ESB Poolbeg Generating Station
Licence Review Application
Attachment 1-2 NON - TECHNICAL SUMMARY

Contents

1.0 Introduction

Poolbeg Generating Station is situated on the mouth of Dublin Harbour on land that was reclaimed from the sea during the 1960s. The area in which it is located has a long tradition in the generation of electricity. The site is adjacent to the old Pigeon House generating station dating from early in the last century. The site of the Poolbeg station includes part of the old Pigeon House generating station coal yard. Poolbeg thermal generating station which consisted of three conventional steam units operated from the early 70's until the 31st March 2010 when the 510MW thermal station ceased operation.

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

The station is 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 adjacent to Poolbeg Generating Station. Gasoil is required as an as an emergency fuel back up in accordance with the secondary fuel requirements of the Commission for Regulation of Utilities (CRU).

Electricity Supply Board 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 twice, with the most recent revision (P0577-03) issued in March 2013. Licence Reg. P0577-03 has been amended four times, the latest of which on 6th July 2020.

There are currently 30 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.

The principal reason for this licence review is due to the proposed development of a 75 MWe (megawatts electrical) of flexible thermal generation (**"Poolbeg FlexGen"**) at a site located within the south eastern portion of the overall ESB Poolbeg Generating station and is within the existing EPA licence boundary of Poolbeg Generating station.

A 75 MW Battery Energy Storage System **("Poolbeg BESS")** is also being proposed to be developed on at a site located within the western portion of the site at Poolbeg. The proposed BESS is not a scheduled activity, as outlined in the EPA Acts 1992 to 2013.

The purpose of the FlexGen units is to provide additional generating capacity during periods of high demand or when weather conditions means renewable sources cannot meet demand. The BESS does not generate electricity but will store surplus energy generated during low demand periods and release this when demand is greater. Both the FlexGen and BESS are designed to come on stream quickly as demand on the grid changes.

2.0 Environmental Impact Assessment Report and Planning

Separate planning applications for Poolbeg FlexGen and the Poolbeg BESS development have been lodged with Dublin City Council (DCC); DCC planning reference no. 3625/20 and 3624/20 refer respectively. The applications were accompanied by an Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS).

Both the EIAR and NIS encompass proposed developments by ESB for the whole of the Poolbeg Peninsula including the following:

- Proposed Poolbeg FlexGen development
- Proposed Poolbeg BESS development
- Proposed Ringsend FlexGen development (At a separate site on the Poolbeg Peninsula and subject to a separate IE licence application)
- Proposed South Wall BESS development (At a separate site on the Poolbeg Peninsula)

The EIAR and NIS have been submitted to the Agency with this application. Refer to:

- Attachment -6-3-1 - Environmental Impact Assessment Report
- Attachment- 6-3-2- Natura Impact Statement

In accordance with the First Schedule to EPA Act 1992 (as amended), as a thermal plant with a rated input of more than 50 MW, Poolbeg FlexGen will require an Industrial Emissions (IE) License and an EU-ETS GHG (Greenhouse Gas) Permit to operate

The Electricity Supply Board (ESB) (on behalf of Poolbeg FlexGen) is applying to the Environmental Protection Agency (EPA) for a revision of the current Poolbeg IE Licence to take account for the proposed FlexGen development.

3.0 Class of Activity

The existing station current operates in accordance with the conditions of the IE Licence (Register No. 577-03) as amended, 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 50MW 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 75MW Poolbeg FlexGen. The proposed Poolbeg BESS is not a scheduled activity, as outlined in the EPA Acts 1992 to 2013. Details of the BESS development are being provided with this licence review application to provide the Agency with information on the proposed development and operations of a BESS on the licensed site at Poolbeg Generating station.

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 this permit or a separate new permit will be required for the proposed FlexGen.

4.0 Description of Activities at Poolbeg Generating Station

4.1 Existing Poolbeg CCGT Generating Station

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 consists of the following:

Two gas turbines	Two heat recovery steam generators
Oil and gas firing systems	Fluegas 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 480MW. The gas turbines can generate independently if needed (open cycle mode), having a capacity of 155MW (x 2) each and the steam turbine has a capacity of 170MW.

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 superheater.

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 passed directly back to the boiler/HRSG.

The water is pumped by the extraction pump from the very low pressure in 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 town 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.

4.2 Description of Proposed Poolbeg FlexGen

In response to Ireland's renewable energy targets EirGrid began a multi-year programme, "Delivering a Secure, Sustainable Electricity System", known as the DS3 Programme. The aim of the DS3 Programme is to meet the challenges of operating the electricity system in a secure manner while achieving renewable electricity targets. This programme is designed to ensure that the power system can securely operate with increasing amounts of variable non-synchronous renewable generation over the coming years. Achieving this level of renewable integration on a synchronous system is unprecedented and presents significant challenges for the real time operation of the power system.

The primary reasoning for the development of the Poolbeg FlexGen, and accordingly this revised Licence application, is to provide fast response electricity generation services as required by EirGrid. This type of development will facilitate an increased level of renewable electricity generation on the Irish grid, by being available as a back-up electrical supply option during the hours of the day when demand is at its highest.

It is expected that plants of this nature will be developed in order to facilitate Ireland meeting its renewable energy targets, by moving away from traditional large-scale fossil fuel plants to renewable generation with FlexGen, and other, electrical grid supports.

Poolbeg FlexGen will normally be unmanned and will be remotely operated. Regular site visits and inspections will take place to ensure the site 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 the existing Poolbeg 220 kV substation which is located on the existing Poolbeg Generating Station Site to the west of the proposed development.

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 75 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 Gaseous 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 at 220 kV to the existing Poolbeg Substation;
- Connection to the existing Gas Networks Ireland (GNI) Above Ground Installation (AGI) within the Poolbeg Generating station.
- Associated gas supply equipment on the proposed site and within the AGI including pressure regulation and compression equipment;
- Water supply, storage and treatment;
- Fire-fighting systems;
- Liquid fuel (fuel oil) storage and treatment facility;
- Welfare and car parking facilities; and
- All necessary ancillary works.

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

Connections to external services and networks including gas, electricity and water will require development works and they are part of the overall project.

4.2.1 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.

