NNB GENERATION COMPANY (HPC) LTD
Company Document

HPC COMBUSTION ACTIVITY PERMIT VARIATION – PERMIT APPLICATION REPORT

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Owner & Approver	Ross Pettigrew – Conventional Environment Technical Manager
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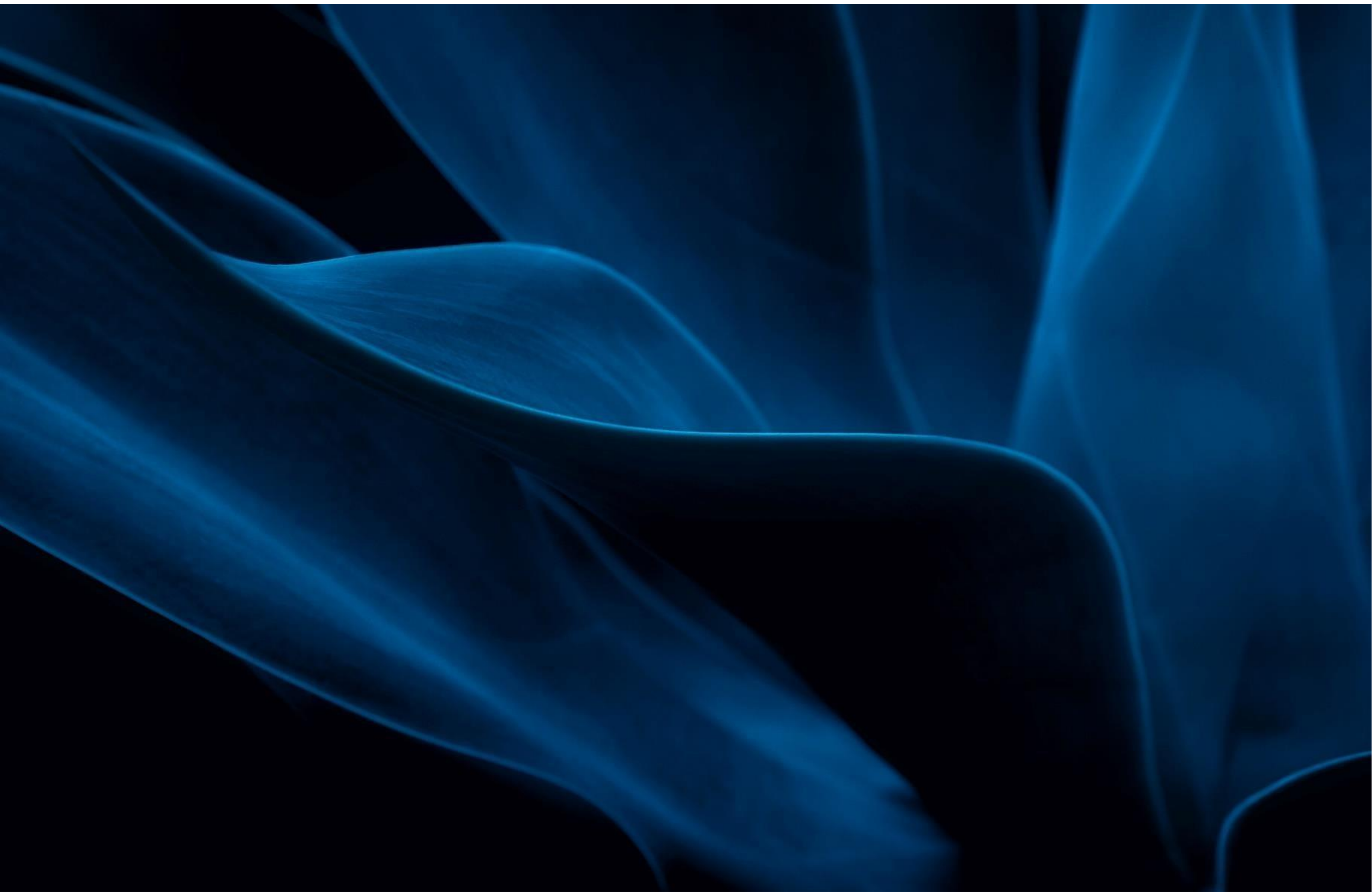
001	P1 - Published for Implementation		Emma Haymer	See EDRMS

NNB Generation Company Ltd

Hinkley Point C

Combustion Activity Environmental Permit Variation

September 2025



Document Control Sheet

Identification	
Client	Nuclear New Build Generation Company
Document Title	HPC Combustion Activity Environmental Permit Variation
Bureau Veritas Ref No.	AIR13252516

Contact Details		
Company Name	Bureau Veritas UK Limited	Nuclear New Build Generation Company
Contact Name	Emma Haymer	Ross Pettigrew
Position	Associate Director	Conventional Environmental Technical Manager

Configuration				
Version	**Date**	**Author**	**Reason for Issue/Summary of Changes**	**Status**
1.0	September 2024	E Haymer	Updated following re-modelling of diesel generators	Draft
1.1	January 2025	E Haymer	Updated following Client comments	Draft
1.2	February 2025	E Haymer	Minor edit	Draft
1.3	July 2025	E Haymer	Updated following Environment Agency comments	Draft
2.0	September 2025	E Haymer	Updated following Environment Agency comments	Draft

	Name	Job Title	Signature
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Approved By	E Haymer	Principal Consultant	

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1 Introduction

This report has been compiled in order to support NNB Generation Company Limited (NNB GenCo) with a Combustion Activity (CA) Environmental Permit (EP) variation application associated with the proposed UK European Pressurised Water Reactors at the Hinkley Point C (HPC) site (the Site), as required under the Environmental Permitting (England and Wales) Regulations 2016 (as amended)[1]. The combustion activity is associated with the provision of back-up power to the Site, comprising several diesel generators.

In relation to combustion activity, the Site currently operates under Environmental Permit reference EPR/WP3200PJ and will continue to operate under this permit during the construction phase of the Site. A separate Environmental Permit has been obtained to cover combustion activities during the operational phase of the site (reference EPR/ZP3238FH). Due to a number of design changes that have taken place since the previous application, the Site wishes to vary this operational Environmental Permit. The variation notice number is EPR/ZP3238FH/V005.

NNBGenCo is a wholly owned subsidiary of NNB Holding Company Limited, which in turn is 80% owned by EDF Holdings Limited and 20% owned by General Nuclear International Limited. In turn:

- EDF Energy Holdings Limited is a wholly owned subsidiary of Electricité de France S.A.; and
- General Nuclear International Limited is a wholly owned subsidiary of China General Nuclear Power Corporation Limited.

The EDF Group of companies own and operate a number of nuclear power stations in the UK, including Hinkley Point B (HPB). The EDF Group of companies also operates over 50 nuclear reactors in France, with a combined total capacity of approximately 63 GW_e. EDF is the largest nuclear utility in the world.

As a member of the EDF Group of companies, NNB GenCo will have access to the resources, experience and expertise of the world's largest owner and operator of nuclear power stations. NNB GenCo has taken, and will continue to take, advantage of the experience and resources of its parents and affiliates. However, as the intelligent customer and knowledgeable owner and Operator of HPC, NNB GenCo will establish its own organisation and procedures that account for the Office for Nuclear Regulation (ONR) and Environment Agency guidance, and these will be developed over time based upon the status of the project.

1.1 Relevant Activities

Each of the two reactors will have separate, standalone emergency power supply. This will be provided by several diesel generators, as listed in Table 1.1. Generators are described as either 'fixed' (i.e. static within buildings), or 'mobile' (also referred to as 'Plug-in-Point', i.e. they are designed to be able to be moved and connected to the appropriate facility needing power). Appendix A provides a list of all key terms, definitions and abbreviations cited in this report.

Since the total aggregated rated thermal input of the back-up generators is in excess of 50 MW_{th}, they are prescribed under the EP regulations (as transposed into UK legislation to comply with the requirements of the Industrial Emissions Directive 2010/75/EU (IED)[2].

The regulated activity is defined under Section 1.1, Part A(1), Paragraph (a) of Schedule 1[3] of the EP regulations as:

> *"Burning any fuel in an appliance with a rated thermal input of 50 or more megawatts."*

[1] https://www.legislation.gov.uk/uksi/2016/1154/contents

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32010L0075

[3] https://www.legislation.gov.uk/uksi/2016/1154/schedule/1/made

Rated thermal input is defined as the rate at which fuel can be burned at the maximum continuous rating of the appliance, multiplied by the gross calorific value of the fuel and expressed as megawatts thermal (MW_{th}).

This permit variation application does not seek to alter the permitted activity described above, only to amend the EP to add several diesel generators that were not included in the previous application. The EDGs and UDGs procured for site are different to the ones included in the original application, however this will not alter their activities or permit compliance.

The changes to the number of diesel generators required are as a result of design changes that have occurred since the previous permit application, to make the site more resilient in a loss of off-site power (LOOP) scenario. The variation is also being sought to update the air quality assessment to account for updated estimated duration of commissioning activities.

Table 1.1 – Back-up Diesel Generators to be Permitted

Reference ID	Description	Fixed or Mobile	Purpose	Thermal Input (MW_{th})
EDG_U1.1	EDG 1 – Unit 1	Fixed	Back-up power – U1	23.11
EDG_U1.2	EDG 2 – Unit 1	Fixed	Back-up power – U1	23.11
EDG_U1.3	EDG 3 – Unit 1	Fixed	Back-up power – U1	23.11
EDG_U1.4	EDG 4 – Unit 1	Fixed	Back-up power – U1	23.11
UDG_U1.1	UDG 1 – Unit 1	Fixed	Back-up power – U1	8.00
UDG_U1.2	UDG 2 – Unit 1	Fixed	Back-up power – U1	8.00
SEG_U1.1	SEG 1 – Unit 1	Fixed	Back-up power – U1	0.47
SEG_U1.2	SEG 2 – Unit 1	Fixed	Back-up power – U1	0.47
SEG_U1.3	SEG 3 – Unit 1	Fixed	Back-up power – U1	0.47
EDG_U2.1	EDG 1 – Unit 2	Fixed	Back-up power – U2	23.11
EDG_U2.2	EDG 2 – Unit 2	Fixed	Back-up power – U2	23.11
EDG_U2.3	EDG 3 – Unit 2	Fixed	Back-up power – U2	23.11
EDG_U2.4	EDG 4 – Unit 2	Fixed	Back-up power – U2	23.11
UDG_U2.1	UDG 1 – Unit 2	Fixed	Back-up power – U2	8.00
UDG_U2.2	UDG 2 – Unit 2	Fixed	Back-up power – U2	8.00
SEG_U2.1	SEG 1 – Unit 2	Fixed	Back-up power – U2	0.47
SEG_U2.2	SEG 2 – Unit 2	Fixed	Back-up power – U2	0.47
SEG_U2.3	SEG 3 – Unit 2	Fixed	Back-up power – U2	0.47
HDU	HDU	Fixed	Back-up power	1.34
SMDG_1	SMDG 1	Mobile*	Back-up power	3.89
SMDG_2	SMDG 2	Mobile*	Back-up power	3.89
SMDG_3	SMDG 3	Mobile*	Back-up power	3.89
CWI_1	CWI Pump 1	Fixed	Back-up power	0.10
CWI_2	CWI Pump 2	Fixed	Back-up power	0.10
BDB_Spare	BDB Spare	Mobile*	Back-up power	3.89
LLV	LLV	Fixed	Back-up power for administration building	1.28
ESS	ESS	Mobile 'Plug-in Point'	Back-up power for site systems – note there are x19 of these gens	0.14
0LLI	LLW / HUB / 0LLI	Mobile 'Plug-in Point'	Back-up power	0.53

HBS	HBS	Mobile 'Plug-in Point'	Back-up power for training centre	0.53

Reference ID	Description	Fixed or Mobile	Purpose	Thermal Input (MW$_{th}$)
HHA	HHA	Mobile 'Plug-in Point'	Back-up power for Framatome warehouse	0.53
HZG	HZG	Mobile 'Plug-in Point'	Back-up power for oil and grease store	0.53

*BDB SMDG and BDB spare has been assumed to be fixed at the time of the assessment and has been assessed as such, which represents a conservative assumption.

