to water in the condenser at very low temperature and pressure by passing over cooling tubes through which water from the River Liffey is pumped. This cooling water (CW) absorbs and carries away the unavailable, low-grade heat remaining in the steam, which cannot be converted into high-grade electrical energy and discharges it to the estuary. The CW is treated with sodium hypochlorite, produced by electrochlorination to prevent marine growth in the condenser and associated cooling circuits.

The condensed process water is pumped by the extraction pump from the condenser to the low-pressure section of the boilers/HRSGs and to the feedwater tanks. From the feedwater tanks, it is pumped by boiler feed pumps to the high-pressure section of the boiler.

This part of the system is a closed circuit around which the water or steam circulates continuously, being heated expanded and cooled, with make-up water added to cater for leaks and system losses. The make-up is de-ionised water produced from mains water in the water treatment plant. It is conditioned with small amounts of chemicals to maintain steam/water cycle chemistry against corrosion and contamination of boiler and turbine surfaces.

The water and steam constitute the medium by which chemical energy in the fuel, released by combustion with air, is conveyed as heat energy to the steam turbine, where it is converted to mechanical energy to drive the generator, which finally produces electrical energy.

7.4 Battery Energy Storage System (BESS)

Battery Energy Storage System (BESS) does not generate energy. BESS is mostly used to provide fast acting short bursts of electricity into the system to offset system events such as failure of an overhead line or generation plant. Traditionally this system stability would be provided by a conventional large generation plant but with increasing renewable generation this stability can be helped by batteries. There is also the potential for batteries to charge up using cheap power at times of low demand and discharge electricity at peak demand times. BESS will be able to provide power for up to 2 hours. A commercial large-scale BESS operates in a similar manner to a standard rechargeable battery that would be found in a domestic appliance. As mentioned above, BESS will allow for increased renewable energy generation connecting onto the electricity grid. These systems will provide response capabilities to support the network and counteract the fluctuations in generation characteristic of technologies such as wind and solar power. Power will be imported, effectively ‘charging the battery’, during periods of excess capacity. The power is stored for future-use and discharged onto the grid during periods of excess customer demand.

The 75 MW BESS development is located in a secure BESS compound within the overall Poolbeg Generating Station (refer to site drawing Attachment-3-2-2-4 Plant and Equipment Map).

The BESS site including the required plant infrastructure, service connections and drainage services is approximately 5.3 Ha. To the north is the ‘South Wall’ of Dublin Bay and the Liffey estuary; to the south is an internal site road with an existing transformer building and

an area of open landscaped ground; to the east is the decommissioned Poolbeg Power Station and to the west is the disused Pigeon House Power Station.

The BESS site comprises the following key elements:

- Electrical cables and connections to existing substation infrastructure within the overall ESB Poolbeg Generating Station installation.
- BESS 'GEN6 – GRIDSTACK' cubes in 18 No. cores with associated battery inverters (up to 18 No.).
- Supporting electrical infrastructure including house transformer, auxiliary supply transformer, VAR support and other electrical plant items.
- Control building.
- Lighting mast, security camera and SCADA pole.
- 33 kV export cable to the ganging transformer at the FlexGen site to the east.
- 220 kV grid connection cable from the ganging transformer arrangement at the Flexgen site to an existing 220 kV Substation within the Poolbeg Generating Station site.
- All necessary ancillary works including drainage, attenuation and internal access roads.

The BESS units are modular and are arranged across the site with associated transformers and inverters. An example of a typical BESS unit is shown in figures 3 and 4 below.

The BESS operates in either a charging mode or a discharging mode. During discharging mode, power from the batteries is converted from direct current to alternating current, by an inverter.

Power from all the batteries is stepped up through a transformer to a 33 kV busbar which then connects to a main transformer and from there an underground cable connects the facility to the grid. During charging mode, the process is reversed and electricity from the grid is fed into the batteries and the energy is stored.