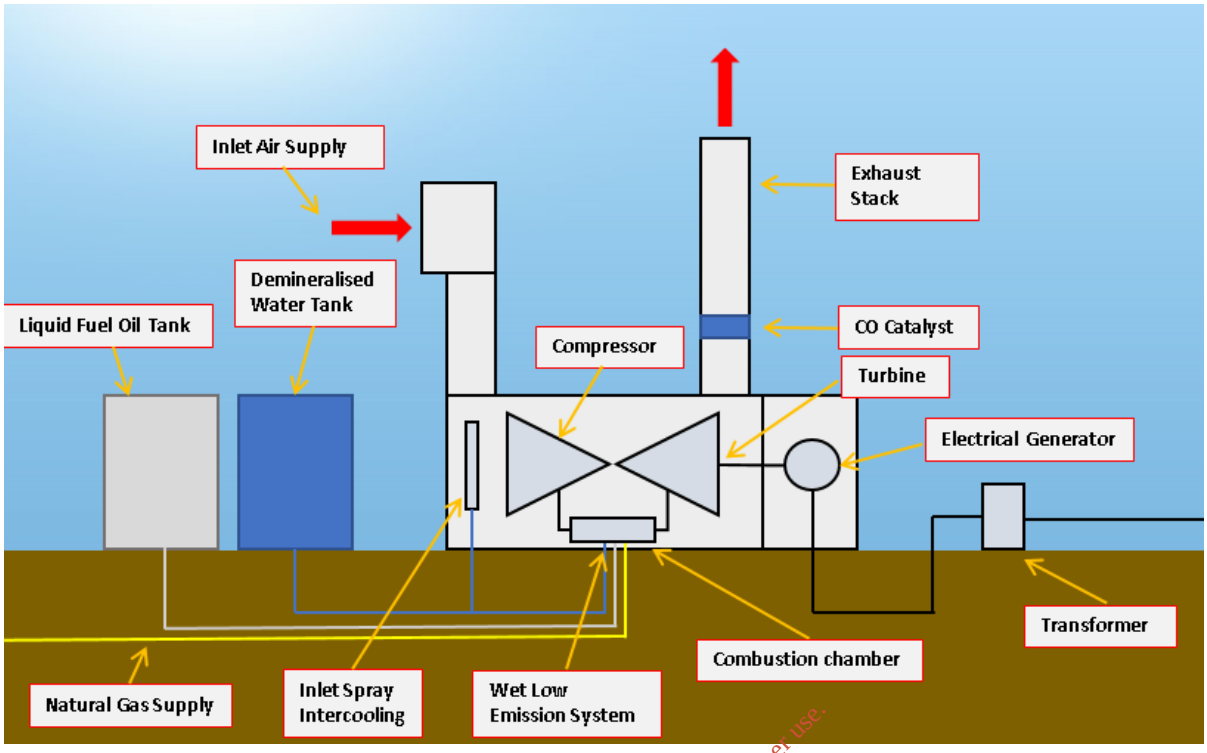

Figure 1: Schematic of Open Cycle Gas Turbine Unit

Note: Schematic drawing is not to scale and is for illustrative purposes only.

4.3 Description of proposed BESS

Battery Energy Storage System (BESS) developments do not generate energy. They are 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. The proposed 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 developments, such as that proposed here, 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 proposed to be located in a secure BESS development site within the overall ESB owned Poolbeg Generating Station.

The full development site including the required plant infrastructure, service connections and drainage services will be 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 site is currently occupied by disused buildings which will be demolished to ground floor to allow construction of the BESS facility.

The BESS development site will generally comprise the following key elements:

- Electrical cables and connections to existing substation infrastructure within the overall ESB Poolbeg Generating Station facility
- 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;
- 33kV export cable to the ganging transformer at the proposed FlexGen site to the west.
- 220kV grid connection cable (non-oil filled) from the ganging transformer arrangement at the proposed Flexgen site to Poolbeg 220kV Substation;

- All necessary ancillary works including drainage, attenuation and internal access roads.

The BESS units are modular and will be arranged across the site with associated transformers and inverters. An example of typical BESS units are shown in the figures below.

A 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.

The design adopted allows for minimising on-site construction as each modular component is manufactured off-site and transported to site for final assembly

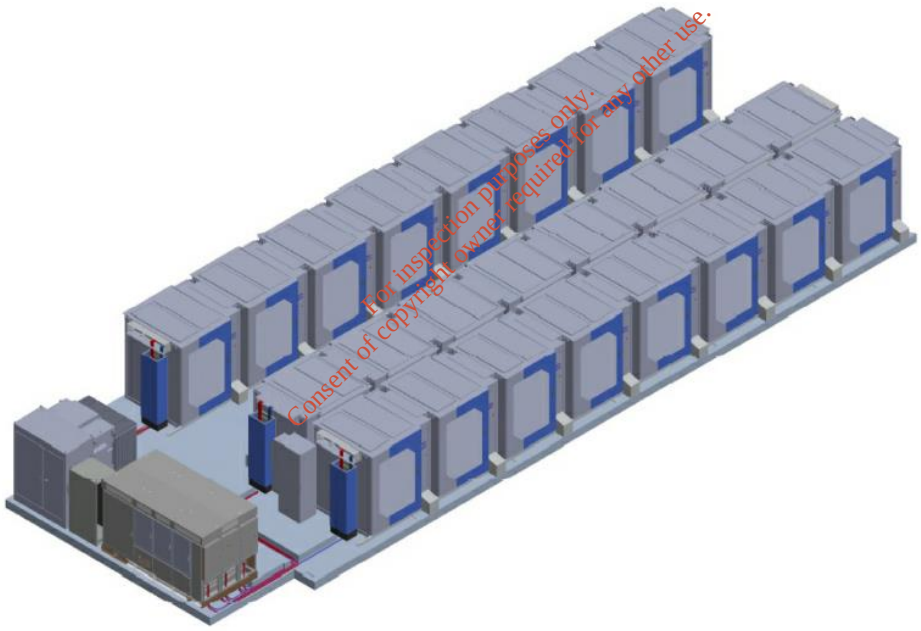

Figure 2 : *Rendered isometric view showing a typical core of the proposed BESS 'GEN 6 – GRIDSTACK' cube technology.*

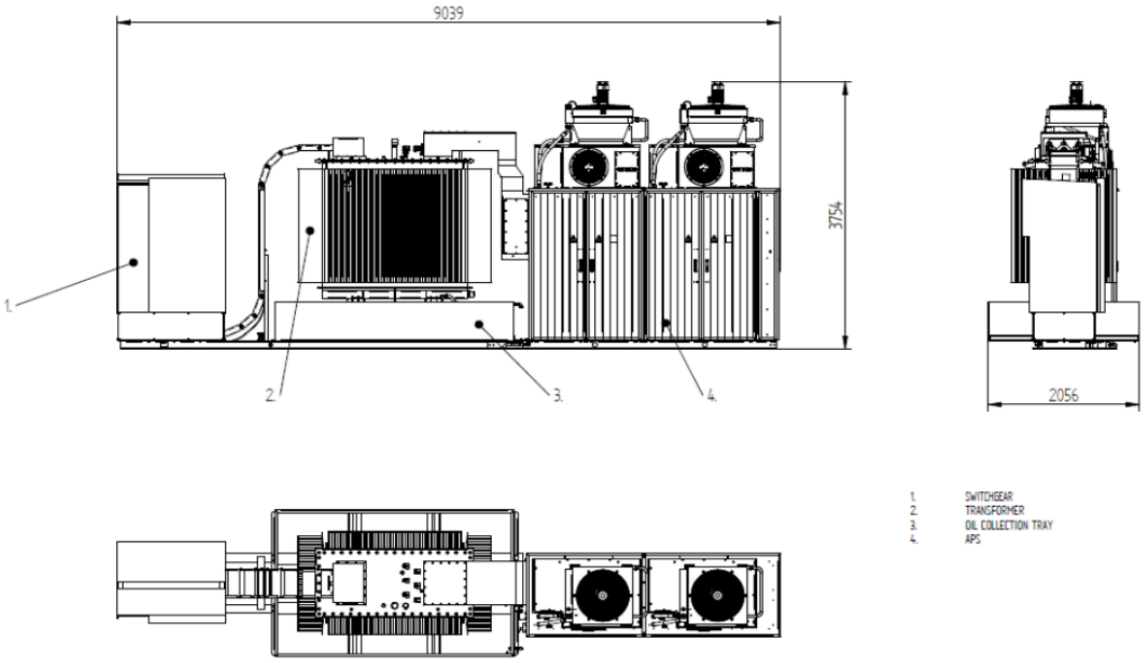

Figure 3: *Plan, section and elevations showing the proposed battery inverters, transformers and ring main units. Note that these transformers contain oil and are fitted with an oil collection tray. This tray will drain into the remote containment tank which is equipped with pumped oil detection and interception.*

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

4.4 Poolbeg CCGT and FlexGen - Fuel Supply and Air

The principal inputs to the process for both the existing Poolbeg CCGT and Flexgen are fuel and air. Fuel is either Natural Gas or Gas oil. Natural Gas is the predominant fuel with gasoil as an emergency fuel back up in accordance with the requirements of the CRU. Natural Gas is currently supplied to the existing CCGT from the Gas Networks Ireland AGI (above ground interface. A new gas pipeline from the existing AGI will be routed to the FlexGen site in Poolbeg.