The relevant prescribed process under the EP Regulations relates to combustion activities and not specifically to the diesel generators. For the purposes of this variation application, the term 'plant' generally refers to the diesel generators that form the permitted installation and not the wider nuclear power station.

The reactor operations are specifically excluded from the scope of the EP variation application, as radioactive substances activities interactions are addressed under a separate environmental permit (under Schedule 23 of the EP Regulations).

1.2 Applicable Guidance

The regulatory guidance used in preparing this submission is listed below in Table 1.2.

Table 1.2 – Summary of Applicable Guidance

Title	Author	Source
Guidance A1 installations: environmental permits	Environment Agency and Defra	https://www.gov.uk/guidance/a1-installations-environmental-permits
Legal operator and competence requirements: environmental permits	Environment Agency and Defra	https://www.gov.uk/guidance/legal-operator-and-competence-requirements-environmental-permits
Risk assessments for your environmental permit	Environment Agency and Defra	https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit
Risk assessments for specific activities: environmental permits	Environment Agency and Defra	https://www.gov.uk/government/collections/risk-assessments-for-specific-activities-environmental-permits
Control and monitor emissions for your environmental permit	Environment Agency and Defra	https://www.gov.uk/guidance/control-and-monitor-emissions-for-your-environmental-permit
Best available techniques: environmental permits	Environment Agency and Defra	https://www.gov.uk/guidance/best-available-techniques-environmental-permits
Energy	Environment	https://www.gov.uk/guidance/energy-efficiency-standards-for-

Title	Author	Source
efficiency standards for industrial plants to get environmental permits	Agency and Defra	industrial-plants-to-get-environmental-permits
Technical guidance for regulated industry sectors: environmental permitting	Environment Agency	https://www.gov.uk/government/collections/technical-guidance-for-regulated-industry-sectors-environmental-permitting
Air emissions risk assessment for your environmental permit	Environment Agency and Defra	https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit
Environmental permitting: air dispersion modelling reports	Environment Agency and Defra	https://www.gov.uk/guidance/environmental-permitting-air-dispersion-modelling-reports
Best Available Technique Reference Documents for Large Combustion Plants	European Commission	https://eippcb.jrc.ec.europa.eu/reference/large-combustion-plants-0
Noise and vibration management: environmental permits	Environment Agency	https://www.gov.uk/government/publications/noise-and-vibration-management-environmental-permits
Noise impact assessments involving calculations or modelling	Environment Agency	https://www.gov.uk/guidance/noise-impact-assessments-involving-calculations-or-modelling
Monitoring emissions to air, land and water (MCERTS)	Environment Agency	https://www.gov.uk/government/collections/monitoring-emissions-to-air-land-and-water-mcerts
How to comply with your environmental permit additional guidance for: Combustion Activities (EPR 1.01). Withdrawn.	Environment Agency	https://assets.publishing.service.gov.uk/media/5b800f43ed915d74ce0f4e78/geho0209bpin-e-e.pdf

1.3 Contents of this Submission

Table 1.3 outlines the structure of this submission.

Table 1.3 – Structure of this Document

Section	Title	Brief Description
1	Introduction	Demonstration of the need for a variation to the current EP and how the EP regulations apply.
2	About the Application	A description of activities currently permitted and the requested amendments.
3	Operations	Description of the scope of activities covered by the environmental permit.
4	Best Available Techniques (BAT) Assessment	Assessment of activities and proposed control measures against indicative BAT.
5	Emissions and Monitoring	A summary of the likely emissions from the permitted activities and monitoring requirements.
6	Impact Assessment	Assessment of emissions to air and noise emissions.
7	Resource Efficiency	A summary of raw materials and energy used at the site and how they're used safely and efficiently.
8	Environmental Management System	A review of the site's Environmental Management System (EMS) and emergency plan.
9	Other Information	How the site will keep records and respond to the regulator.
Appendix A	Terms and Definitions	A list of all key terms, definitions and abbreviations cited in this report.
Appendix B	Air Quality Impact Assessment	A copy of the report produced from the detailed air dispersion modelling carried out.
Appendix C	Ecological Technical Note	A copy of the report produced considering the effect of emissions to air on habitats and species.
Appendix D	BAT Discussion: Choice of Engine	Further information pertaining to the selection process for the diesel engines relative to BAT requirements.

2 About the Application

2.1 The Site and the Operator

This document supports NNB's application to vary their existing permit to operate a Part A(1) installation under the EP regulations at HPC. The site is located adjacent to the Hinkley Point A (HPA) and Hinkley Point B (HPB) power stations near Bridgwater, Somerset. The site address is:

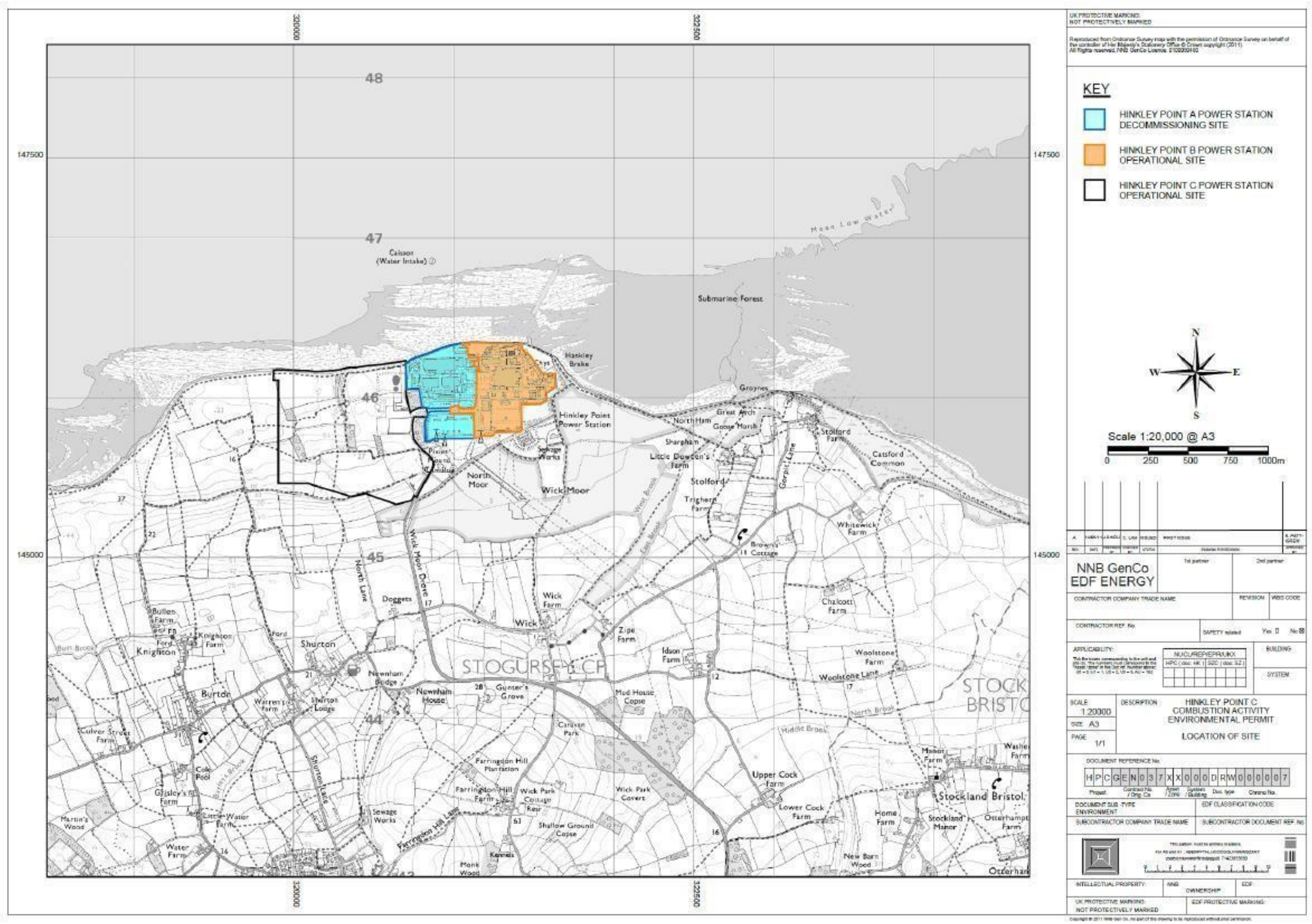
NNB Generation Company Limited
Hinkley Point C Power Station
Wick Moor Drove
Bridgwater
Somerset
TA5 1UD

National Grid Reference
ST 20300 45800

The installation is located in a coastal area adjacent to the decommissioning HPA site, owned by Nuclear Restoration Services (NRS). For the purpose of the EP regulations, the installation will lie within the Nuclear Licensed Site Boundary.

Figure 2.1 provides a location map of the site, whilst Figure 2.2 shows the revised permitted Installation boundary at the Site, in line with the details provided in this EP variation application.

Figure 2.1 – Site Location



2.2 Permitted Installation

In order to ensure power is always available to the site (even in the event of loss of connection/supply to the National Grid) the site proposes to operate a number of diesel generators. The total aggregated capacity of the planned diesel generators is in excess of 50 MW_{th} and, as such, is prescribed under Part A(1) of the EP regulations.

Table 2.1 outlines the installation as currently permitted. This permit variation application does not seek to alter the activities covered by the permit, only to amend the generator capacity covered by the description of specified activities.

Table 2.1 – Permitted Operations

Activity Reference	Activity listed in Schedule 1 of the EP Regulations	Description of Specified Activity	Limits of Specified Activity
A1	S1.1 A1 (a): Burning any fuel in an appliance with a rated thermal input of 50 megawatts or more	The combustion of fuel (gas oil) for the production of electricity using the diesel generators	From use of fuel oil, through the plant producing electricity to the discharge of combustion products to air
Directly Associated Activity			
A2	Directly Associated Activity	Fuel oil storage	From receipt of raw materials to dispatch for use
A3	Directly Associated Activity	Surface water drainage	Handling and storage of site drainage until discharge to the site surface water drainage system

The majority of plant (i.e. generators, pipework and fuel tanks) will be housed in specifically designed buildings; these buildings form the extent of the Installation. The plant housed in these buildings are either termed ‘fixed plant’ (static), or ‘mobile plant’ generators (also referred to as ‘Plug-in-Points’ as they are designed to be able to be moved and connected to the appropriate facility needing power). The proposed plant list covered by this EP variation is provided in Table 1.1.

Specifically excluded from the installation are raw material and waste storage facilities. These areas serve the wider site with the main purpose being to serve the reactor operations. The diesel generator wastes, and raw materials, comprise a minor portion of that required and generated by the wider site operations. Oily water drains from the permitted installation are covered in detail in a separate environmental permit variation application for a water discharge activity.

2.2.1 Requested Amendments to the Environmental Permit

The following amendments to permit reference EPR/ZP3238FH/A001 are proposed in line with the scope of the changes as requested and detailed within this EP variation application.

The proposed variation affects the existing Schedules within the EP in the following way:

- Schedule 1: No changes requested.
- Schedule 2: No changes requested.
- Schedule 3: Table S3.1 and Table S3.3 – updated to include new permitted release points and revised Station Blackout Diesel Generator (SBDG) terminology.
- Schedule 4: Table S4.1 and Table S4.3 – updated to include new permitted release points and revised SBDG terminology.
- Schedule 5: No changes requested.