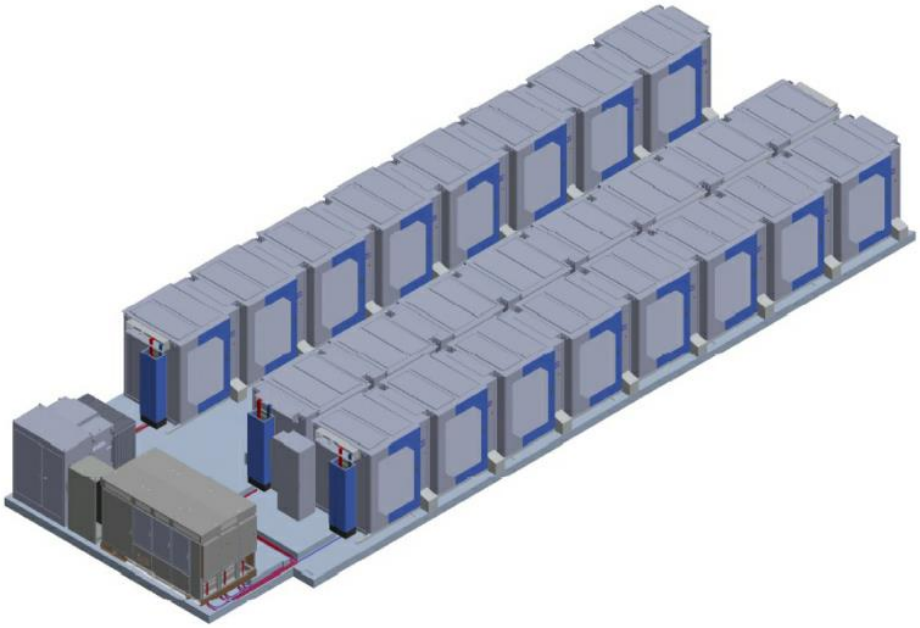

Figure 3: *Rendered isometric view showing a typical core of the BESS 'GEN 6 – GRIDSTACK' cube technology.*