Gasoil is stored for the existing CCGT in an adjacent bunded oil storage facility managed by NORA (National Oil Reserve Agency). This tank farm is outside the scope of the IE Licence.

The FlexGen development will utilise the existing gasoil supply facilities for Poolbeg CCGT which is supplied by NORA. However, in order to ensure security of supply the backup fuel, gas oil will be stored in a single dedicated fuel oil day tank on the Poolbeg Flexgen site. The fuel oil tank will be bunded for environmental protection in accordance with requirements of the EPAs guidance note “Storage and Transfer of Materials for Scheduled Activities 2004”. In order to fulfil the requirement for three days in accordance with CRU requirements, the remaining gas oil will be stored in the existing fuel oil tanks that are managed by NORA and tanks will be interconnected by a pipeline to top up the tank on the Flexgen Site. This supply pipeline will be inspected and tested as per EPA Guidelines and IE L licence requirements.

Note no fuel is required for the proposed Poolbeg BESS facility.

4.5 Water Requirements

Existing CCGT

Water to supply the makeup needs of the existing HRSGs and for cooling and other purposes is drawn from the Dublin City Council/Irish Water, water main.

In 2019, 56,100 m^3 of potable water was consumed on-site for both plant and domestic purposes.

Proposed 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 NOx (Nitrogen Oxide) control, using Wet Low Emission (WLE) technology and to increase efficiency using Inlet Spray Intercooling (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 within the proposed development 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 fuel 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. It is assumed as a conservative estimate that the tank may be filled once a year. The demand to fill the tank is estimated as 2,000,000 litres. 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 below in Section 10 below for a conservative and a worst case scenario.

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.

Proposed BESS

A water supply will be required to provide welfare facilities during periods of maintenance.
It is proposed to make a new connection to the Poolbeg Generation station water supply to provide water during maintenance works. Water demand will be low and is estimated at approximately 6 tonnes per annum.

5.0 Best Available Techniques

Commission Implementing Decision (CID) on Best Available Techniques (BAT)

The Commission Implementing Decision (CID) of relevance to existing Poolbeg CCGT and Poolbeg FlexGen is:

- CID (EU) 2017/1442 of 31 July 2017 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 (2017) 5225).

Best Available Techniques Reference (BREF) Documents

The relevant Best Available Techniques reference (BREF) documents are:

- Industrial Cooling Systems (ICS) BREF (12.2001);
- Energy Efficiency (ENE) BREF (02.2009); and
- Emissions from Storage (EFS) BREF (07.2006).
- https://eippcb.jrc.ec.europa.eu/reference/monitoring-emissions-air-and-water-ied-installations-0

EPA National BAT

The current relevant EPA Best Available Techniques guidance notes are:

- BAT Guidance Note for the Energy (LCP) Sector (2008).

A review of the existing Poolbeg plant and proposed Poolbeg FlexGen has been undertaken to determine the applicability of the CID, BREF and the EPA National BAT documents.
Full details of the BAT assessment undertaken are contained within Section 4.7 of this IE revised Licence application.

6.0 Sources of Emissions/Emission Limits

Poolbeg Power Station currently operates under IE licence P0577-03, as amended, which regulates emissions to air, water and specifies noise limits.

6.1 Emissions to Atmosphere

Existing Poolbeg CCGT

The main air emissions are via either HRSG stacks (2 x 75 m high) or via bypass stacks (2 x 60 m high). Licensed air emissions from these stacks relate to nitrogen oxides (NOx) and carbon monoxide (CO). There is also an auxiliary boiler stack (30 m high), licensed emissions (NOx) 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 and these will continue

- Dry Low NOx (premix) combustors.
- Fast start-up to minimise emissions (other than normal operating conditions).
- 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 IED licence.

As part of this licence review air emission limits for the existing CCGT will be revised in line with BAT LCP AELs. See the following attachment accompanying this application.

- See attachment – 7-4 -1. Emissions to Air Main

Proposed FlexGen

The main air emissions associated with the FlexGen are via the exhaust stack, which is approximately 30m high. It is anticipated that the proposed FlexGen development will comply with BAT LCP AELs related to nitrogen oxides (NOx) and carbon monoxide (CO) when firing primarily on natural gas. In the unlikely event that the unit is required to operate using gasoil (Secondary fuel), Flexgen will comply with BAT LCP AELs related to nitrogen oxides (NOx) and carbon monoxide (CO), Dust and Sulphur Dioxide (SOx). This has been reviewed under section 4.7 of this licence review application. A number of controls/abatement technologies are proposed in relation to potential air emissions generated and thus will ensure air emissions are reduced. These are as follows;

- The turbine injects demineralised water into the combustor using Wet Load Emission (WLE) technology to reduce NOx emissions.
- The demineralised water will be used in a Wet Compression System which will cool the inlet air temperature. The Wet Compression System will operate only when the ambient air temperature is greater than 7^{o}C.
- Additionally, CO Catalyst technology is utilised to reduce Carbon Monoxide (CO) emissions.

Poolbeg FlexGen will operate a Continuous Emission Monitoring System (CEMS) and will report emission monitoring and compliance to the EPA as per IED licence requirements.

- See Attachment – 7-4 -1 Emissions to Air Main.

Further details relating to abatement technologies for the both Poolbeg CCGT and FlexGen can be found in this application under:

- Attachment – 4 -10-1- Plant Information - Poolbeg CCGT and FlexGen
- Attachment – 4 -10-2 - LCP – Abatement – Poolbeg CCGT
- Attachment – 4 -10-2 - LCP – Abatement - Poolbeg Flexgen

The following EIAR chapter and Air Quality Assessment submitted with this application are relevant in relation to Air Emissions

Attachment 6-3-1 - Environmental Impact Assessment Report Volume 2 – Main Report, as follows;

- Chapter 13 Air Quality and Climate

Attachment 6-3-1 - Environmental Impact Assessment Report – Volume 3 - Appendices, as follows;

- Appendix 13 ESB FlexGen Air Quality Assessment

The Air Quality assessment modelled a number of scenarios for the Poolbeg site to include; the existing Poolbeg CCGT, Poolbeg FlexGen conservative operational scenario and worst-case gas scenario and worst gas diesel scenario as detailed in the assessment. The conclusion of the Air Quality Assessment Report for Poolbeg FlexGen notes that the modelling results demonstrate that ambient pollutant concentrations (including background) beyond the site ownership boundary are well below the applicable ambient air quality limit values at all off-site receptors modelled for all scenarios assessed.