- Schedule 6: No changes requested.
- Schedule 7: Update to Site Plan showing new emission points to air.

The proposed variation introduces the following amendment to the Schedule 3: Table S3.1 Point Source Emissions to Air – Emission Limits and Monitoring Requirements (proposed changes shown in **bold blue text**).

Table 2.2 – Proposed Amendment to Schedule 3: Table S3.1 Point Source Emissions to Air – Emission Limits and Monitoring Requirements

Emission point ref. & location	Parameter	Source	Limit (including unit)	Reference period	Monitoring frequency	Monitoring standard or method
A1, A2, A4, A5, A7, A8, A10 and A11 (each generator exhaust) [Points A1, A2, A4, A5, A7, A8, A10 and A11 on site plan in Schedule 7]	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	Essential Diesel Generator exhaust stack	1900 mg/m^3	Hourly average	Annual	BS EN 14792
	Sulphur dioxide		No limit set	Hourly average	Annual	BS EN 15267-3 [Note 1]
	Carbon monoxide		150 mg/m^3	Hourly average	Annual	BS EN 15058
	Particulate matter		50 mg/m^3	Hourly average	Annual	BS EN 13284-1
A3, A6, A9 and A12 (each generator exhaust) [Points A3, A6, A9 and A12 on site plan in Schedule 7]	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	**Ultimate Diesel Generator exhaust stack**	1900 mg/m^3	Hourly average	Annual	BS EN 14792
	Sulphur dioxide		No limit set	Hourly average	Annual	BS EN 15267-3 [Note 1]
	Carbon monoxide		194 mg/m^3	Hourly average	Annual	BS EN 15058
	Particulate matter		50 mg/m^3	Hourly average	Annual	BS EN 13284-1
A13, A14, A15, A16, A17 and A18 (each generator exhaust) [Points A13, A14, A15, A16, A17 and A18 on site plan in Schedule 7]	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**Diversified Ultimate Cooling Water Supply System Generator exhaust stack**	**1900 mg/m^3**	**Hourly average**	**Annual**	**BS EN 14792**
	Sulphur dioxide		**No limit set**	**Hourly average**	**Annual**	**BS EN 15267-3 [Note 1]**
	Carbon monoxide		**150 mg/m^3**	**Hourly average**	**Annual**	**BS EN 15058**
	Particulate matter		**50 mg/m^3**	**Hourly average**	**Annual**	**BS EN 13284-1**
A19 [Point A19 on site plan in Schedule 7]	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**Emergency Response Training Centre Back-up Generator exhaust stack**	**No limit set**	**In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published**	**After 1500 operating hours have elapsed and no less frequent than every 5 years**	**In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published**

Emission point ref. & location	Parameter	Source	Limit (including unit)	Reference period	Monitoring frequency	Monitoring standard or method
				04 June 2024 (formerly known as TGN M5)		04 June 2024 (formerly known as TGN M5)
	Sulphur dioxide		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Carbon monoxide		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Particulate matter		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
A20, A21 and A22 (each generator exhaust) [Points A20, A21 and A22 on site plan in Schedule 7]	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	Small Mobile Diesel Generator exhaust stack	No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)

Emission point ref. & location	Parameter	Source	Limit (including unit)	Reference period	Monitoring frequency	Monitoring standard or method
	Sulphur dioxide		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Carbon monoxide		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Particulate matter		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
A23 and A24 (each generator exhaust) [Points A23 and A24 on site plan in Schedule 7]	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	Cooling Water Injection Pumps Back-up Generator exhaust stack	No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Sulphur dioxide		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified	After 1500 operating hours have elapsed and no less frequent	In line with web guide: Monitoring stack emissions: low risk MCPs and specified

Emission point ref. & location	Parameter	Source	Limit (including unit)	Reference period	Monitoring frequency	Monitoring standard or method
				generators Published 04 June 2024 (formerly known as TGN M5)	than every 5 years	generators Published 04 June 2024 (formerly known as TGN M5)
	Carbon monoxide		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Particulate matter		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
A25 [Point A25 on site plan in Schedule 7]	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	Beyond Design Basis Spare Back-up Generator exhaust stack	No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Sulphur dioxide		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)

Emission point ref. & location	Parameter	Source	Limit (including unit)	Reference period	Monitoring frequency	Monitoring standard or method
	Carbon monoxide		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Particulate matter		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
A26 [Point A26 on site plan in Schedule 7]	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	HBX Building Back-up Generator exhaust stack	No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Sulphur dioxide		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Carbon monoxide		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified	After 1500 operating hours have elapsed and no less frequent	In line with web guide: Monitoring stack emissions: low risk MCPs and specified

Emission point ref. & location	Parameter	Source	Limit (including unit)	Reference period	Monitoring frequency	Monitoring standard or method
				generators Published 04 June 2024 (formerly known as TGN M5)	than every 5 years	generators Published 04 June 2024 (formerly known as TGN M5)
	Particulate matter		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
A27, A28, A29, A30, A31, A32, A33, A34, A35, A36, A37, A38, A39, A40, A41, A42, A43, A44 and A45 (each generator exhaust) [Points A27, A28, A29, A30, A31, A32, A33, A34, A35, A36, A37, A38, A39, A40, A41, A42, A43, A44 and A45 on site plan in Schedule 7]	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	Site Systems Back-up Generator exhaust stack	No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Sulphur dioxide		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Carbon monoxide		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)

Emission point ref. & location	Parameter	Source	Limit (including unit)	Reference period	Monitoring frequency	Monitoring standard or method
	Particulate matter		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
A46 [Point A46 on site plan in Schedule 7]	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	Outage Access Control Building Back-up Generator exhaust stack	No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Sulphur dioxide		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Carbon monoxide		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Particulate matter		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified	After 1500 operating hours have elapsed and no less frequent	In line with web guide: Monitoring stack emissions: low risk MCPs and specified

Emission point ref. & location	Parameter	Source	Limit (including unit)	Reference period	Monitoring frequency	Monitoring standard or method
				generators Published 04 June 2024 (formerly known as TGN M5)	than every 5 years	generators Published 04 June 2024 (formerly known as TGN M5)
A47 [Point A47 on site plan in Schedule 7]	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	Training Centre Back-up Generator exhaust stack	No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Sulphur dioxide		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Carbon monoxide		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Particulate matter		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)

Emission point ref. & location	Parameter	Source	Limit (including unit)	Reference period	Monitoring frequency	Monitoring standard or method
A48 [Point A48 on site plan in Schedule 7]	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	Framatome Warehouse Back-up Generator exhaust stack	No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Sulphur dioxide		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Carbon monoxide		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
	Particulate matter		No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)	After 1500 operating hours have elapsed and no less frequent than every 5 years	In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)
A49 [Point A49 on site plan in Schedule 7]	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	Oil and Grease Store Back- up Generator exhaust stack	No limit set	In line with web guide: Monitoring stack emissions: low risk MCPs and specified	After 1500 operating hours have elapsed and no less frequent	In line with web guide: Monitoring stack emissions: low risk MCPs and specified

Emission point ref. & location	Parameter	Source	Limit (including unit)	Reference period	Monitoring frequency	Monitoring standard or method
				generators Published 04 June 2024 (formerly known as TGN M5)	than every 5 years	generators Published 04 June 2024 (formerly known as TGN M5)
	Sulphur dioxide		**No limit set**	**In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)**	**After 1500 operating hours have elapsed and no less frequent than every 5 years**	**In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)**
	Carbon monoxide		**No limit set**	**In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)**	**After 1500 operating hours have elapsed and no less frequent than every 5 years**	**In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)**
	Particulate matter		**No limit set**	**In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)**	**After 1500 operating hours have elapsed and no less frequent than every 5 years**	**In line with web guide: Monitoring stack emissions: low risk MCPs and specified generators Published 04 June 2024 (formerly known as TGN M5)**

Note 1: certification to the MCERTS performance standards indicates compliance with BS EN 15267-3

The proposed variation introduces the following amendment to the Schedule 3: Table S3.3 Process Monitoring Requirements (proposed changes shown in **bold blue text**).

Table 2.3 – Proposed Amendment to Schedule 3: Table S3.3 Process Monitoring Requirements

Emission point reference or source or description of point of measurement	Parameter	Monitoring frequency	Monitoring standard or method	Other specifications
Essential Diesel Generators	Hours of operation	Continuous	Not applicable	None
Ultimate Diesel Generators	Hours of operation	Continuous	Not applicable	None
Diversified Ultimate Cooling Water Supply System Generators	**Hours of operation**	**Continuous**	**Not applicable**	**None**
Emergency Response Training Centre Back-up Generator	**Hours of operation**	**Continuous**	**Not applicable**	**None**
Small Mobile Diesel Generators	**Hours of operation**	**Continuous**	**Not applicable**	**None**
Cooling Water Injection Pumps Back-up Generators	**Hours of operation**	**Continuous**	**Not applicable**	**None**
Beyond Design Basis Spare Back-up Generator	**Hours of operation**	**Continuous**	**Not applicable**	**None**
HBX Building Back-up Generator	**Hours of operation**	**Continuous**	**Not applicable**	**None**
Site Systems Back-up Generators	**Hours of operation**	**Continuous**	**Not applicable**	**None**
Outage Access Control Building Back-up Generator	**Hours of operation**	**Continuous**	**Not applicable**	**None**
Training Centre Back-up Generator	**Hours of operation**	**Continuous**	**Not applicable**	**None**
Framatome Warehouse Back-up Generator	**Hours of operation**	**Continuous**	**Not applicable**	**None**
Oil and Grease Store Back-up Generator	**Hours of operation**	**Continuous**	**Not applicable**	**None**

The proposed variation introduces the following amendment to the Schedule 4: Table S4.1 Reporting of Monitoring Data (proposed changes shown in **bold blue text**).

Table 2.4 – Proposed Amendment to Schedule 4: Table S4.1 Reporting of Monitoring Data

Parameter	Emission or monitoring point/reference	Reporting period	Period begins
Emissions to air Parameters as required by condition 3.5.1.	**A1 to A49 inclusive**	Every 12 months	1 January