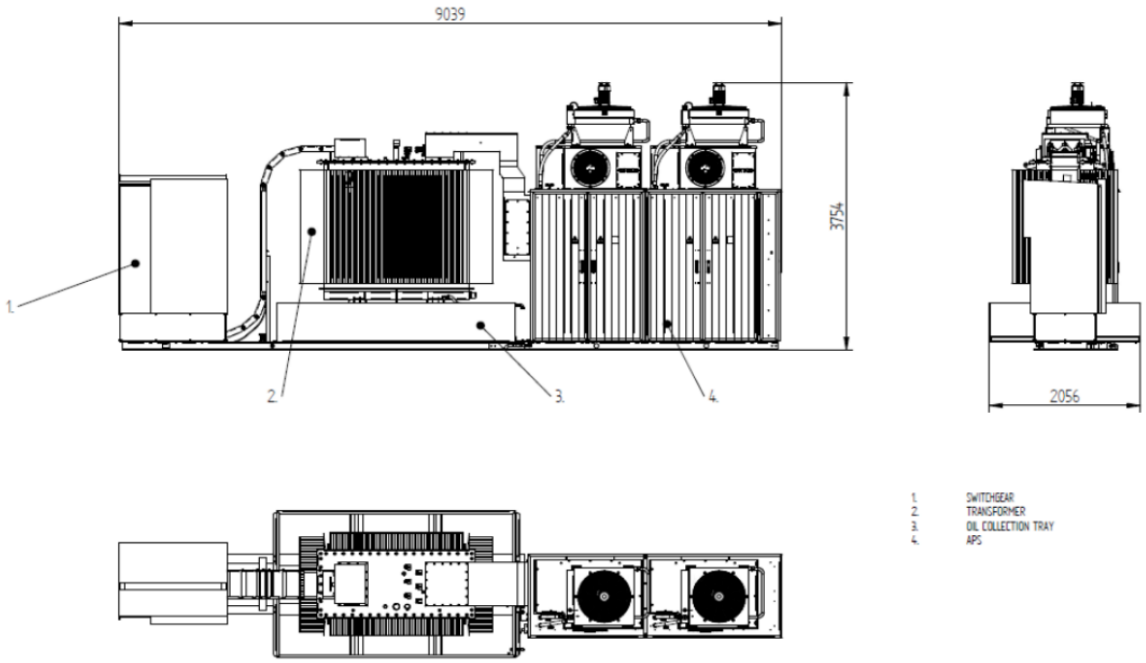

Figure 4: *Plan, section and elevations showing the battery inverters, transformers and ring main units. Note that these transformers contain oil and are fitted with an oil collection tray. This tray will drain into the remote containment tank which is equipped with pumped oil detection and interception.*

Poolbeg BESS will be normally unmanned and operated remotely. Regular site visits and inspections will take place to ensure the site is appropriately managed, maintained to ensure compliance with the IE licence.

8 Emissions

Poolbeg Generating Station currently operates under IE licence P0577-04 which regulates emissions to air, water and specifies noise limits.

8.1 Emissions to Atmosphere

8.1.1 Emissions to Air - Main

8.1.1.1 Proposed OCGT

The main air emissions associated with the proposed OCGT are via the exhaust stack, which is approximately 40 m high. The proposed OCGT will comply with the BAT-AELs specified for new OCGT plants when firing on either natural gas (primary fuel) or gas oil (secondary fuel).

The following controls/abatement systems are in place in relation to air emissions generated at the proposed OCGT plant:

- Low-NOx burners.
- Advanced control systems.
- Air and/or fuel staging.
- Continuous Emissions Monitoring System (CEMS) monitoring and reporting in line with IE licence.

More details on the main emissions to atmosphere are provided in Attachment 7-4-1 Emissions to Air Main.

8.1.1.2 Licensed Flexgen

The main air emissions associated with the FlexGen are via the exhaust stack, which is approximately 30m high. ESB requests that the ELVs specified in the existing licence,

which comply with the limits prescribed in the LCP Regs[1] and BAT (LCP-CID[2]), are retained unchanged in the revised licence.

The following controls/abatement systems are in place in relation to air emissions generated at the FlexGen plant:

- The turbine injects demineralised water into the combustor using Wet Low Emission (WLE) technology to reduce NO_x emissions.
- The demineralised water will be used in the Inlet Spray Intercooling (ISI) system which will cool the inlet air temperature. The ISI system will operate only when the ambient air temperature is greater than 7°C.
- Additionally, Carbon Monoxide (CO) Catalyst technology is utilised to reduce CO emissions.
- CEMS monitoring and reporting in line with IE licence.

8.1.1.3 Existing CCGT

The main air emissions are via either HRSG stacks (2 x 75 m high) or via bypass stacks (2 x 60 m high). With the exception of the SO_2 ELV for gas oil firing, ESB requests that the ELVs specified in the existing licence, which comply with the limits prescribed in the LCP Regs and BAT (LCP-CID), are retained unchanged in the revised licence.

There is also an auxiliary boiler stack (30 m high), licensed emissions (NO_x) are related to the auxiliary plant boiler, this is a support unit when the plant is starting.

The following controls/abatement systems are in place in relation to air emissions generated at the CCGT plant:

- Dry Low NOx (premix) combustors.
- Periodic tuning of plant during overhauls to maintain lowest practicable emissions during operation.
- Low sulphur gasoil. Gasoil only used in grid system emergencies.
- CEMS monitoring and reporting in line with IE licence.

[1] European union (Large Combustion Plants) Regulations 2012 (S.I. No. 566 of 2012)
[2] COMMISSION IMPLEMENTING DECISION (EU) 2021/2326 of 30 November 2021 establishing best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for large combustion plants (notified under document C (2021) 8580)

8.1.2 Emissions to Air - Minor, Potential and Fugitive

Gas vents, associated with the generating units and gas compressors, are minor emission points to the atmosphere. There will be fifteen minor emission points (A3-1 to A3-15) and eleven potential emission points (A4-1 to A4-11) at the installation.