A cumulative scenario was also modelled for the worst-case pollutant (NO2) as Poolbeg Power Station, the proposed Poolbeg FlexGen, and Dublin Waste-to-Energy facility are located in close proximity to both the Dublin Bay Power Plant and the proposed Ringsend FlexGen. The modelling results for the *Cumulative Scenario* demonstrate that ambient NO2 concentrations (including background) beyond the site ownership boundaries are well below the applicable ambient air quality limit values at all off-site receptors modelled.

6.2 Emissions to Surface Water/Storm Water

6.2.1 Existing Poolbeg CCGT

The current principal discharges 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. These discharges are monitored in line with the current IE licence. Surface Water Emission Points in the current licence SW1, SW3, SW7, SW8 and SW11 refer.

The following controls/abatement systems are in place

- Surface Water is routed through oil separators before discharge to the Liffey Estuary
- 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.

See the following attachment included with this licence application.

- Attachment 7-2 Emissions to Surface Water

Drainage from surface drainage networks which collect run-off and drainage from the station are monitored at storm water emission points SW9 and SW12. Revised trigger values have been calculated in line with 'The *EPA Guidance on the setting of trigger values for storm water discharges to off-site surface waters at EPA IPPC and waste licensed facilities'* for these storm water emission points and have been included with this application.

- Attachment 7.7 Discharges to Storm Water

6.2.2 Proposed Poolbeg FlexGen Surface Water

The surface water proposals for the proposed development have been developed to mimic the natural drainage patterns of the site and in accordance with the Best Management Practices (BMPs) of Sustainable Drainage Systems (SuDS). Although this is a previously developed site, for the purpose of drainage design calculations and in line with current best practice, it has been assumed to act as a greenfield site as per DCC guidelines. This results in a conservative upgraded drainage design

The surface water proposals include measures to attenuate surface water to greenfield runoff rates and to provide extensive treatment of surface water prior to discharge from the site. It is proposed to discharge the treated runoff to the existing Poolbeg Generating Station surface water network located to the north of the site (New Surface Water Emission Point SW13).

Where surface water runoff is being discharged from site, the proposals ensure only high quality, treated runoff leaves the site at a controlled rate. This will ensure that the development does not impact on compliance with the current Poolbeg Generating Station Industrial Emissions licence (current licence No. P0577-03) and / or future licence revisions which include for the proposed development.

As per SuDS BMPs, prevention of runoff generation was first considered for the proposed areas. Accordingly, the extent of impermeable area on the development was minimised and the proposed permeable area will remain finished in single size clean compound stone. This permeable compound stone will allow rainwater to infiltrate to ground as it would on a greenfield site. Any run-off from these areas which does not drain to ground will be collected in the proposed land drains.

The surface water treatment measures proposed for the development includes an attenuation tank and a Class 1 Full Retention Oil Separator to ensure the highest quality of surface water discharge to the drainage system.

The proposed surface water drainage system will collect surface water from the proposed new developments before discharging into manholes and into the Class 1 full retention oil separator oil before reaching the attenuation tank.

Surface water generated in the proposed impermeable transformer bunds shall discharge via an oil sensitive dewatering system (Entexol SCS001 or equivalent) to the Class 1 Full

Retention Oil Separator before reaching the attenuation tank. This system will ensure only non-contaminated water is discharged from the site drainage network.

Process water is required during operation of the FlexGen development in the water treatment plant which demineralises potable water for use in the gas turbine. During normal plant operation, the aero derivative gas turbine uses Wet-Low Emission (WLE) combustion technology to reduce Nitrogen Oxide (NOx) emissions. This is achieved by injecting demineralised water into the combustor to reduce the formation of NOx. Furthermore, in order to improve the efficiency of the unit, the turbine utilises Inlet Spray Intercooling (ISI) technology to cool inlet air to the gas turbine. Water injected during these processes will not enter the surface water drainage network because it will evaporate due to the high temperatures and discharge through the exhaust stack to the atmosphere as water vapour. The emissions control system will ensure operational adherence in accordance with IE Licence Requirements. Water treatment plant effluent will be neutralised as appropriate and will be discharged to the existing Poolbeg Generating Station surface water drainage network and will be in line with IE licence requirements.

In case of emergency, a shutdown valve will be provided at the discharge point from the treatment plant before entering the proposed drainage network.

Although this is a previously developed site, best practice SuDS methods recommend calculating the runoff rate as if the site was greenfield. The site has an area of approximately 15,228 m^2. This has been taken to be the catchment area for the site due to the flat local topography and the absence of hydrological connections with the surrounding area. It has been calculated that it would be necessary to limit discharge from the site to no more than 12 litres per second which is the calculated greenfield runoff rate.

Runoff from the impermeable surfaces on the site which are positively connected to the proposed surface water drainage network has been calculated assuming a 100% runoff rate. The proposed impermeable surfaces will constitute an area of approximately 2,356 m^2 while the road area will consist of permeable Clause 804 crushed stone accounting for 2,075 m^2. The rest of the site (10,797 m^2) will be comprised of compound stone. Runoff from the road areas has been calculated using a 60% runoff rate and using a 50% runoff rate from the permeable stone areas.

The attenuation volume has been sized to provide storage for a 1 in 100-year rainfall return period. The rainfall data for the site, obtained from Met Éireann, has been factored up by 20% to allow for climate change in accordance with best practice and guidelines. Discharge from the tank will be limited to the pre-development runoff rate using a flow control device.

A Drainage and Services Report has been submitted as part of this application;

Attachment 6-3-1- Environmental Impact Assessment Report Volume 3 – Appendices, as follows;

- Appendix 5 ESB Poolbeg Flexible Generation - Drainage and Services

Two additional surface water emission points are proposed from the FlexGen Site, refer to

- Attachment 7-2 Emissions to Surface Water

6.2.3 Proposed BESS Surface Water

The proposed drainage design for the BESS site is presented in a Drainage and Services Report submitted as part of this application

Attachment 6-3-1 – Environmental Impact Assessment Report, Volume – Appendices, as follows;

- Appendix 5 ESB Poolbeg BESS - Drainage and Services

Similar to the FlexGen site the surface water proposals have been developed to mimic the natural drainage patterns of the site and in accordance with the Best Management Practices (BMPs) of Sustainable Drainage Systems (SuDS). Although this is a previously developed site, for the purpose of drainage design calculations and in line with current best practice, it has been assumed to act as a greenfield site (as per DCC guidelines). This results in a conservative upgraded drainage design

The surface water proposals include measures to attenuate surface water to greenfield runoff rates and to provide extensive treatment of surface water prior to discharge from the project development. It is proposed to discharge the treated runoff from the BESS proposed development to the existing Poolbeg Generating Station surface water drainage network.

Where surface water runoff is being discharged from the proposed developments, the proposals ensure only high quality, treated runoff leaves the site at a controlled rate. This will ensure that the development does not impact on compliance with Poolbeg Generating Stations IE licence. Surface runoff generated on the impermeable elements of the BESS development will pass through a Class 1 Full Retention Oil Separator and into a proposed attenuation tank where it will be discharged at the calculated greenfield runoff rate into the existing Poolbeg surface water drainage network.

Transformer bunds will additionally be fitted with oil sensitive dewatering systems prior to being discharged to the surface water drainage system.