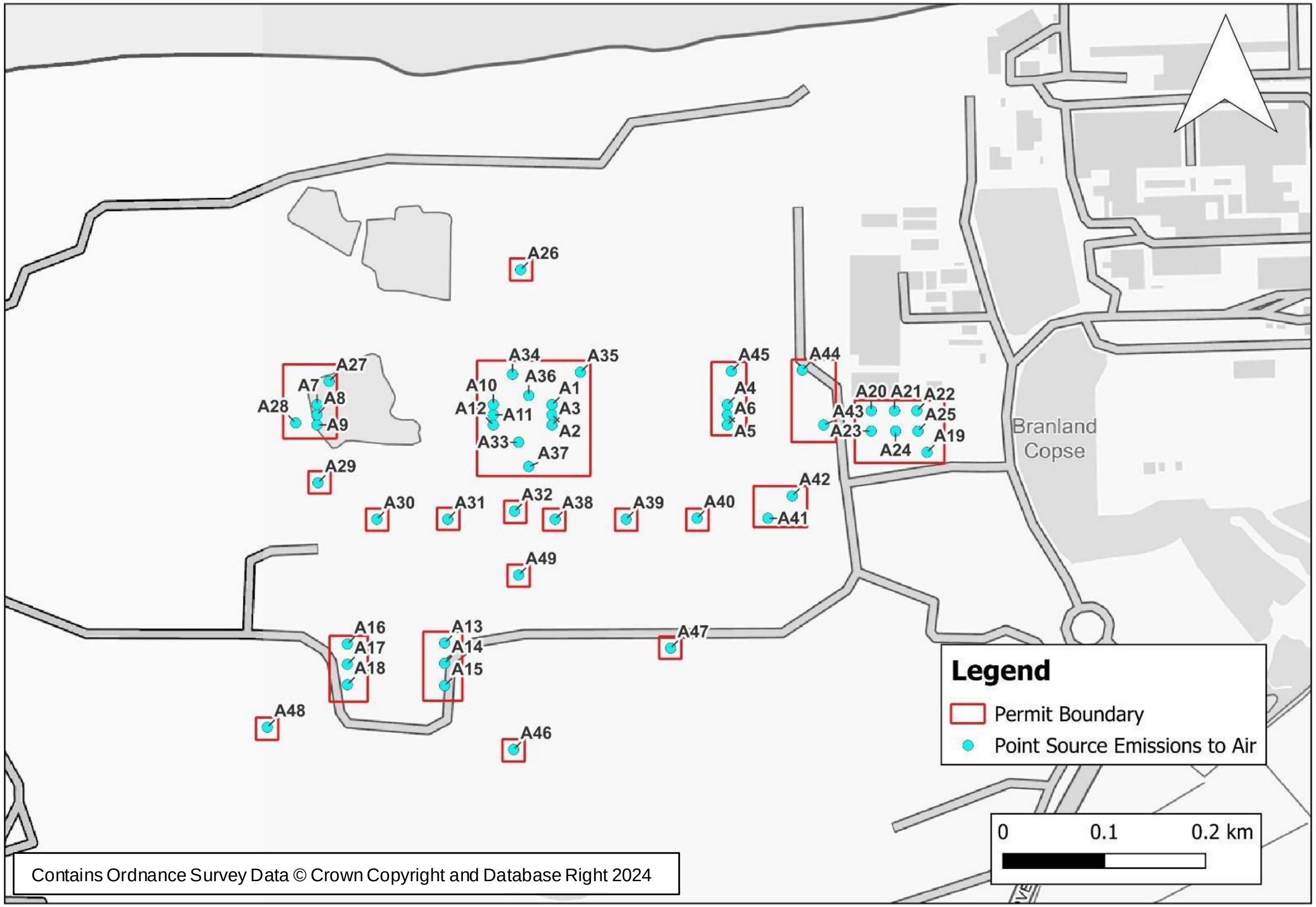
The proposed variation introduces the following amendment to the Schedule 4: Table S4.3 Performance Parameters (proposed changes shown in **bold blue text**).

Table 2.5 – Proposed Amendment to Schedule 4: Table S4.3 Process Monitoring Requirements

Parameter	Frequency of Assessment	Units
Gas oil usage	Annually	Tonnes
Essential Diesel Generators	Monthly	Hours of operation and Cumulative 12-monthly hours of operation
Ultimate Diesel Generators	Monthly	Hours of operation and Cumulative 12-monthly hours of operation
Diversified Ultimate Cooling Water Supply System Generators	**Monthly**	**Hours of operation and Cumulative 12-monthly hours of operation**
Emergency Response Training Centre Back-up Generator	**Monthly**	**Hours of operation and Cumulative 12-monthly hours of operation**
Small Mobile Diesel Generators	**Monthly**	**Hours of operation and Cumulative 12-monthly hours of operation**
Cooling Water Injection Pumps Back-up Generators	**Monthly**	**Hours of operation and Cumulative 12-monthly hours of operation**
Beyond Design Basis Spare Back-up Generator	**Monthly**	**Hours of operation and Cumulative 12-monthly hours of operation**
HBX Building Back-up Generator	**Monthly**	**Hours of operation and Cumulative 12-monthly hours of operation**
Site Systems Back-up Generators	**Monthly**	**Hours of operation and Cumulative 12-monthly hours of operation**
Outage Access Control Building Back-up Generator	**Monthly**	**Hours of operation and Cumulative 12-monthly hours of operation**
Training Centre Back-up Generator	**Monthly**	**Hours of operation and Cumulative 12-monthly hours of operation**
Framatome Warehouse Back-up Generator	**Monthly**	**Hours of operation and Cumulative 12-monthly hours of operation**
Oil and Grease Store Back-up Generator	**Monthly**	**Hours of operation and Cumulative 12-monthly hours of operation**

The proposed variation and introduction of additional generators requires amendment to the Schedule 7: Site Plan. The revised Site Plan showing all permitted release points is provided in Figure 2.2.

Figure 2.2 – Proposed Amendment to Schedule 7: Site Plan



3 Operations

3.1 Back-Up Diesel Generators

The back-up diesel generators will be installed in order to safeguard standalone emergency power supply to each of the EPR units, even in the event of loss of offsite power (LOOP) This only occurs when connection/supply to the National Grid is lost, and the station is unable to operate under house load.

The size and number of diesel generators is based on the power demand and the role of each piece of plant in emergency situations, which form the design basis of the standby/emergency power supply required. The nominal power of the diesel generators is determined by the reference emergency situation (accident) having the greatest power demand together with an additional safety margin.

Careful consideration was given to the potential technologies available for emergency power supply before concluding that diesel generators were the most appropriate. Further detail is provided in the following sections.

3.1.1 Choice of Generators

The selection of diesel generators was assessed in the Generic Design Assessment (GDA) as part of a standard design that has been assessed by the Environment Agency and the ONR. The diesel generators are required to meet safety functional requirements, be safety qualified and meet relevant quality standards as part of the nuclear safety case provided as part of the GDA. This is because the role of the emergency back-up diesel generators is to provide electrical power supply to the Key Safety Classified Systems of the nuclear power station in the event of a LOOP scenario, enabling the nuclear power station to come to, and maintain, a safe shutdown state. Failure of the emergency back-up diesel generators to perform this safety critical role therefore has the potential to result in a nuclear incident. The actual operation of the diesel generators will be minimised as far as possible, but must be adequate to ensure that they remain fit for their nuclear safety purpose.

The fundamental requirements for the selected technologies to fulfil their role as emergency back-up generators are:

- Reliability.
- Fast start-up.
- Independent of off-site systems and services.

The technologies used should cause the least environmental impact, whilst not compromising its required safety function.

The original EP application considered the above options using a fundamental requirements assessment, as well as a performance and environmental impact assessment. The assessment concluded that diesel generators run on fuel oil was considered to be the best technology in this instance and should be used to provide the emergency electricity supply to the essential systems for HPC.

A detailed discussion on the choice of Emergency Diesel Generators (EDGs) and Ultimate Diesel Generators (UDGs) employed at the Site is provided within Section 4. The remainder of diesel generators at HPC are proposed to be designed and operated with maximum NO_X emissions at the TA-Luft 2g standards; this is in line with prior discussions with the Environment Agency.

It may be emphasised that:

- The choice of diesel generators (rather than gas fired engines), is considered to be BAT with regards to safety aspects and based on operational experience. “Tried and tested” diesel generators outweigh the potential benefits of using “bespoke never before classified” equipment.

- EDGs can be started from cold very quickly (in less than 30 seconds). This is vital given their role on the HPC site.
- The decision to use EDGs is part of the reference design in the GDA, and safety assessments carried out for the EPR.

In addition, EDF Energy and the wider EDF Group of companies have extensive experience in successfully maintaining and operating EDGs on sites across the UK, as well as in support of 58 nuclear reactors in France.

3.1.2 Choice of Fuel

NNB GenCo has also considered suitable fuels for the provision of emergency power. As each plant will only be operated (under normal operations) for maintenance purposes and during periodic nuclear safety tests, the storage of fuel was an important aspect in the decision to use diesel as the fuel.

In addition to emissions of nitrogen dioxide (NO_2) and particulate matter (PM), the use of fuel oil will result in sulphur oxide (SO_x) releases. However, the combustion plant at HPC will use ultra-low sulphur diesel (below 0.001% w/w sulphur) in line with the SCOLF Regulations (as amended) 2014. This negates the need for any form of flue gas desulphurisation (FGD).

There will be a safety requirement to ensure that there is diversity in the fuel supply chain. This will not have an effect on the sulphur content of the diesel fuel used as all suppliers will be able to provide diesel with sulphur levels that comply with the Sulphur Content Of Liquid Fuels (SCOLF) Regulations.

3.1.3 Description of Plant

The majority of generator units are classified as safety equipment, providing back-up supply to supported systems in the unlikely case of Loss of Offsite Power (LOOP). The generators to be used at HPC comprise a combination of fixed plant and mobile plant, as provided within Table 1.1.

Each of the fixed plant items are self-contained in a separate room in each of the generator buildings, which are designed to withstand a range of internal and external hazards. The mobile plant is able to be moved around Site, but movement is limited to them being brought on/off Site as and when required and limited to the system/building they are supporting.

For fixed plant, the plant comprises:

- Diesel fuel system.
- Lubricating oil system.
- Coolant system.
- Start-up air system.
- Air intake and extract system.
- Alternator, excitation and protection circuit.
- Local instrumentation and control/alarm signalling.

Each generator will exhaust through its individual stack. All generators will undergo test runs to demonstrate reliability. Test runs of diesel generators will be required according to the Routine Testing schedule. The detailed test programme will depend on the station safety specification and manufacturer's recommendations.

3.1.4 Operating Scenarios

There are three operational regime/scenarios covered by this variation application. These are the broadly aligned to those detailed within the previous EP application, but incorporating the additional generators:

- Commissioning.
- Routine Testing.
- Loss of Offsite Power (LOOP).

Further details pertaining to each scenario are provided below.

3.1.4.1 Commissioning

Commissioning refers to the period of testing that generators must go through in order to ensure the generators are correctly installed and set-up prior to being able to operate on Site for their intended use. Not all generators included within the permit will be commissioned at the HPC site, due to them being mobile in nature and assigned to set 'plug in points', i.e. brought onto Site when necessary. This is shown in Table 3.1.

Table 3.1 – Generator Commissioning Details

Plant Item	Fixed or plug in point?	Commissioning Hours (estimated)	Commissioned at HPC?
EDG	Fixed	400	Yes
UDG	Fixed	400	Yes
SEG	Fixed	96	Yes
HDU	Fixed	72	Yes
BDB SMDG	Mobile*	2	Some factory testing, some at HPC
BDB CWI Pumps	Fixed	2	Some factory testing, some at HPC
BDB Spare	Mobile*	2	Some factory testing, some at HPC
LLV / HBX	Fixed	1	Yes
ESS	Plug in point	No commissioning	No
LLW	Plug in point	No commissioning	No
HBS	Plug in point	No commissioning	No
HHA	Plug in point	No commissioning	No
HZG	Plug in point	No commissioning	No

*BDB SMDG and BDB spare has been assumed to be fixed at the time of the assessment and has been assessed as such, which represents a conservative assumption.

The assessment of Commissioning scenarios has considered three sub-scenarios, all based upon commissioning of the EDGs and UDGs only. These plant are the largest and most polluting, therefore commissioning of other generators will not have as great an effect as commissioning of the EDGs and UDGs. Full details of the assessed Commissioning scenarios are provided in Appendix B.

3.1.4.2 Routine Testing

Routine testing refers to 'normal' operation of the back-up generators, during periods of regular maintenance and testing that will be scheduled throughout the lifetime of the power station. Again, routine testing differs according to whether the plant is fixed or a plug in point (i.e. mobile). The anticipated operating profiles for routine testing for each of the generators covered by the permit is shown in Table 3.2. Full details of the assessed Routine Testing scenario are provided in Appendix B.