There will be no fugitive emission associated with the installation.

More details on the minor and potential emission points to atmosphere are provided in Attachment 7-4-2-Emissions to Air-Minor and Potential.

8.2 Emissions/Discharges to Water

8.2.1 Surface Water Emissions

8.2.1.1 Proposed OCGT

There will be no process emissions to surface water from the OCGT. Therefore, there are no changes proposed to the existing licence in relation to process emissions to surface water.

8.2.1.2 Licensed FlexGen

Demineralised water is required during operation of the WLE and ISI systems. Waste water will not be generated from this process as the water injected into the gas turbine will evaporate due to the high temperature and be discharged through the exhaust stack to the atmosphere as water vapour.

A dedicated water treatment plant for the Flexgen plant will demineralise potable water for use in these systems. As part of the water treatment process, a small volume of reject water is produced which discharges to the surface water drainage system via existing emission point SW14.

8.2.1.3 Existing CCGT

The current principal discharge to surface water is cooling water, extracted and returned to the Liffey. Other discharges are related to the screen wash water, boiler blowdown and water treatment effluent which all discharge to the Lower Liffey Estuary. There are five existing surface water emission points associated with the CCGT, ref. no. SW1, SW3, SW7, SW8 and SW11. These discharges are monitored in line with the existing IE licence.

The following controls/abatement systems are in place:

- Online temperature and chlorine monitoring of cooling water (SW1).
- Automatic shutoff value for pH on discharge of water treatment plant (SW3).
- The boiler blowdowns (SW7 and SW8) are discharged to tanks to reduce pressure and temperature prior to discharge through the surface water system.
- Monitoring in line with IE licence requirements.

Further details on surface water emission points are provided in Attachment 7-2 Emissions to Surface Water

8.2.2 Storm Water Discharges

There are four existing storm water discharge points at the installation. SW9 and SW12 are associated with the existing CCGT and SW13 and SW15 are associated with the licensed FlexGen and BESS assets.

An additional storm water discharge point is proposed for the OCGT (ref. no. SW16).

All storm water generated on site (with the exception of roofed areas) will discharge via a Class 1 Full Retention Oil Interceptor to the Liffey Estuary Lower waterbody.

8.3 Emissions to Sewer

With the exception of domestic effluent from toilets, sinks, etc., there are no discharges to sewer from the installation.

8.4 Emissions to Ground/Groundwater

There are no emissions to ground, or groundwater associated with the installation.

9 Raw and ancillary materials

9.1 Fuel Supply and Air

The principal inputs to the process for all three thermal plants (existing CCGT, licensed FlexGen and the proposed OCGT) are fuel and air. Fuel is either natural gas or gas oil. Natural gas is the predominant fuel with gas oil as an emergency back-up fuel in accordance with the requirements of the CRU. Natural gas is supplied to the CCGT and FlexGen from the Gas Networks Ireland's AGI (above ground installation). A new gas pipeline from the existing AGI will be routed to the proposed OCGT site in Poolbeg.

Gas oil for the existing CCGT is imported directly from the adjacent bunded oil storage facility managed by NORA (National Oil Reserve Agency). This tank farm is outside the scope of the IE Licence. There is no bulk storage of gas oil within the IEL boundary associated with the existing CCGT.

A dedicated gas oil day tank (185 m^3) will be located within the IEL boundary to serve the licensed Flexgen. This day tank will be fed, by pipeline, from the adjacent NORA tank farm.

Similar to the existing CCGT, gas oil will be imported by pipeline directly from the NORA tank farm, as required. There will be no bulk storage of gas oil within the IEL boundary associated with the proposed OCGT.

No fuel is required for the Poolbeg BESS facility.

9.2 Raw Materials

Natural gas will be the primary fuel used for electricity generation in Poolbeg Generating Station. The details of process related raw materials, intermediates, products, etc., used or generated on the site are provided in Attachment-4-6-2-Raw-Material-Interm-Products. This includes the following materials and raw products.