Surface water generated in the proposed battery inverter transformer bunds will be conveyed in a separate pipe network to a remote containment tank and will be discharged from the containment tank using an oil sensitive pump. This discharge will then pass through a separate and dedicated Class 1 Full Retention Oil Separator for the battery inverters before being conveyed to the attenuation tank for discharge to the existing Poolbeg surface water network.

One additional surface water emission point is proposed for the BESS site, refer to

- Attachment 7-2 Emissions to Surface Water

6.3 Emissions to Ground

A baseline assessment of the site was carried out and full details of the conditions and compliance in relation to soils and groundwater can be found in the following licence review attachment;

- Attachment-4-8-3- Poolbeg Baseline Assessment

A Site Investigation and Generic Quantitative Risk Assessment Report (GQRA) has also been submitted with this licence review application as;

- Attachment 4-8-2 Poolbeg BESS and FlexGen SI and GQRA

In the EIAR, Chapter 8 Land, Soils and Ground Conditions summarises the findings of the geology, soils and contaminated land technical assessment that was undertaken for proposed FlexGen and BESS developments on the Poolbeg Peninsula. Refer to;

Attachment 6-3-1 – Environmental Impact Assessment Report - Volume 2 – Main Report, as follows;

- Chapter 8 Land, Soils and Ground Conditions.

The associated reports in EIAR Volume 3 Appendix 8 refer,

- ESB Proposed BESS and FlexGen Sites, Poolbeg Baseline Assessment.
- ESB Poolbeg BESS and FlexGen SI and GQRA
- ESB Poolbeg FlexGen Hotspot Remedial Excavation and Validation

Two of the associated EIAR Appendix 8 reports mentioned above have been submitted with this application as Attachment-4-8-3-Poolbeg Baseline Assessment and Attachment 4-8-2 Poolbeg BESS and FlexGen SI and GQRA.

The Poolbeg FlexGen Hotspot Remedial Excavation and Validation Report has been submitted previously to the satisfaction of the Agency previously via Eden reference number LR052440.

A review of the site's chemical inventory identified three relevant hazardous substances which, on the basis of storage and containment infrastructure on site, maintenance and handling procedures it was concluded there was a low risk of losses to ground occurring.

The proposed FlexGen facility will not lead to an increase in the number of hazardous substances stored on site but will increase the volume of Gas oil storage. It is proposed to install the liquid fuel storage tank (capacity 182 m^3) and bund in the north-eastern corner of the FlexGen site. Fuel stored on the FlexGen site will be contained, managed and integrity tested in line with IE licence requirements and as per current Poolbeg EMS procedures.

A review of the site setting and history identified a number of areas where potential sources of contamination to soil and groundwater may exist due to historic activities and the nature of the site's development. Previous site investigations did not identify significant sources of contamination to soil and groundwater beneath the site.

The current baseline assessment incorporated additional site investigation that targeted potential historic known source areas as well general areal coverage across the site.

Results of this investigation detected two hotspots of contamination within the proposed FlexGen site which were delineated and remedial soil excavation has now been completed. A report on the remedial works has been submitted to the satisfaction of the Agency via Eden reference number LR052440 and is included in EIAR Appendix 8 reports - Poolbeg FlexGen Hotspot Remedial Excavation and Validation Report.

Assessment of soil and groundwater quality across the remainder of the proposed FlexGen site, the proposed BESS site and the Poolbeg facility as a whole has not identified significant contamination that would pose a risk to human health or controlled water receptors.

6.4 Emissions to Noise

Poolbeg CCGT Noise Monitoring

There are emission limits in relation to noise set out in the existing IE licence. However, monitoring was discontinued at the NSLs on agreement with the Agency in 2011 (Correspondence P0577-02/AP03MG, dated 28/04/11). This was due to the difficulty to obtain credible noise readings as dominant noise at the NSLs is due to traffic, port activity and various other local industrial activity. Noise Monitoring at the site boundary took place in 2014 and again 2018. The site is compliant with noise limits.

FlexGen and BESS Projects Noise Impact Assessment

A noise impact assessment has been carried out in line with guidance provided in *Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* as published by the Environmental Protection Agency's Office of Environmental Enforcement.

Details of this assessment is contained in the EIAR submitted with this application

Attachment 6-3-1 – Environmental Impact Assessment Report, Volume 2 – Main Report, as follows;

- Chapter 11 Noise and Vibration

Attachment 6-3-1 – Environmental Impact Assessment Report, Volume 3 – Appendices, as follows;

- Appendix 11 - Sound Power Levels of fixed plant used in the operational noise assessments

Potential noise impacts from Poolbeg FlexGen and BESS are considered separately and in combination with the other FlexGen (Ringsend FlexGen) and BESS (South Wall BESS) projects proposed for the Poolbeg Peninsula. An assessment of cumulative noise impacts

from the other industrial developments close-by are also considered. These include Dublin Bay Power, Poolbeg CCGT, the Covanta Dublin Waste to Energy facility and Ringsend Wastewater Treatment Plant.

The operational noise impacts of Poolbeg FlexGen and BESS when considered individually demonstrated that the predicted noise levels at the representative noise receptors in Dublin Bay area due to the proposed developments are below the lowest criterion given in the NG4 guidance of 45 dB(A) Leq for the night-time. The noise levels are therefore also below the criteria for daytime and evening of 55 dB(A) Leq and 50 dB(A) Leq respectively. The predicted noise levels are also more than 10 dB below the baseline noise levels measured in 2016, 2018 and 2019. This indicates that predicted operational noise from either the FlexGen plant or BESS will not contribute to an increase in prevailing noise as they are sufficiently below the baseline. Therefore, there is no potential significant adverse effect due to operational noise from Poolbeg FlexGen or BESS.

The predicted operational noise at the representative noise receptors due to the four project elements (The proposed developments of two FlexGen and two BESS plants on the Poolbeg Peninsula) shows the combined predicted noise level does not exceed the night-time criteria of 45 dB(A).

Cumulative impacts of predicted operational noise from the four proposed project elements (2 Flexgen and 2 BESS Projects on the Poolbeg peninsula) and the three individual operating licensed sites in the area were considered and the predicted noise levels at the representative noise receptors show that the combined level does not exceed the night-time criterion of 45 dB(A).

The modelling assessment indicates that the noise contribution from Poolbeg CCGT and the proposed FlexGen and BESS will meet the limits set out in NG4, and no mitigation will be required.

6.5 Emissions Other (Foul)

Existing Poolbeg CCGT

Foul water from Poolbeg Generating Station currently discharges through the site foul sewer network system and is discharged offsite into the Dublin City Council foul network system.

Proposed FlexGen Site

The are no existing foul water drains on the proposed FlexGen site. It is proposed to discharge foul water generated by the new development to the existing foul sewer network associated with Poolbeg Generating Station. Located approximately 110 m north west of the proposed site. All connection works will be carried out in accordance with the requirements of Dublin City Council and Irish Water.

The foul drainage proposals must cater for the wastewater generated in the welfare facilities of the proposed development. These welfare facilities include for one toilet and a sink. The proposed station will be unmanned and as such will generate small quantities of foul waste. On the infrequent occasions when the facility is manned, a two-person crew can be expected to use each of the facilities four times a day. Assuming they would be present for no more than three days on a given week, this would result in a maximum contribution of approximately 91 litres of foul waste per week per person.