Table 3.2 – Generator Routine Testing Details

Plant Item	Fixed or plug in point?	Routine Testing Hours (per annum, estimated)
EDG	Fixed	36
UDG	Fixed	36
SEG	Fixed	4
HDU	Fixed	144
BDB SMDG	Mobile*	54
BDB CWI Pumps	Fixed	54
BDB Spare	Mobile*	54
LLV / HBX	Fixed	54
ESS	Plug in point	No routine testing
LLW	Plug in point	No routine testing
HBS	Plug in point	No routine testing
HHA	Plug in point	No routine testing
HZG	Plug in point	No routine testing

*BDB SMDG and BDB spare has been assumed to be fixed at the time of the assessment and has been assessed as such, which represents a conservative assumption.

3.1.4.3 LOOP

This scenario will cover a loss of off-site power (LOOP) situation. This only occurs when connection/supply to the National Grid is lost, and the station is unable to operate under house load.

A worst-case scenario of a 24-hour LOOP (LOOP Scenario A) event with all eight EDGs operating simultaneously has been assumed within the assessment. Probability analysis within the 2018 assessment[4] indicated that short LOOP scenarios (up to 2 hours) represent more than 95% of possible LOOP scenarios and therefore would be a credible worst-case scenario to assess. However, in order to demonstrate an assessment of the worst-case, a 24-hour LOOP event scenario would take account of a potential scenario (however unlikely) whereby LOOP occurs for longer than a 2-hour period, in order to assess the impact for longer periods.

Following a LOOP event, the EDGs are not immediately shut down when LOOP is over, in order to ensure that off-site power has been successfully secured.

In addition to operation of the EDGs, there may be a series of smaller generators that will also be called upon in the event of a LOOP. These are detailed in Table 3.3.

An additional 72-hour LOOP scenario (LOOP Scenario B) has been considered with all eight EDGs operating simultaneously. This scenario has been considered due to 72 hours being the standard time recommended by UK Power Networks (UKPN) to cover the maximum period a black start recovery[5] is expected to last.

[4] EDF Energy, NNB Generation Company. 2016. Site Specific Short and Long Loop Frequency Updates for HPC and SZC EPRs. Document reference: HPC-UKX-NNBOSL-U0-GEV-RET-100000

[5] The procedure to recover from a total or partial shutdown of the National Electricity Transmission system which has caused an extensive loss of power supplies.

Table 3.3 – Generator Details for LOOP Operation

Plant Item	Fixed or plug in point?	Operated during LOOP?
EDG	Fixed	Yes
UDG	Fixed	Yes, but only if EDGs fail
SEG	Fixed	Yes, but only if EDGs and UDGs fail
HDU	Fixed	Yes
BDB SMDG	Mobile*	Yes, but only if EDGs and UDGs fail and can't be started again during battery mission times of 24 hours
BDB CWI Pumps	Fixed	Yes
BDB Spare	Mobile*	Yes
LLV / HBX	Fixed	Yes
ESS	Plug in point	Yes
LLW	Plug in point	Yes
HBS	Plug in point	Yes
HHA	Plug in point	Yes
HZG	Plug in point	Yes

3.2 Management of Plant Items

The on-site HPC buildings within which the diesel generators will be housed will include a leak tight discharges area for loading and unloading of tanker vehicles to allow for capture and clean -up of any hydrocarbon leaks occurring during deliveries. These will comply will all relevant Pollution Prevention Guidelines (PPGs). The floor will be built to withstand the physical and chemical actions of hydrocarbons and will be fire resistant. Drainage for floor washings will be connected to the oily water drainage system.

Any storage container with a capacity greater than 200 litres of hazardous material will be stored in a retention area with a volume at least equal to 110% of the capacity of the largest container or 25% of the total capacity of the containers present. This will ensure compliance with the Oil Storage Regulations 2001[6] as a best practice measure. Drainage in this area will be connected to the oily water system, which is discussed in a separate EP for water discharge activity.

The design of the diesel buildings will also minimise hazards that might potentially lead to incidents, accidents or failures associated with:

- Pipe leaks and breaks.
- Failure of tanks, pumps and valves.
- Internal flooding.
- Failing loads (i.e. physical damage).
- Internal explosion.
- Fire.

Demonstration of these measures is provided within the Accident Management Plan.

[6] https://www.legislation.gov.uk/uksi/2001/2954/contents/made

3.3 Emissions Control

The operation of the diesel generators will lead to the discharge of gases generated through the combustion process. A summary of the proposed controls for emissions to air is provided below, whilst Section 4 provides for a detailed comparison of the environmental management techniques to be implemented with indicative Best Available Techniques (BAT).

Optimisation of the diesel generator management with regards to emissions control has been considered at the engine procurement phase, as reflected in the design specification, with due regard to equipment reliability which is the priority for the diesel generators.

Emissions control will be addressed by the maintenance programme applied to the diesel generators to ensure optimum performance. The Operator's Maintenance Policy will specify the work programme required to maintain the diesel generators in the best possible standby state to ensure optimum engine availability. This work programme will be based on engine running hours and manufacturer's recommendations. It should be noted that, following maintenance activities, which can significantly affect the engine performance, specific tests, such as stack testing, could be performed following completion of the work, if deemed necessary.

With respect to the control of NO_X emissions, secondary abatement measures have been considered, however given the very low number of annual running hours, no end of pipe NO_X abatement plant is currently proposed as part of the reference design for the HPC generators. Abatement plant requires steady operating conditions to function effectively and none of the generators would operate within a suitable regime to fulfil this requirement. Therefore, any abatement plant would rarely function effectively and be non-operational for the majority of the year, in addition to also producing an additional effluent stream.

The primary measure used to reduce emissions of sulphur oxides (SO_X) will be the use of ultra-low sulphur diesel (below 0.001% w/w sulphur) in line with the SCOLF Regulations (as amended) 2014. This precludes the need for any form of flue gas desulphurisation (FGD). Further, FGD and sorbent injection are not considered appropriate abatement techniques for the diesel generators, which operate less than 500 hours a year.

In terms of control of particulate matter (PM) emissions, no abatement plant (e.g. Electrostatic precipitators (ESPs), fabric filters, ceramic filters, wet scrubbers, cyclones, etc) is proposed. This is on basis that PM emissions are not significant, and emissions will be adequately controlled without the need for secondary abatement plant. In addition, it is noted that the use of particulate abatement on standby generation plant is undesirable in any case, when the intermittent, short duration, operating regime is considered, together with the adverse effect on reliability, which would be introduced by the use of particulate filters, due to the risk of blockage. The type of fuel and optimised combustion will be primary measures to control the extent of PM arising from the generators.

Finally, in consideration of other emissions to air associated with the operation of the diesel generators (i.e. carbon dioxide (CO_2), carbon monoxide (CO) and Volatile Organic Compounds (VOCs)):

- CO and VOCs will be addressed by plant maintenance to ensure efficient and reliable combustion, which will in turn ensure minimised releases. No abatement is proposed.

- All measures to reduce fuel use will also reduce CO_2 emissions and use of fuel with a low ratio of carbon content to calorific value will also reduce CO_2 emissions.

This approach is consistent with other standby diesel plant are operated by EDF in France and the UK where combustion control is used as the main control measure to minimise pollutants. Secondary abatement techniques are not considered BAT due to the operating profile.

4 Best Available Techniques (BAT)

The EP Regulations were amended in 2012 in relation to the Industrial Emissions Directive (IED), effectively integrating the relevant EU legislation into UK law. The IED forms the basis of regulation for Large Combustion Plant (LCP) (combustion units >50 MW_{th}), such as the Combustion Activities associated with HPC.

The IED provides rules on integrated prevention and control of pollution arising from specified industrial activities (listed as Annex 1 within the Directive) designed to prevent or, where that is not practicable, to reduce emissions into air, water and land and to prevent the generation of waste, in order to achieve a high level of protection of the environment. Annex V, Part 2 of the IED sets out the expected performance requirements for Large Combustion Plant which come into operation after 1st January 2016 and specifically includes Emission Limit Values (ELVs) for combustion gases.

A primary function of the IED was for tighter implementation of Best Available Techniques (BAT) with regards to pollution prevention and control. BAT is defined (using the definition in Article 3 of the IED Directive) as:

- 'Best Available Techniques' shall mean the most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing in principle the basis for emission limit values designed to prevent and, where that is not practicable, generally to reduce emissions and the impact on the environment as a whole.

- 'Techniques' shall include both the technology used and the way in which the Installation is designed, built, maintained, operated and decommissioned.

- 'Available' techniques shall mean those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable condition, taking into consideration the costs and advantages, whether or not the techniques are used or produced inside the Member State in question, as long as they are reasonably accessible to the Operator.

- 'Best' shall mean most effective in achieving a high general level of protection of the environment as a whole.

In addition, European BAT Reference documents, known as 'BRefs', have been compiled to provide guidance on techniques that may be considered to represent BAT, including a BRef for LCP[7]. In addition to the BRef, further clarification of the requirements for BAT is published in a BAT Conclusion (BATc) document[8]. According to Article 14(3) of the IED, BAT conclusions shall be the reference for setting the permit conditions for installations covered by the Directive.

Table 4.1 presents the guidance notes referred to in this application.

[7] https://eippcb.jrc.ec.europa.eu/sites/default/files/2019-11/JRC_107769_LCPBref_2017.pdf

[8] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32017D1442

Table 4.1 – Guidance Documents relating to BAT

Guidance Document	Comment
BAT Reference Document for Large Combustion Plants (LCP) (2010/75/EU, European Commission, 2017 (LCP BRef)	Chapter III Article 29 of the IED details the aggregation rules for combustion activities with a total rated thermal input of 50 MW or more (fulfilled at HPC). Specifically relevant to the combustion activities installation is the requirement for *"separate combustion plants which are installed in such a way that, taking technical and economic factors into account, their waste gases could in the judgment of the competent authority, be discharged through a common stack, are to comply with the EU-wide emission limit values and monitoring requirements laid down in Annex V of the IED".* It is considered that the diesel generators could not be aggregated to release their emissions via a common stack. For the purpose of nuclear safety, each diesel generator must be capable of operating entirely independently and a shared stack would potentially restrict this ability if the stack were to be compromised in any way. As the HPC site standby generation plant does not contain individual units (or units which share a common stack) with capacities over 50 MW_{th}, the LCP BRef BAT-AELs do not apply. However, the principles of the LCP BRef have been considered within this application.
Establishing Best Available Techniques (BAT) Conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for Large Combustion Plants, Nov 2021 (LCP BATc)	As the standby generation plant do not contain individual units, or units which share a common stack, over 50 MW_{th}, the BAT conclusions and BAT associated emission levels (AELs) do not apply to the power station standby generation plant. It is further noted that many of the BAT conclusions relating to operating techniques specifically exclude standby plant and plant operating less than 500 hours a year. However, the principles of the LCP BRef have been considered within this application.
Directive (EU) 2015/2193 of The European Parliament and of the Council on the limitation of emissions of certain pollutants into the air from medium combustion plants (Medium Combustion Plant Directive) (MCPD)[9]	The back-up generators are defined as 'Medium Combustion Plant' in accordance with the aggregation rule in the MCPD, however it is considered that the plant does not fall under the scope of the MCPD, as the specified emission limit values are not applicable to new combustion plant that operate for less than 500 hours/year (over a three year averaging period). As such, HPC will be applying for an exemption from the Environment Agency under the MCPD. It is further noted that many of the diesel generators will have a defined nuclear safety role under a nuclear licence issued by the Office for Nuclear Regulations, and therefore are considered to be "excluded generators" as defined in Schedule 25B of the Environmental Permitting Regulations 2018 (as amended).
Specified generator guidance, UK Government[10]	The specified generator guidance applies to generators that generate electricity and that are between 1 and 50 MW_{th} (or to two or more generators that aggregate to a capacity over 1 MW_{th} but less than 50 MW_{th}). However, the specified generator guidance does not apply to excluded generators, which include generators subject to the provisions of Chapter II or Chapter III of the IED, generators operating with a defined nuclear safety role under a nuclear site licence issued by the ONR; and back-up generators operated for the purpose of testing for no more than 50 hours per year.
Data Centre FAQ. Draft version 10.0 H.Tee 01/06/18 – Release to Industry. Environment Agency, 2018[11]	In the absence of any legislative limits for the emissions from diesel generators operating as emergency back-up plant, the Environment Agency produced this draft guide for data centres. Although not directly applicable to nuclear power station sites, the Environment Agency referenced this guidance document within a Schedule 5 request at the time of the EP application for Sizewell C. As such, the principles within this guidance will also be followed within this variation application, particularly in relation to the latest emissions standards for standby plant, *"equivalent or better than 'TA-Luft 2g' or Tier II USEPA."*

[9] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32015L2193

[10] https://www.gov.uk/guidance/specified-generator-when-you-need-a-permit

[11] Environment Agency. (2018). Data Centre FAQ. Draft version 10.0 H.Tee 01/06/18 – Release to Industry.