- Natural Gas
- Gas oil

- Lubricating Oil Various
- Gas Turbine Aerosol Fire Protection
- Water Wash Drain Tank
- Water
- Ethylene Glycol Water
- Compressor Water Wash Chemicals
- Nitrogen Gas
- SF6 Circuit Breakers
- Propane

10 Water Use

10.1 Proposed OCGT

The proposed OCGT will not require water injection during normal operation conditions, when firing on natural gas. However, water injection may be required when firing on gas oil during testing or emergency conditions.

The turbine could potentially require up to 70,000 litres per hour of demineralised water (worst case running on gas oil). If required, this would amount to a demand of 1,680,000 litres/year of demineralised water based on 2 hours of test operation per month running on gas oil.

Low quantities of demineralised water will also be required for other process activities such gas turbine wash cycles and the high-pressure purging water system.

The demineralised water will be supplied to the OCGT from the existing CCGT water treatment plant in Poolbeg. The demineralised water on the OCGT site will be stored in one (1) dedicated storage tank (6,000 m^3).

Potable water will be required to fill the fire water/raw water tank (2650 m^3). It is assumed as a conservative estimate that the tank may be filled once a year.

The remaining water demand for the proposed OCGT will be low. Potable water will be required for domestic purposes (drinking water, toilets, etc.) in the welfare facility. The estimated volume of water required to accommodate the welfare facilities is approximately 11,000 litres per year. This will be provided from the existing CCGT mains water supply from Irish Water.

The connection will be metered and shut off valves will be provided on the connection. All connection works will be carried out in accordance with the requirements of Dublin City Council and / or Irish Water.

10.2 Licensed FlexGen

The FlexGen site water requirements are as follows:

Raw water will be supplied by Irish Water to the FlexGen site from a new mains water supply connection.

A standalone water treatment plant will treat the raw water to an appropriate quality (demineralised) for use in the process. Demineralised water is required for the purpose of NO_x control, using WLE technology and to increase turbine efficiency using ISI technology.

The demineralised water on the Poolbeg FlexGen site will be stored in one (1) dedicated storage tank to facilitate sufficient storage for up to three days' supply.

The remaining water demand for the proposed FlexGen will be low, potable water will be required for domestic purposes (drinking water, toilets, etc.) in the welfare facility. This will be provided from the mains water supply connection from Irish Water.

The water demand for FlexGen will be predominantly associated with the demineralised water for the turbine. It is expected that the turbine will require 25,781 litres per hour of demineralised water (worst case running on natural gas). This would amount to demand for the turbine of 128,905 litres/day of demineralised water based on 5 hours of operation per day.

The demineralised water will be produced from potable water using an on-site water treatment plant. The water treatment plant will operate for approximately 8.4 hours per day and consume 22,000 litres per hour of potable water to produce the required daily amount of demineralised water. This equates to 184,150 litres per day of potable water.

Potable water will also be required to fill the fire water tank (2,000 m^3). It is assumed as a conservative estimate that the tank may be filled once a year. Volumes associated with use of welfare facilities will be insignificant by comparison. The estimated annual total potable water demand for the FlexGen site is estimated to be 11,000 litres per year.

The connection will be metered and shut off valves will be provided on the connection. All connection works will be carried out in accordance with the requirements of Dublin City Council and / or Irish Water.

10.3 Existing CCGT

Water to supply the makeup needs of the existing HRSGs and for cooling and other purposes is drawn from the Irish Water, mains water.

In 2021, 53,593 m^3 of potable water was consumed on-site for both plant and domestic purposes.

10.4 BESS

A water supply is required to provide welfare facilities during periods of maintenance. Water demand will be low and is estimated at approximately 6,000 litres per year.