Further details in relation to foul drainage is available in the following;

Attachment 6-3-1 – Environmental Impact Assessment Report - Volume 3 – Appendices, as follows;

- Appendix 5 ESB Poolbeg Flexible Generation - Drainage and Services

Proposed BESS Site

There is no proposed foul network for the BESS development. Existing foul services and structures that cross the site are proposed to be rerouted internally within the site as required or removed if redundant.

7.0 Waste Management

7.1 Existing Poolbeg CCGT Station

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 and 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.

7.2 Proposed FlexGen and BESS Assets

It is anticipated that the waste produced from the proposed developments will be very small due to the mode of operation anticipated for the developments. 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. A description of how waste will be managed at the proposed development has been outlined in Attachment -8-2-1- Waste Hierarchy. Details regarding proposed waste volumes and management systems can be found as part of this application in the following attachments;

- Attachment-8-1-Waste Generated
- Attachment -8-2-1 Waste Hierarchy

8.0 Accident Hazards Involving Dangerous Substances

COMAH Regulations and SEVESO Directive 7

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 amended to reflect this change (Refer to Technical Amendment C of IE Licence P0577-03).

As a result, Poolbeg site 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 Poolbeg site and considered an Upper Tier Seveso site by the HSA, ESB Poolbeg 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 FlexGen 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 FlexGen plant is provided in Appendix 5D of the EIAR.

Seveso Sites

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

The proposed FlexGen plant at Poolbeg will store a maximum of 182m^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 156tonnes; below the 2,500 tonnes threshold. In accordance with current regulations, the proposed development is not classified as a Seveso site and Seveso Ill regulations do not apply.

The proposed FlexGen diesel storage will not classify the Poolbeg site as a SEVESO site.

9.0 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 FlexGen development.

10.0 Materials and Raw Products

Existing Poolbeg CCGT Station

In 2019 Poolbeg generated 634 gigawatt hours (GWh) of electricity and used 18(GWh) of this electricity to operate the station itself.

The principal material/substance that is used is natural gas as a fuel to fire the gas turbines and in 2019 approximately 145,000,000 Nm^3 of natural gas was consumed by the plant.

Gas oil which is a low-sulphur content light distillate similar to diesel is required as an emergency fuel back-up in accordance with the secondary fuel requirements of the Commission for Regulation of Utilities (CRU). Gasoil is only used for testing purposes and in times of grid system emergency. No gasoil was consumed by the gas turbines during 2019.

In 2019 water use was approximately 56,000 m^3, extracted from the public water supply system.

Proposed Poolbeg Flexgen Plant

The principal fuel proposed for use for electricity generation is natural gas. Two operational scenarios have been identified in relation to the proposed development, that of a worst case scenario and that of a conservative scenario have been identified for the materials and raw product. The methodology of both scenarios has been detailed in the paragraphs below.

Conservative (expected) Operational Scenario which assumes that the proposed FlexGen plant operates for 1,000 hours per year running on natural gas with 607 of those hours assumed to be start-up hours as a worst-case. Operational hours were assumed to occur between 6am and 8am in the morning and between 4pm and 7pm in the evening with a greater number of daily operational hours in colder months (maximum of 5 hours per day) and a lower number of hours during warmer months (minimum of 1 hour per day). It is anticipated under a conservative operational case scenario that approximately 21,000,000 Nm^3 of natural gas and approximately 40,000 m^3 of water will be consumed by the station over the course of a year. It is anticipated that Poolbeg FlexGen will generate approximately 75 gigawatt hours (GWh) of electricity over the course of a standard year running for 1000 hours.

Worst-case Operational Scenario which presumes that the proposed FlexGen operates for every hour of the year running on natural gas. This is an unrealistic scenario but has been modelled to ensure all possible conditions over the course of each year have been considered. It is anticipated under a worst-case scenario that approximately 180,000000 Nm^3 of natural gas and approximately 350, 000 m^3 of water will be consumed by the station over the course of a year.

Gas oil, which is a low-sulphur content light distillate similar to diesel, will be available as a back-up fuel in line with the requirements of the Commissioner for the Regulation of Utilities (CRU). It is not anticipated that gas oil will not be consumed outside of commissioning, annual testing or emergency scenarios. It should be noted that conservative estimated annual testing may consist of up to 18 hours running per year.

Proposed Poolbeg BESS Plant

BESS does not require fuel or water to operate, water demand is very low estimated at 6 m^3 per year.

Expected water and energy consumption for the proposed developments (based on conservative FlexGen operational scenario above and estimated BESS standby electrical load) and existing Poolbeg CCGT water and energy consumption (based on AER data 2017 -2019) have been presented as part of this application in the following attachment.

- Attachment -4-1-Water-Energy-Usage

11.0 Environmental Conditions and Designations at the Site in relation to Air Emissions

Poolbeg Power Station is located in Air Quality Zone A – Dublin.

The existing CCGT station has adhered to licence emission limits to air over the past three years**.** A small number of minor incidents relating to air have been reported during this period which concern air monitoring equipment functioning and not breaches of Emission Limit Values (ELVs). These incidents were all resolved promptly, and the likelihood of reoccurrence is low.

The proposed FlexGen station will operate as a peaking plant and comprises of an aero-derivative gas turbine which will run primarily on natural gas with a dual -fuel ability to run on gasoil as a back-up fuel source. Gas oil is normally only used for testing purposes and in times of grid system emergency. Peaking plants are used to provide additional power to the grid and will only run when there is a high demand, known as peak demand, for electricity.

The following EIAR chapter and Air Quality Assessment are relevant in relation to Air Emissions.

Attachment 6-3-1- Environmental Impact Assessment Report, Volume 2 – Main Report, as follows;

- Chapter 13 Air Quality and Climate

Attachment 6-3-1 - Environmental Impact Assessment Report, Volume 3 – Appendices, as follows;

- Appendix 13 ESB FlexGen Air Quality Assessment

The contributions of emissions from the proposed FlexGen Plants (Poolbeg and Ringsend) and the existing Poolbeg and Dublin Bay Power to off-site ambient pollutant concentrations was assessed for a range of scenarios and the location and maximum of the worst-case ground level concentration

BESS does not have any operational air emissions and thus is not required to be assessed.

Nitrogen Oxides (NOx)

Per the EPA Air Quality in Ireland 2019 report there was one exceedances of the EU annual limit values in relation to nitrogen dioxide. NO2 was measured at 21 monitoring stations in Ireland in 2019. There was one exceedance of the EU annual limit value at St. John's Road West in Dublin. All other concentrations observed were below the annual limit values.

Air dispersion modelling scenarios as detailed in the air quality assessment for the proposed FlexGen are summarised as follows;

The Conservative Operational Scenario (Gas) which assumes that the proposed Poolbeg FlexGen plant operates for 1,000 hours per year running on natural gas. Testing of the FlexGen plant running on gas oil as a fuel source was also assumed to occur for 2 hours per month. Existing emission points A1-5 and A1-6 at the Poolbeg Generating Station were all assumed to be running on natural gas for all hours of the year and existing emission point A1-4 was assumed to be running on natural gas for four hours per day, every day of the year. Operational details and process emissions for the existing emission points were based on a review of the IED licence for the facility, the recent Annual Environmental Reports, available stack monitoring reports and supplemented by information from the facility operators where any gaps remained after the information review.

Conservative Operational Scenario Modelling Results

The NO2 modelling results for the *Conservative Operational Scenario* indicate that the ambient ground level concentrations are below the relevant air quality limit values for NO2. Emissions from the facility including background lead to an ambient NO2 concentration which is 61% of the maximum 1-hour limit value (measured as a 99.8th%ile) and 36% of the annual limit value at the worst-case off-site receptor for the worst-case year modelled (2018).