Emergency backup diesel engines on installations: best available techniques (BAT)[12]	The Environment Agency produced this BAT for diesel engines on an installation that are classed as new medium combustion plant, operating up to 500 hours a year that are exempt from emission limit values (ELVs). The guidance applies to emergency backup diesel engines that are: on combustion installations – Part A 1.1 activity greater than 50 MWth; part of an Industrial Emissions Directive (IED) installation as a directly associated activity; both static and mobile – this guidance does not apply if the mobile plant is temporary.
How to comply with your environmental permit additional guidance for: Combustion Activities (EPR 1.01)[13]	This sector guidance note (SGN), now withdrawn, was part of a series of additional guidance for Part A(1) activities listed in Schedule 1 of the EPR. Although withdrawn it provides relevant indicative BAT to ensure minimal emissions to air.

[12] Environment Agency (2023). Emergency backup diesel engines on installations: best available techniques (BAT). https://www.gov.uk/guidance/emergency-backup-diesel-engines-on-installations-best-available-techniques-bat

[13] Environment Agency (2009). How to comply with your environmental permit additional guidance for: Combustion Activities (EPR 1.01). Withdrawn. https://assets.publishing.service.gov.uk/media/5b800f43ed915d74ce0f4e78/geho0209bpin-e-e.pdf

4.1 Best Available Techniques (BAT) Assessment

The EP application is made within the context of the IED, however, as discussed in Table 4.1 there is not a BATc/BRef document that covers activities at HPC specifically, where some exclusions from the regulations apply for back-up diesel plant.

With this in mind, a combination of the following guidance documents has been used to undertake an appraisal of the Site's operating techniques:

- The Environment Agency's 'Data Centre FAQ Headline Approach' guidance - developed by the Environment Agency as a draft non-statutory guidance following the principles set out in IED Article 14(6);
- BAT Reference document for Large Combustion Plant (LCP) – reviewed for potential general measures applicable to HPC;
- The Environment Agency's 'Emergency backup diesel engines on installations: BAT'; and
- The Environment Agency's withdrawn guidance 'How to comply with your environmental permit additional guidance for: Combustion Activities (EPR 1.01)'.

As a working draft, the data centre guide compiled by the Environment Agency is not a legal document, and it is recognised within the guide that permitting and day to day regulation must inevitably be on a site specific basis.

It is also important to note that the use of diesel generators for the continuity of power supply for a data centre is not directly comparable to the requirement for a nuclear power plant. This is because, for a nuclear power plant, the diesel generators are relied upon to maintain critical nuclear safety. A nuclear power plant has a defined nuclear safety requirement, e.g. seismic qualification, and the diesel generators need to meet stringent safety function requirements. The qualification process for nuclear safety classified diesel generators involves a rigorous and costly testing regime, ensuring they can continue to operate under a wide range of extreme conditions, which is not the case for data centres.

The determination of BAT is specific to a particular installation in a particular location, as there may be geographical, technological or local environmental reasons why a particular technique cannot be applied to the installation's process. In some cases, this could mean that the competent authority permits emission concentrations above those stated as BAT, provided a justification is given for the departure.

Table 4.2 provides a comparison against the requirements of the Requirements in Data Centre FAQ Headline Approach, 2018. A comparison against the requirements of the Environment Agency's draft non-statutory guidance and indicative BAT for LCP is provided in Table 4.3.

Table 4.2 – Conformity with Requirements in Data Centre FAQ Headline Approach, 2018

Environment Agency Requirement	Description of Proposed Activities/ Facilities
We accept that oil fired diesel generators are presently the default technology for standby generators in data centres. However, the permit application still requires a BAT discussion detailing the choice of engine, the particular configuration and plant sizing meeting the standby arrangement (e.g. 2n).	The role of the emergency back-up diesel generators is to provide electrical power supply to the Key Safety Classified Systems of the nuclear power station in the event of a Loss of Off-site Power event (LOOP), enabling the nuclear power station to come to and maintain a safe shutdown state. Failure of the emergency back-up diesel generators to perform this safety critical role therefore has the potential to result in a nuclear incident. The actual operation of the diesel generators will be minimised as far as possible but will be adequate to ensure that they remain fit for their nuclear safety purpose. The current HPC permit (ref: EPR/ZP3238FH) covers the operation of EDGs and Station Blackout Diesel Generators (SBDGs - now termed UDGs), the technology for which has already been approved. The permit variation application covers the introduction of further generating capacity for different processes at HPC, in order that all critical infrastructure aspects at the Site are catered for in a LOOP event, not just the nuclear reactors themselves (e.g. supply to safety critical infrastructure and plant, potable water systems, etc.). For the same type of generators already covered by the HPC permit, a BAT assessment was carried out for the Sizewell C EP application, covering the following technologies: - Option 1: Proposed diesel generators – NO_X emissions in excess of the TA-Luft 2g standard - Option 2: Diesel generators with NO_X emissions at the TA-Luft 2g standard. The BAT assessment for Sizewell C concluded that Option 1 (i.e. the same type of diesel generators proposed for EDGs and UDGs) were in fact BAT. The approach for HPC, which is consistent with that of Sizewell C, is therefore also considered BAT. A detailed discussion on the choice of engines for the EDGs and UDGs for HPC has applied the same principles as that for Sizewell C and is provided within Appendix D of this EP variation application. The BAT assessment for Sizewell C is considered to be wholly applicable to HPC. The remainder of diesel generators at HPC are proposed to be designed and operated with NO_X emissions at the TA-Luft 2g standards, which, through prior discussion with the Environment Agency, was the requirement for those additional generators to be added through the environmental permit variation.

Standby engine capacities are added together in MW thermal input at the quoted standby rating, being usually 110% of the continuous rating.	Appropriate ratings have been used; the installed generating capacity at HPC is in excess of 50 MW_{th} as shown in Table 1.1.
If precise MW_{th} figures are unavailable and spec sheets or face-plates are unclear, the calculation for MW_{th} derived from MVA output is based on: power factor 0.8 and an assumed poor conversion efficiency of 0.35 for MW_{th} to MW_{elec}	This methodology has been followed when calculating values for the back-up diesel generators.
The sum of generator plant capacities is based only on MW thermal inputs of all plant regardless of the standby configuration. MW_{elec} output constraints such as realistic customer load or other practical output limiting factors do not constitute a limit to the MW_{th} input as defined in the EA's guide RGN02.	The installed generating capacity at HPC is in excess of 50 MW_{th}.
Proximity of data centres with a company campus, adjacent, neighbouring or close-by buildings in urban locations (e.g. within a common trading estate but only separated by a road width or notional distance) may constitute a single site for determining the boundary of the installation as 'same site – same operator' as per RGN02	Not applicable to HPC.
Permits will include a maximum 500 hour 'emergency/standby operational limit' for any or all the plant producing on-site power under the limits of the combustion activity; and thereby emission limit values ELVs to air (and thus engine emissions monitoring) are not required within the permit.	Emergency operation is highly unusual and is not expected to exceed 500 hours. Worst-case emergency operation would be classed as a LOOP event. Probability analysis within the previous assessment indicated that short LOOP scenarios (up to 2 hours) represent more than 95% of possible LOOP scenarios and therefore would be a credible worst-case scenario to assess. Impacts of a 24-hour and 72-hour LOOP scenarios (LOOP A and LOOP B, respectively) were assessed as worst-case scenarios.
Emergency hours' operation includes those unplanned hours required to come off grid to make emergency repair of electrical infrastructure associated but occurring only within the data centre itself	Not applicable to HPC.

Each individual generator with its own discharge stack, can be maintained, tested and used in a planned way for up to 500 hours per calendar year each without ELVs (and hence no monitoring) under IED/MCPD. Though clearly the EA expects planned testing and generator operations to be organised to minimise occasions and durations (subject to client requirements). Ideally a target should seek to keep individual generator testing to below 50 hours/annum each as required for MCPD specified generator exclusion.	The generators installed at HPC are excluded from the Specified Generator regulations.
In summary 7, & 8 means the whole or part site can only operate as emergency plant up to 500 hours as an absolute limit for grid backup issues; but that individual plant (at any load) with its own stack (or a stack with multiple plant) with justification can be operated for up to 500 hours (ideally <50) each as part of its non-emergency role under maintenance and testing.	HPC is expected to operate in accordance with this requirement.
For the purposes of determining operating hours, data centre diesel generators are regarded as having a minimal start-up or shut-down times. Operational hours start on the first fuel ignition.	Noted, this follows the same assumption as used within the air quality assessment, available in Appendix B.

Data Centre permits (unless they apply and justify it in a permit application) will expressly have a limit on the activity to exclude voluntary 'elective power operation' such as demand side response (i.e. on-site use) or grid operating reserve (STOR) (i.e. off-site export of electricity) and Frequency Control by Demand Management (FCDM) for grid support. This is primarily to differentiate data centres from 'diesel arrays or MCPD specified generators' that voluntarily operate within the balancing market, and importantly a clear way to demonstrate minimisation of emissions to air as 'Emergency plant'.	The generators at HPC will not be used for demand side response, STOR or FCDM.
The default engine specification as a minimum for new plant to minimise the impacts of emissions to air (NO_X) is 2g TA-Luft (or equivalent standard).	NNB GenCo has committed to procuring generators that perform within the 2g TA-Luft emissions standards for those generators that fall outside of the EDGs and UDGs. The BAT assessment for EDGs and UDGs, which will operate above 2g TA-Luft standards, is provided within Table 4.3. The air quality assessment contains a full appraisal of the expected emissions from the generators under likely operating scenarios and their respective impacts on local air quality.
CBA for improved exhaust emissions, dispersion and mitigations from the plant is expected for the maintenance/testing and the emergency standby roles. We would be looking for improvements particularly if Local Air Quality (LAQ) modelling (under H1) indicates anything other than an insignificant contribution to short term local air quality for the 'planned' maintenance emissions of the plant.	The air quality assessment considered three main scenarios for operation of the back-up generators: - Commissioning - Routine Testing - LOOP The routine testing scenario would fall into the category of 'planned' maintenance of the plant. The air quality assessment demonstrated that results during Routine Testing could be summarised as follows: - Results for all long-term assessment metrics, and the majority of the short-term metrics are below the relevant Air Quality Assessment Levels (AQAL). However, the 99.79th percentile of 1-hour mean NO_2 was predicted to exceed the relevant AQAL. - A probability analysis was then carried out for the Routine Testing scenario, taking into account a worst-case maximum run time. A 24 hour run time was utilised in the hypergeometric distribution, to calculate the number of hours of exceedances. Only three hours were predicted to exceed the AQAL, which is well below the permitted 18 exceedances per year. Therefore, the results for the Routine Testing Scenario can be considered not significant for human receptors.