11 Waste management

11.1 Proposed OCGT

It is anticipated that the waste produced from the proposed OCGT will be very small due to the mode of operation anticipated for the plant. Waste arising from the OCGT will be strictly controlled and segregated and promptly removed from site for recycling, reuse or disposal, by independent licenced waste contractors.

A description of how waste will be managed at the installation has been outlined in Attachment -8-2-1- Waste Hierarchy. Details regarding estimated waste volumes and management systems can be found as part of this application in Attachment-8-1-Waste Generated.

11.2 Licensed FlexGen and BESS Assets

The waste produced from FlexGen and BESS will be very small as these assets will be remotely operated. Waste arising from the annual maintenance operations will be strictly controlled and segregated and promptly removed from site for recycling, reuse, or disposal, by independent licenced waste contractors.

11.3 Existing CCGT

Waste generated on site through routine operation and maintenance activities is strictly controlled, segregated and promptly removed from site for recycling, reuse or disposal and is managed in compliance with the requirements of the Waste Management Act 1996, as amended, and as per IE Licence requirements. Waste is independently managed by licenced waste contractors and all waste removed from site is reported to the EPA annually in the AER.

12 Other Process Waste Waters

Small volumes of wastewater will also be generated during maintenance operations such as the gas turbines wash cycles (approximately 6 m^3/year). Wastewater from these processes will be collected in suitably designed holding tanks. The content of the holding tanks will be collected by a suitably licenced waste contractor in accordance with the Waste Management Act 1996, and associated regulations for disposal.

13 Accidents Hazards Involving Dangerous Substances

The Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the “COMAH Regulations”), implement the Seveso III Directive (2012/18/EU) in Ireland.

The regulations require operators of establishments where dangerous substances are present, in quantities equal to or in excess of defined threshold, to take all measures necessary to prevent major accidents, limit their consequences and ensure a high level of protection for man and the environment. Establishments, which fall under the remit of the COMAH Regulations, are classified as either 'lower tier' or 'upper tier' SEVESO sites depending on the quantities of dangerous substances held on site.

Since 2016 the National Oil Reserve Agency (NORA) have assumed responsibility of the Poolbeg Oil Farm. The licence boundary was amendment to reflect this change (refer to Technical Amendment C of IE Licence P0577-03).

As a result, the Poolbeg installation is no longer a ‘lower tier’ Seveso site or subject to the provisions of the COMAH Regulations. However, as the now NORA fuel storage establishment is adjacent to the installation and considered an Upper Tier Seveso site by

the HSA, ESB will attend NORA site Domino Effect meetings and participate in NORA emergency exercises.

The COMAH Regulations define a “consultation distance” as a distance or area relating to an establishment, within which there are potentially significant consequences for human health or the environment from a major accident at the establishment, including potentially significant consequences for developments such as residential areas, buildings and areas of public use, recreational areas and major transport routes.

Poolbeg OCGT will be located within 300 metres consultation distance of the NORA fuel storage establishment and as such is subject to a Land Use Planning assessment in accordance with HSA guidelines. A COMAH assessment for the OCGT plant is provided in Appendix D of the EIAR.

13.1 Seveso Sites

As stated above, the Poolbeg installation is currently not a Seveso site as NORA have taken over management of the oil farm.

The licensed FlexGen plant at Poolbeg will store a maximum of 185 m^3 of liquid fuel (gas oil) on site in a day tank as a backup fuel. The regulations specify lower and upper threshold quantities of 2,500 and 25,000 tonnes respectively for gas oil. The higher density of gas oil is 850 kg/m^3 giving a total weight of fuel oil being stored on the site of 157 tonnes; below the 2,500 tonnes threshold.

Excluding a small diesel tank (4 m^3) associated with the diesel generator, there is no bulk storage of gas oil associated with the proposed OCGT plant within the installation boundary. A new gas oil storage tank will be constructed within the NORA fuel storage establishment, which will serve the proposed OCGT. This tank will be managed by NORA.

Therefore, in accordance with current regulations, the installation is not classified as a Seveso site and Seveso lll regulations do not apply.