The **Worst-case Gas Scenario** which presumes that the proposed Poolbeg FlexGen operates for every hour of the year running on natural gas. This is an unrealistic scenario that has been modelled to ensure all possible meteorological conditions over the course of each year have been considered. Existing emission points A1-5 and A1-6 at the Poolbeg Generating Station were all assumed to be running on natural gas for all hours of the year and existing emission point A1-4 was assumed to be running on natural gas for four hours per day, every day of the year.

Worst-case Gas Scenario Modelling Results

The NO2 modelling results for the *Worst-case Gas Scenario* indicate that the ambient ground level concentrations are below the relevant air quality limit values for NO2. Emissions from the facility including background lead to an ambient NO2 concentration which is 62% of the maximum 1-hour limit value (measured as a 99.8th%ile) and 36% of the annual limit value at the worst-case off-site receptor for the worst-case year modelled (2018).

Worst-case Diesel Scenario which assumes that the proposed Poolbeg FlexGen plant operates for 1,000 hours per year running on diesel. Testing of the Poolbeg FlexGen plant running on diesel as a fuel was also assumed to occur for 2 hours per month. This represents an unrealistic scenario as the proposed Poolbeg FlexGen plant will only operate on diesel in the event of a national electrical system emergency in the unlikely event of an interruption to the natural gas supply to the site which would likely be resolved within a few hours. Existing emission points A1-5 and A1-6 at the Poolbeg Generating Station were all assumed to be running on diesel for up to 500 hours per year and running on gas for all remaining hours of the year. Existing emission point A1-4 was unrealistically assumed to be running on diesel for four hours per day, every day of the year.

The NO2 modelling results for the *Worst-case Diesel Scenario* demonstrate that ambient pollutant concentrations (including background) beyond the site ownership boundary are well below the applicable ambient air quality limit values at all off-site receptors.

Existing Scenario – Poolbeg Generating Station

The Poolbeg NO_2 modelling results for the *Existing Scenario (Poolbeg CCGT only)* as detailed in the air quality assessment report indicate that the ambient ground level concentrations are below the relevant air quality limit values for NO_2. Emissions from the facility including background lead to an ambient NO_2 concentration which is 61% of the maximum 1-hour limit value (measured as a 99.8th%ile) and 36% of the annual limit value at the worst-case off-site receptor for the worst-case year modelled (2018).

Cumulative Scenario for Poolbeg Peninsula

As the Poolbeg Power Station, the proposed Poolbeg FlexGen, and Dublin Waste-to-Energy facility are located in close proximity to both the Dublin Bay Power Plant and a proposed Ringsend FlexGen, a *Cumulative Scenario* assessing the impact from all five facilities operating simultaneously has been modelled for the worst-case pollutant (NO2) using 5 years of meteorological data (Dublin Airport 2015 – 2019). The C*umulative Scenario* includes all existing emission points at all facilities as well as the proposed Poolbeg and Ringsend FlexGen plants. A worst-case, unrealistic scenario has been assumed for the *Cumulative Scenario* that the proposed FlexGen plants will both operate continuously for all hours of the year, running on natural gas.

The modelling results for the Cumulative Scenario demonstrate that ambient NO_2 concentrations (including background) beyond the site ownership boundaries are well below the applicable ambient air quality limit values at all off-site receptors modelled.

Carbon Monoxide (CO)

Conservative Operational Scenario Modelling Results

The CO modelling results for the *Conservative Operational Scenario* indicate that the ambient ground level concentrations are below the relevant air quality limit value for CO. Emissions from the facility including background lead to an ambient CO concentration which is 31% of the maximum 8-hour limit.

Worst-case Gas and Diesel Scenarios

The CO modelling results for the *Worst-case Gas Scenario* indicate that the ambient ground level concentrations are below the relevant air quality limit value for CO. Emissions from the facility including background lead to an ambient CO concentration which is 31% of the maximum 8-hour limit value at the worst-case off-site receptor for the worst-case year modelled (2018).

The CO modelling results for the Worst-case diesel scenario demonstrate that ambient pollutant concentrations (including background) beyond the site ownership boundary are well below the applicable ambient air quality limit values at all off-site receptors.

PM Particles

Per the EPA Air Quality in Ireland 2019 report there were no exceedances of the EU annual limit values (annual and daily). However, the World Health Organisation (WHO) air quality guideline daily value was exceeded at fourteen monitoring stations.

Per the same report there were no exceedances of the EU annual limit in relation to $PM_{2.5}$ particles in 2019. However, the WHO air quality guideline annual and daily values were exceeded respectively at 5 and 25 of the 30 monitoring stations

It is expected that PM limits will only be stated in the revised IE licence in the circumstances where the proposed FlexGen is operating on its secondary fuel (gas oil). Particulate emissions have not been included with the air quality assessment report as the emissions of particulates associated with the proposed FlexGen plant will be negligible.

In the circumstances where the FlexGen will be operating on its primary fuel, natural gas, as per the Industrial Emissions Directive and BAT conclusions, specifically BAT 4, emissions limits for PM do not apply. BAT assessments can be found in submission Attachment – 4-7-1 CID assessment – 2020 and further details on air emissions can be found in Attachment-7-3-1- Emissions to Air.

Sulphur Dioxide

Sulphur Dioxide emission limit values are applicable when the FlexGen station is operating using secondary fuel gasoil.

The SO2 modelling results for the Worst-case diesel scenario demonstrate that ambient pollutant concentrations (including background) beyond the site ownership boundary are well below the applicable ambient air quality limit values at all off-site receptors.

12.0 Fuel & Chemical Storage

Existing Poolbeg CCGT

All hazardous substances on site are controlled in accordance with Code of Practice for Chemical Agents Regulations 2016 and as per IE licence requirements.

Fuel and Chemical Storage in the existing CCGT plant is limited to hydrocarbons (transformer oils and fuel oils) and bulk chemicals used for the existing CCGT for boiler water conditioning and for regeneration of the water treatment plant. They are principally ammonia, sodium hydroxide, sulphuric acid and caustic brine. All bulk chemical and fuel tanks are bunded, tested and inspected as per EPA guidelines and IE Licence requirements. Other chemicals stored appropriately in small quantities are used for standard laboratory testing and other purposes. Diesel for supply to the gas turbines is supplied from the adjacent NORA site. Drainage from station areas is through a series of drainage lines which pass through oil separators before discharging to the Liffey Estuary. Drainage lines are inspected and tested as per IE licence requirements.

Fuel and Chemical storage FlexGen Site

Fuel Storage, which is primarily limited to hydrocarbons (transformer oils, fuel oils etc) will be stored within bunded areas. Situations where oils will be used or where the possibility of oil spillage exists, will be bunded to prevent discharge into the environment. In the unlikely event of a spillage occurring into a bunded area, the effluent will be pumped out to a road tanker for re-use or disposed of in accordance with relevant legislative requirements. Drainage from the station bunds is through a series of drainage lines which pass through Class 1 oil separators with high level oil alarms which are connected back to the plant control panel which is connected to a manned control centre via the plants Supervisory Control and Data Acquisition (SCADA) telecom relay system to discharging to an attenuation pond before discharging to the river

The proposed FlexGen development includes for a liquid fuel tank which will be supplied by pipeline from the NORA oil farm. This day tank will contain oil for an 8-hour supply with an approximate capacity of 182 m^3. As stated above, the remaining required capacity will be stored in the adjacent NORA tank farm.