Retrofit abatement techniques for existing installations for engine emissions such as selective non-catalytic or catalytic reduction (SNCR or SCR) would not normally be expected for standby plant to mitigate the emissions for standby/emergency operation. BAT might include improved flue gas dispersion (e.g. stack modifications, increased height) or improved low NO_X engine management controls or possibly fuel choice.	See above explanation for BAT assessment around choice of engine and fuel choice, as presented within 3.2 and 3.3. The planned maintenance for the back-up generators will help to ensure efficient running/combustion of the generators when they do need to operate.
Operations and management procedures should reflect the outcomes of the air quality modelling by minimising the duration of testing, phasing engines into subgroups, avoiding whole site tests and planning off-grid maintenance days and most importantly times/days to avoid adding to "at risk" high ambient pollutant background levels.	Where possible, simultaneous operation of generators during planned maintenance and testing to be avoided as per the testing regime provided. However, it should be acknowledged that some simultaneous operation is likely to be required, which has been considered within the air quality assessment. In addition, overall run time per annum is reduced as far as is reasonably possible.
When AQ modelling the emissions from the engines, the certified technical standard provided by the manufacturer should be used (i.e. likely worst case emissions). However any 'fit for purpose' monitoring of the actual emissions from installed plant will be considered as evidence of the likely real impacts as part of the permitting decision process.	Worst-case emissions and assumptions have been used within the air quality assessment where appropriate.

The groundwater monitoring of fuel storage tanks and distribution pipework using GW boreholes is risk based for the site condition report (SCR) and IED 5-yearly monitoring. Should GW monitoring be required for underground tanks and/or the SCR, the boreholes should be positioned for whole site surveillance (for the SCR) rather than as a very local control immediately around the buried fuel oil tanks (i.e. not be just an addition to double skinned tanks already protected by leak detection and hence ignoring distribution pipework etc)	Pre-operational conditions 3 and 4 of the permit relate to the requirements of Articles 14(1)(b), 14(1)(c), 14(1)(e), 16(1), 22(2), and 22(3) of Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) hereafter referred to as the Industrial Emissions Directive (IED).
	PO3 states:
	"Prior to the commencement of commissioning, the Operator shall submit a report on the baseline conditions of soil and groundwater at the installation. The report shall contain the information necessary to determine the state of soil and groundwater contamination so as to make a quantified comparison with the state upon definitive cessation of activities provided for in Article 22(3) of the industrial Emissions Directive (IED). The report shall contain information, supplementary to that already provided in application Site Condition Report, needed to meet the information requirements of Article 22(2) of the IED"
	As a newly developed site, with no history of hydrocarbon contamination, the land and groundwater beneath the permitted installation should be considered to be clean for the purposes of determining any necessary remediation at the point of site closure.
	PO4 states:
	"Prior to the commencement of commissioning the Operator shall submit the written protocol referenced in condition 3.2.4 for the monitoring of soil and groundwater for approval by the Environment Agency. The protocol shall demonstrate how the Operator will meet the requirements of Articles 14(1)(b), 14(1)(c), 14(1)(e) and 16(1) of the IED."
	It is considered that the monitoring of groundwater every 5 years and monitoring of soil every 10 years is unnecessary at HPC for the following reasons:
	• HPC is an entirely new facility with no legacy land or groundwater contamination. The installation site is entirely impermeable.
	• The storage of diesel fuel is located within the same buildings as the diesel generators therefore avoiding the need for buried pipework or pipe trenches.
	• HPC will implement a risk-based approach to groundwater and land contamination management in relation to the permitted installation. This will include:
	    o Robust operator training.
	    o Plant condition monitoring.
	    o Preventative maintenance schedules.
	    o Regular plant walkdowns.
	    o Internal and external audits and compliance inspections.
	• Opportunistic samples can be taken if groundworks are required within the boundary of the permitted installation.
	The full details of these arrangements will be agreed with the Environment Agency through consultation on the structure and content of HPC's operational management system (related to PO1).
	These arrangements will include a procedure for the management of land and groundwater quality which will set out the process for assessing risk during the operational life of HPC and will include guidance on what action might be taken (including soil and groundwater monitoring) should the risk of soil or groundwater contamination warrant this.

10-yearly soil sampling under IED is normally not needed but still needs some justification.	As above, it is considered that the monitoring of groundwater every 5 years and monitoring of soil every 10 years is unnecessary at HPC for the following reasons: • HPC is an entirely new facility with no legacy land or groundwater contamination. The installation site is entirely impermeable. • The storage of diesel fuel is located within the same buildings as the diesel generators therefore avoiding the need for buried pipework or pipe trenches. • HPC will implement a risk-based approach to groundwater and land contamination management in relation to the permitted installation. This will include: ○ Robust operator training. ○ Plant condition monitoring. ○ Preventative maintenance schedules. ○ Regular plant walkdowns. ○ Internal and external audits and compliance inspections. • Opportunistic samples can be taken if groundworks are required within the boundary of the permitted installation.
The permit application must assess and provide evidence of actual reliability data for the local electricity grid distribution (including data centre internal electrical design) for the EA to judge the realistic likelihood of the plant needing to operate for prolonged periods in an emergency mode (especially if emissions model so as to exceed short term air quality standards).	This is generally not applicable at HPC given that the Site is powered by the nuclear reactors. Worst-case emergency operation would be classed as a LOOP event. Probability analysis within the previous assessment indicated that short LOOP scenarios (up to 2 hours) represent more than 95% of possible LOOP scenarios and therefore would be a credible worst-case scenario to assess. Impacts of a 24-hour and 72-hour LOOP scenarios (LOOP A and LOOP B, respectively) were assessed as worst-case scenarios.
Optimising grid reliability within the site as part of general BAT to minimise emergency operating hours is required – evaluation is needed within the permit application on the Tier reliability standard under ISO27001 and Uptime.	Not applicable at HPC.
Reporting of standby engine operational run hours and discussion of any electrical outages (planned or grid failures regardless of duration) required annually.	This requirement is noted.

Assuming AQ modelling, based on operating scenarios, indicates a local air quality risk then notification to the EA of unplanned (and pre-notification of planned) continuous grid outage exceeding 18 hours LAQM (or the otherwise assessed short term interval from modelling) is likely required under a permit schedule 5 notification.	NNB GenCo will notify the Environment Agency of planned and unplanned operation of the diesel generators.
The notification requirement stated in the permit should also indicate the actual number of generators that need to be operating above which the local air quality is at risk e.g. 'notification of continuous emergency operation exceeding 18 hours with 5 or more engines operating together is required' (i.e. model shows 4 or less engines unlikely to breach LAQ)	This requirement is noted.
Assuming AQ modelling, based on emergency outage operating scenarios, indicates a very significant risk to local air quality and identified receptors, the EA will ask the operator to have a written AQ outage action plan to manage the issue for prolonged emergency running of the plant (including sensitive receptors list and mitigations, assessments and impacts evaluation against modelled risk conditions i.e. occurrence at periods of most concern in the year, possibly ambient air monitoring surveillance at very sensitive receptors). An AQ outage action plan is also likely required for sites which might operate in conjunction with other neighbouring large sites during an outage i.e. data centre hubs.	An outage action plan specific to air quality is considered not to be required for HPC given the nature of operations at the site being that, during an emergency, priority will be safety of the nuclear reactors. Plans and procedures will be inherently in place to ensure that emergency situations are exited as soon as practicable. However, in the event of emergency generation being required (i.e. grid supply is lost) the number of running hours will be recorded and reported to the EA.

Due to the emphasis of the permit on electrical (and cooling) systems it is noted that the EA considers the F-Gas regulations as falling under the remit of the EPR permit (for notifications and management) where F-gases (or potentially any polluting potential substance) are used directly under the combustion aspects of the permitted activity (e.g. switchgear). It is important to notify the EA of any significant releases. Other uses of F-gases e.g. for server room cooling are not strictly under the EA permit but are regulated by the EA generally so it may still be prudent to make the EA aware of your F-gas releases.	F-gases will be used as part of numerous HPC systems. A detailed F-gas management strategy is being prepared. This will detail all operational F-gas management procedures, including requirements on reporting of any significant F-gas leaks to the Environment Agency.
The permit application should detail the likely quantities of waste engine oil generated annually - EWC 13 02 waste oils following servicing for example. Although unlikely to be huge, the Pollution inventory has a reporting threshold of 1 tonne for non-hazardous waste but technically no lower thresholds for hazardous waste oil.	Current estimates are that there will be 75,180 litres of engine oil in use by the diesel generators on Site at any one time: • Each EDG has an oil capacity of 8,830 v, 8x EDGs = 70,640 litres. • Each UDG has a total oil capacity of 1,060 litres, 4x UDGs = 4,240 litres. • The magnitude of engine oil capacity will be far lower for the other diesel generators on site, estimated to be another 300 litres combined. The frequency of oil change for all diesel generators is estimated to be once every six years; however, oil analysis will be undertaken with a scheduled frequency to determine the precise requirements for changing.

Table 4.3 – BAT Review: Conformity with BAT Conclusions for Large Combustion Plant (LCP)

Relevant Indicative BAT	Description of Proposed Activities/ Facilities
General BAT Conclusions – Environmental Management Systems	
BAT 1. In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates the features presented in the BREF.	NNB GenCo is preparing an overarching EMS for operation of the HPC Site, which will be ISO14001 accredited. The current EMS associated with the construction phase permitted activities at the Site (EPR/WP3200PJ) has been included within Appendix E. The EMS is certified to ISO 9001:2015 and ISO 14001:2015. The EMS associated with the operation of the Site will follow a similar content and structure. Amongst other aspects, the 300+ EMS documents will detail: - The scope and processes contained within the management system; - The environmental policy of NNB GenCo; - The targets and objectives which have been determined for environmental aspects at the Site; - Clear steps of actions required to meet targets and objectives; - Roles and responsibilities of the management team and their accountability; - Responsibility of employees; - Details on internal and external communication; - Compliance obligations; - Ongoing evaluation and review processes; and, - Procedures for emergency preparedness. NNB GenCo also has a site specific Environment Monitoring Plan, which is a live document listing relevant processes, their controls, the minimum monitoring requirements and whether each process is compliant.
General BAT Conclusions – Monitoring	

BAT 2. BAT is to determine the net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the gasification, IGCC and/or combustion units by carrying out a performance test at full load(1), according to EN standards, after the commissioning of the unit and after each modification that could significantly affect the net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the unit. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.	As all generators at the Site are considered individually to be medium combustion plants, and for the purpose of emergency generation, they are only required to comply with the Medium Combustion Plant Directive requirements for monitoring instead of the LCP BREF.
BAT 3. BAT is to monitor key process parameters relevant for emissions to air and water including those given in the BREF.	Normal operating conditions is for the Site to be powered by electricity supplied by either the HPC reactors or from National Grid (i.e. in-house load). The only opportunity to monitor the back-up generators is during routine testing for maintenance purposes. Outside of these times, the back-up generators only operate during emergency situations. Monitoring to air will be required to comply with MCPD requirements only. The current permit acknowledges the potential for uncontaminated surface water and contaminated water from oil storage areas, but monitoring is not required, which is proposed to be maintained.
BAT 4. BAT is to monitor emissions to air with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.	The generators are considered individually to be medium combustion plants and are used for emergency generation; therefore, they are only required to comply with the MCPD requirements for monitoring instead of LCP BREF.