13.2 Risks of accidents

Passive and active safety measures are in place at Poolbeg Generating Station and are anticipated for the proposed OCGT development. They include:

- Provision of bunding for storage tanks at the station.
- Inspection of bunds on a weekly basis and after every heavy rainfall event.
- Emergency firefighting facilities for the areas of the station most at risk.
- A certified Environmental Management system (EMS) is in operation at Poolbeg Generating Station and a certified EMS is proposed for the OCGT site.
- Emergency Response Procedure relating to both Safety and Environmental incidents.
- Storage of all oils and lubricants in bunded oil stores/areas.
- Spill kits and Fire Fighting equipment.

- Equipment containing SF6 and F-gases are inspected and maintained as per manufacturer's instructions.

The expected significant effects on the environment arising from the vulnerability of the proposed OCGT to risks of major accidents and/or natural disasters, which are relevant to the project, have been assessed and included as part of the EIAR.

14 Cessation of Activity

As required by Condition 10 of the IE Licence a CRAMP was prepared which addresses the key issues that would occur in the orderly shutdown of all station activities.

The CRAMP was prepared in accordance with the EPA's Guidance on assessing and costing environmental liabilities (EPA, 2014). In addition to the CRAMP a separate Environmental Liabilities Risk Assessment (ELRA) has been prepared and submitted to the EPA in accordance with Condition 12 of the IE licence.

The preparation of the CRAMP and ELRA allows for the proper environmental liability management of the site and ensures that residual environmental impacts upon closure are eliminated or minimised, any environmental incidents that could potentially arise are planned for, and adequate financial provision made to cover the costs of their implementation.

A revised CRAMP and ELRA will be prepared at the appropriate time, to include consideration of the licensed FlexGen, BESS and proposed OCGT.

15 Assessment of Alternatives

An assessment of alternative has been assessed in the EIAR as follows,

Refer to Chapter 2 - Attachment-6-3-1-2-EIAR December 2022_Main.

16 EIAR - Likely Significant Effects

The EIAR which accompanied the planning application and this licence review application for the installation, describes in detail the likely significant effects anticipated as a result of the proposed OCGT. For clarity, the table below summarises the likely significant effects. However, the submitted EIAR (which is provided with this application) should be referred to for the full assessment.

Table 1: Summary of Likely Significant Effects – Operational Phase

Source and /or pathway /receptor	Reasonable Worst-case consequence	Embedding Mitigation	Could this result in a major accident and /or disaster with mitigation in place	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place	Likely significant Adverse Effects
Flooding					
Tidal flooding could cause failure to electrical components	The proposed development is located *directly adjacent to Dublin Bay*. However, flood risk assessment prepared by ESB indicates that the site is located in Flood Risk Zone C. The proposed site is not located within an area considered to be at risk of flooding from sea.	The proposed site lies within Flood Zone C as defined by the Guidelines document to Planning Authorities in relation to Flood Risk Management.	No. The proposed levels of the development lie in the range of 3.5-4.56moD (Source ESB) this proposed development will not result in loss of floodplain as the site boundary is outside the area vulnerable to flooding	Yes	None. Flood risk is discussed in Chapter 10.
Fire					
OCGT Plant	A generator fire resulting in emission of smoke and fumes	There will be a comprehensive fire detection and fire-fighting system on the site Heat, fire and gas detection systems will be incorporated as appropriate to the fire risk. Where required, flame detection will also be installed. Firefighting	No	Yes	No likely significant adverse effects

Source and /or pathway /receptor	Reasonable Worst-case consequence	Embedding Mitigation	Could this result in a major accident and /or disaster with mitigation in place	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place	Likely significant Adverse Effects
		on site will predominately be carried out by manual fire suppression using the fire water hydrant network on site. Portable extinguishers appropriate to the fire risk will be sited at readily accessible fire points throughout the site. All switchgear rooms, relay rooms, communications rooms, cable basements, cable tunnels and the control room, will be provided with induced draught smoke/heat extraction fans as appropriate., A combined fire water and process water storage tank of approximately 2649m3 will be installed on site.			
The proposed transformer on site could fuel a fire	A transformer fire resulting in emission of smoke and fumes and rupture of the transformer tank with loss of oil into the bund below	The transformer has a containment bund which will retain any leakage oil. The likelihood of such an event is very rare. As the event is unlikely to occur for a long enough period of time to result in exceedances of the	No	Ye	No likely significant adverse effects. Discussed separately in the Landuse Planning Report provided in Appendix D.