Chemical storage on the FlexGen site will occur primarily for the purposes of water treatment, Attachment-4-8-1 Operational Report discusses the water treatment plant options currently being considered for Poolbeg FlexGen. The chemical tanks specific to water treatment will be contained within the water treatment plant building.

- See Attachment-4-8-1-Operational Report

All fuels and chemicals stored on site will be subject to a COSHH (Control of Substances Hazardous to Health) assessment and compliance with the requirements of REACH;

- All containers and bunds will be inspected regularly;
- Accidental spillages will be contained and cleaned immediately;
- Spill kit(s) will be stored on site; and
- All potentially polluting substances including waste will be stored in

designated areas in appropriate containers within bunds, drip trays or spill pallets, as required.

All tanks containing liquids whose spillage could be harmful to the environment will be bunded. No tanks or pipework containing liquids such as fuel, oils or chemicals will be stored below ground.

13.0 Accidental Emissions

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

- Provision of bunding to 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 FlexGen and BESS sites.
- Emergency Response Procedure relating to both Safety and Environmental incidents.
- Storage of all oils and lubricants in bunded oil stores/areas; and
- 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 development to risks of major accidents and/or natural disasters which are relevant the project have been assessed and included as part of the EIAR.

14.0 Cessation of Activity

As required by Condition 10 of the IE licence a Decommissioning Management Plan (DMP) / CRAMP was prepared which addresses the key issues that would occur in the orderly shutdown of all station activities.

The DMP/CRAMP was prepared in accordance with the EPA's Guidance on assessing and costing environmental liabilities (EPA, 2014).

In addition to the DMP a separate Environmental Liabilities Risk Assessment (ELRA) has been prepared and submitted to the EPA in accordance with Condition 12 of the IE licence. This identifies and addresses potential liabilities from past and present activities on the site and then financial provision required to deal with such incidents should they arise.

The preparation of the DMP 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 DMP and ELRA will be prepared at the appropriate time, to include consideration of the proposed FlexGen and BESS, with consideration for any conditions of the IE Licence for the proposed new development which will include details of decommissioning of all plant and equipment ensuring that there will be no environmental pollution.

15.0 Assessment of Alternatives

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

Refer to Attachment 6-3-1 - Environmental Impact Assessment Report, Volume 2 – Main Report, as follows;

- Chapter 2 Assessment of Alternatives.

16.0 EIAR - Likely Significant Effects

The EIAR which accompanied the planning application and this licence review application for the station describes in detail the likely significant effects anticipated as a result of the proposed development. 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.

Environmental Factor	Likely significant effects identified	Brief description of effect	Mitigation measures proposed to control effect
Biodiversity FlexGen and BESS Operational Phase	Negligible potential for significant disturbance from noise and visual disturbance during operation of the FlexGen or BESS. The effects of drainage from either FlexGen or BESS projects on biodiversity are considered to be negligible. FlexGen Only; The effects of released air emissions during the operation of the FlexGen on biodiversity is considered to be negligible. No increased risk of collision/bird strike.	N/A	Operational impacts on Biodiversity were deemed negligible. There is no requirement for mitigation measures.
Land, Soil and Ground Conditions Flexgen and BESS Operational Phase	No significant effects identified.	N/A	Risk mitigation measures have been designed into the initial design of the FlexGen and BESS, such as bunded fuel tank, bunded transformers and impermeable surfacing reducing infiltration. No further mitigation is considered necessary for the operational phase.
Water Environment FlexGen and BESS Operational Phase	No significant impacts are assessed from the following; Pollution from site drainage reaching Dublin Bay. Mobilisation of residual contamination. Flood Risk.	N/A	Operational risk mitigation measures have been designed into the FlexGen design. The drainage system has been designed to mitigate the effects of severe rainfall. Incident rainwater will collect in an attenuation tank which will slowly empty, reducing the surge of water entering the drainage system and reducing flood risk. The development platform will be raised outside the 0.1% annual exceedance probability with climate change factored flood risk level. The safety systems designed into the plant will monitor rainfall levels in bunded areas and maintain these free of rainwater. These systems are designed to prevent contaminated water being discharged into the drainage system. No other mitigation is required. As no significant impacts are assessed as likely, no monitoring is required.

Environmental Factor	Likely significant effects identified	Brief description of effect	Mitigation measures proposed to control effect
Landscape and Visual FlexGen and BESS Operational Phase	Based on the landscape and visual impact judgements provided throughout the Landscape and Visual Impact Assessment, the proposed FlexGen and BESS developments are not considered to give rise to any significant landscape or visual impacts.	N/A	There are no additional mitigation measures proposed in relation to the proposed Poolbeg FlexGen or BESS development. The siting and design of the proposed developments are the main mitigation measures associated with this project (i.e. the mitigation measures are already embedded). In addition, any proposed screening is not considered necessary or effective in this overtly industrial context. Owing to this, monitoring of these measures is neither necessary nor applicable.
Noise and Vibration FlexGen and BESS Operational Phase	There is no potential significant adverse effect due to operational noise.		No specific mitigation measures are proposed for the mitigation of operational noise impacts at off-site sensitive receptors. However, noise emissions should be minimised at source, in accordance with best practice, to minimise the exposure site personnel to noise from operational plant. The siting and design of the development is the main mitigation measure associated with this project (i.e. the mitigation measures are already embedded). t is expected that the noise limits will be in line with those specified in NG4 against which this development has been assessed.
Archaeology, Architecture and Cultural Heritage Operational Phase FlexGen and BESS	As no cultural heritage impacts have been identified for the operational phase, no mitigation measures are required.	N/A	
Air Quality and Climate FlexGen and BESS Operational Phase	There are no significant impacts to climate predicted as part of the operational phase of the proposed FlexGen development therefore no mitigation is proposed.		The stack height of the development has been designed to ensure that an adequate height was selected to aid dispersion of the emissions and achieve compliance with the EU ambient air quality standards at all off-site locations (including background concentrations).

Environmental Factor	Likely significant effects identified	Brief description of effect	Mitigation measures proposed to control effect
Waste FlexGen and BESS Operational Phase	No significant effects identified.	N/A	The facility is small and will not generate process waste during its operation and so no further mitigation is considered to be required. There will be a small amount of domestic type waste produced in the welfare facilities which will be managed in accordance with ESB's existing waste disposal procedures. This will have no significant effect on waste management resources. Mitigation has been built into the design and procurement of the FlexGen and BESS. The modular nature of the construction has been selected to increase resource efficiency by reducing waste generated during the construction process.
Traffic, Transportation and Material Assets FlexGen and BESS Operation Phase	No significant impact identified	N/A	Given the significantly lower traffic movements during the operational phase when compared to the construction phase. It is not envisaged that there will be mitigation measures required for the operation phase.
Population and Human Health FlexGen and BESS Operation Phase	No significant effects identified	N/A	There are no additional mitigation measures proposed to address population and human health effects in relation to the FlexGen and BESS developments. It is assumed that relevant mitigation measures would be implemented and are proposed within Chapter 13: Air Quality, Chapter 11: Noise and Vibration and Chapter 15: Traffic, Transport and Material Assets of the EIAR.