Source and /or pathway /receptor	Reasonable Worst-case consequence	Embedding Mitigation	Could this result in a major accident and /or disaster with mitigation in place	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place	Likely significant Adverse Effects
		long or short-term averaging periods of the air quality standards, these events are not considered to be a significant source of emissions so have not been considered further			
Extreme temperature (heatwave, cold snap) high winds storm					
Design standards mitigate against extreme temperature	None. Major accidents disasters are unlikely	Not applicable	Not applicable	Not applicable	No likely significant adverse effects
Electricity Failure					
Electricity failure can be caused by several factors such as extreme weather conditions.	Loss of power supply resulting in disruption to the operation of the plant	Not applicable	Not applicable	Not applicable	No likely significant adverse effects
Exposure to High Voltage					
Construction workers and maintenance staff coming in contact with exposed live conductors	Risk of damage or harm	All equipment to be designed in compliance with latest safety in design requirements. Access will be carefully controlled and	No	Yes	No likely significant adverse effects

Source and /or pathway /receptor	Reasonable Worst-case consequence	Embedding Mitigation	Could this result in a major accident and /or disaster with mitigation in place	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place	Likely significant Adverse Effects
		allowed only for trained and competent persons			
Earthquake					
An earthquake of sufficient intensity to inflict severe damage is unlikely	None. Major accident / disaster unlikely	Not applicable	Not applicable	Not applicable	No likely significant adverse effects
Biological hazard – epidemic, pandemic					
Apart from construction workers and maintenance staff the proposed development does not generate human interaction. The proposed development also does not generate interaction with animals. Construction phase activities will be carried out in accordance with Government guidelines	None. Major accident / disaster unlikely	Not applicable	Not applicable	Not applicable	No likely significant adverse effects
Malicious attacks/cyberattack					
The proposed development will feed into Ireland's electrical transmission grid	Damage would likely be limited to disruption of the generator's ability to operate	The site is secured by high fences with security gates,	No	Yes	No likely significant adverse effects. Loss of functionality to the proposed

Source and /or pathway /receptor	Reasonable Worst-case consequence	Embedding Mitigation	Could this result in a major accident and /or disaster with mitigation in place	Is the reasonable worst consequence managed to an acceptable level with existing mitigation in place	Likely significant Adverse Effects
and could be subject to malicious physical or cyber attack	until the damage was repaired	operated by security personal.			development only, no environmental impacts
Contaminated land Groundwater					
Foundations for the gas turbine generators will be adjacent to the groundwater table.	Release of hydrocarbons to the receiving environment	Foundations will be constructed above the water table to avoid impacts on groundwater	No	Yes	Land, soils and hydrogeology is discussed in Chapter 11
Spillage or seepage of pollutants into watercourse/ground					
The proposed plant will operate mainly on natural gas. Secondary fuel is diesel oil. All chemicals and oils will be stored in suitably bunded areas and with weather protection	Oil seepage into the ground which could lead to contamination of the soil and waterways	The transformer bund and tank bunds are sized to collect the full volume of oil from the transformer. The bunds will be subject to annual integrity tests in line with the IE licence	No	Yes	Surface Water is discussed in Chapter 10 Land, Soils and Hydrogeology is discussed in detail in Chapter11
As the cables are solid insulation type there are no sources of pollution and they will not offer a pathway to any receptor	None. Major accident / disaster unlikely	Not applicable	Not applicable	Not applicable	Not applicable