BAT 5. BAT is to monitor emissions to water from flue-gas treatment with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.	Not applicable - no flue gas treatment on Site.
General BAT Conclusions – General Environment and Combustion Performance	
BAT 6. In order to improve the general environmental performance of combustion plants and to reduce emissions to air of CO and unburnt substances, BAT is to ensure optimised combustion and to use an appropriate combination of the techniques given in the BREF.	NNB GenCo has an all-encompassing preventative maintenance program which is designed to avoid unscheduled downtime, maximising plant availability, its ability to operate efficiently and to maintain an efficient level of operation between maintenance activities.
BAT 7. In order to reduce emissions of ammonia to air from the use of selective catalytic reduction (SCR) and/or selective non-catalytic reduction (SNCR) for the abatement of NO_X emissions, BAT is to optimise the design and/or operation of SCR and/or SNCR (e.g. optimised reagent to NO_X ratio, homogeneous reagent distribution and optimum size of the reagent drops).	Not applicable – no use of SCR / SNCR.
BAT 8. In order to prevent or reduce emissions to air during normal operating conditions, BAT is to ensure, by appropriate design, operation and maintenance, that the emission abatement systems are used at optimal capacity and availability.	There is no abatement technology installed at the Site. Emissions to air are reduced through minimal operation of the back-up generators, in particular through the scheduling of testing regimes.

BAT 9. In order to improve the general environmental performance of combustion and/or gasification plants and to reduce emissions to air, BAT is to include the following elements in the quality assurance/quality control programmes for all the fuels used, as part of the environmental management system (see BAT 1).	The fuel used at the Site is ultra-low sulphur diesel (maximum 10 ppm sulphur). Usage is low due to the generators not being routinely used (i.e. only used through periodic routine testing and in the event of an emergency scenario). HPC is conventionally powered by electricity supplies (on-site reactors/grid electricity). Therefore, the fuel selected is optimal for the intended use (i.e. emergency supply of power in the absence of conventional electrical power supply).
BAT 10. In order to reduce emissions to air and/or to water during other than normal operating conditions (OTNOC), BAT is to set up and implement a management plan as part of the environmental management system (see BAT 1), commensurate with the relevance of potential pollutant releases.	Normal operation for HPC is for it to be powered by the on-site nuclear reactors. There is relatively minimal operation of the generators through routine testing regimes. In the event of emergency generation being required (i.e. grid supply is lost) the number of running hours will be recorded and reported to the EA. There are no additional emissions to water during OTNOC.
BAT 11. BAT is to appropriately monitor emissions to air and/or to water during OTNOC.	Normal operation for HPC is for it to be powered by the nuclear reactors. OTNOC occur in emergency situations where there is no opportunity to schedule monitoring.
General BAT Conclusions – Energy Efficiency	
BAT 12. In order to increase the energy efficiency of combustion, gasification and/or IGCC units operated ≥ 1 500 h/yr, BAT is to use an appropriate combination of the techniques given in the BREF.	Not applicable – the generators provide back-up power only and will operate for less than 1,500 hours per year.
BAT 13. In order to reduce water usage and the volume of contaminated wastewater discharged, BAT is to use one or both of the techniques given in the BREF.	Not applicable – only surface water drainage emissions to water covered by the Combustion Activity permit. Emissions to water are covered within the water discharge permit ref: EPR/HP3228XT.

BAT 14. In order to prevent the contamination of uncontaminated wastewater and to reduce emissions to water, BAT is to segregate waste water streams and to treat them separately, depending on the pollutant content.	Current requirements pertaining to water within the permit will be maintained.
BAT 15. In order to reduce emissions to water from flue-gas treatment, BAT is to use an appropriate combination of the techniques given below, and to use secondary techniques as close as possible to the source in order to avoid dilution.	Not applicable – no flue gas treatment or emissions to water.
General BAT Conclusions – Waste Management	
BAT 16. In order to reduce the quantity of waste sent for disposal from the combustion and/or gasification process and abatement techniques, BAT is to organise operations so as to maximise, in order of priority and taking into account life-cycle thinking: *a. waste prevention, e.g. maximise the proportion of residues which arise as by-products;* *b. waste preparation for reuse, e.g. according to the specific requested quality criteria;* *c. waste recycling;* *d. other waste recovery (e.g. energy recovery)*	The installation will have appropriate procedures in place outlining identification of waste streams and how they must be handled, including appropriate segregation and storage within designated waste storage areas on site. This will be detailed within the operational Waste Management Plan. NNB GenCo will apply waste hierarchy principles for the management of any waste produced on site. However, in relation to the combustion plant, due to the inherent nature of the site operations and fuel used, the installation is expected to produce minor quantities of waste, primarily associate with generator maintenance. Where possible, the waste generated on site will be sent off for recycling, with any hazardous waste streams sent off site for appropriate treatment and/or disposal.
General BAT Conclusions – Noise Emissions	

BAT 17. In order to reduce noise emissions, BAT is to use one or a combination of the techniques given in the BREF.	There is a large separation distance (at least 1 km) between the EDGs/UDGs and the nearest noise sensitive receptors. As part of the wider design of HPC and landscaping to the south, the noise propagation pathways from the EDG/UDG buildings are largely screened. Generators will be housed within buildings or dedicated container units, with noise breakout predominantly from air intake/exhausts and cooling/ventilation panels. Heavy access/fire doors will significantly attenuate noise breakout. Routine inspections and maintenance will ensure optimal operational condition of generators and ancillary equipment.
BAT Conclusions for the Combustion of Solid Fuels	
BAT conclusions for the combustion of coal and/or lignite BAT 18 - 23	Not applicable – liquid/gaseous fuel used.
BAT conclusions for the combustion of solid biomass and/or peat BAT 24 - 27	Not applicable – liquid/gaseous fuel used.
BAT Conclusions for the Combustion of Liquid Fuels	
HFO- and/or gas-oil-fired boilers BAT 28 – 30	Not applicable.
HFO- and/or gas-oil-fired engines *BAT 31. In order to increase the energy efficiency of HFO and/or gas oil combustion in reciprocating engines, BAT is to use an appropriate combination of the techniques given in BAT 12 and below in the BREF.*	There is no opportunity to use combined cycle operation as the generators are only used as emergency, back-up generators.
HFO- and/or gas-oil-fired engines *BAT 32. In order to prevent or reduce NO_X emissions to air from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or a combination of the techniques given below in the BREF.*	See previous explanation with regards to the choice of engine for HPC (Appendix D). SCR is not applicable to combustion plants operating less than 500 hours per year.

HFO- and/or gas-oil-fired engines *BAT 33. In order to prevent or reduce emissions of CO and volatile organic compounds to air from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or both of the techniques given below in the BREF.*	The back-up generators provide emergency power supply only and combustion/operation is optimised for this purpose.
HFO- and/or gas-oil-fired engines *BAT 34. In order to prevent or reduce SO_X, HCl and HF emissions to air from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or a combination of the techniques given below in the BREF.*	Ultra-low sulphur diesel is used at the Site to minimise emissions of sulphur dioxide. The individual generators fall under emissions requirements for MCPD.
HFO- and/or gas-oil-fired engines *BAT 35. In order to prevent or reduce dust and particulate-bound metal emissions from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or a combination of the techniques given below in the BREF.*	The individual generators fall under emissions requirements for MCPD.
Gas-oil-fired gas turbines BAT 36 – 39	Not applicable – no turbines.
BAT Conclusions for the Combustion of Gaseous Fuels	
BAT conclusions for the combustion of natural gas *BAT 40 – 45*	Not applicable.
BAT conclusions for the combustion of iron and steel process gases *BAT 46 - 51*	Not applicable.
BAT conclusions for the combustion of gaseous and/or liquid fuels on offshore platforms *BAT 52 - 54*	Not applicable.

BAT conclusions for multi-fuel-fired plants *BAT 55 - 59*	Not applicable.
BAT conclusions for the co-incineration of waste *BAT 60 - 71*	Not applicable.
BAT conclusions for gasification *BAT 72 - 75*	Not applicable.

Table 4.4 – BAT Review: Conformity with BAT for Emergency backup diesel engines on installations

Relevant BAT	Description of Proposed Activities/ Facilities
Build standards	
Engines must be optimised to reduce emissions ('emissions optimised'). Engines that are optimised to reduce fuel ('fuel optimised') have greater emissions and will not meet BAT unless they have secondary abatement. *Combustion plant specification sheets that keep to one or more of the former 2g TA Luft and United States Environment Protection Agency (EPA) Tier 2 (or equivalent) standards are acceptable proof of BAT plant. These do not need on-site exhaust emission monitoring.*	NNB GenCo has committed to procuring generators that perform within the 2g TA-Luft emissions standards for those generators that fall outside of the EDGs and UDGs. The BAT assessment for EDGs and UDGs, which will operate above 2g TA-Luft standards, is provided above. The air quality assessment contains a full appraisal of the expected emissions from the generators under likely operating scenarios and their respective impacts on local air quality.
Your stack design should ensure good flue gas dispersion. Stacks should be vertical and emissions should not be obstructed by caps or cowls.	It is noted that vertical and unobstructed stacks are preferable to ensure good flue gas dispersion. However, as per nuclear safety case requirements, some of the stacks will have to have rain caps (EDGs and HDU), and have a horizontal release (SEGs). The horizontal stacks and rain caps proposed at HPC are required to prevent the ingress of water and foreign objects, which otherwise may lead to operational issues on combustion plant critical to nuclear safety. This design ensures the generators can reliably power vital systems that are necessary to maintain a safe shutdown of the reactor, if required.
Operational Controls	
Minimise how much you test diesel engines. You must test for less than 50 hours a year.	For nuclear safety requirements, some engines will be tested for more than 50 hours per year. As presented in Table 3.2, HDU will be tested for 144 hours, and the BDB SMDG, BDB CWI Pumps, BDB Spare and LLV will be tested for 54 hours.
Avoid testing engines when the air quality is poor.	This is noted. Operations will seek to minimise air quality impacts as much as feasibly possible while maintaining safety. For nuclear safety, it will be required to test engines on a strict schedule.
Do not test more than one engine at a time.	Again for nuclear safety requirements, some engines will be tested at the same time to ensure they can run concurrently if required.
When using backup diesel generators, you must manage the impacts on air quality to minimise harm to human health and the environment.	This is noted. Operations will seek to minimise air quality impacts as much as feasibly possible while maintaining safety.

Table 4.5 – BAT Review: Conformity with requirements in Additional guidance for: Combustion Activities, EPR 1.01 (Withdrawn)

Relevant BAT	Description of Proposed Activities/ Facilities
Indicative BAT - Energy Efficiency	
1. Demonstrate that the proposed or current situation represents BAT where there are other considerations involved, e.g. recovering energy from waste affects the energy efficiency of the process.	See below
Indicative BAT 2 to 9	Not applicable
Reciprocating engines *10. Maximise engine efficiency by measures such as turbo charging and air intercooling. However, this should be balanced against increased NO_X emissions.*	EDG and UDG engines designed with turbo chargers and no air intercooling.
11. Recover exhaust gas heat for process or building heating or absorption chilling.	Not applicable function or requirement to EDG/UDG gensets.
12. Recover lower-grade heat from engine coolants.	Not applicable function or requirement to EDG/UDG gensets. Any engine heat generation is cooled via coolant system via air fan coolers and system heat exchangers in HD building. There is no heat recovery from these systems to recover heat loss.
13. Where additional heat is required, supplementary fuel may be fired into the boiler, although this can be complicated by the pulsating exhaust and size limitations. (These features are usually incorporated at the design stage.)	Not applicable function or requirement to EDG/UDG gensets.
Indicative BAT - Avoidance, recovery and disposal of wastes	

1. Store, handle and transport all waste streams to prevent the release of waste, dust, VOC, leachate or odour. *2. Store bottom ash and fly ash separately. This provides flexibility to re-use the different ash fractions.* *3. Where scale allows, store ash fractions and other dusty residues in closed silos fitted with high level alarms and dust abatement plant.* *4. Explore markets for waste streams, for example:* *• bottom ash for aggregate* *• PFA for cement manufacture and construction products* *• FGD gypsum and fused slags for construction products* *5. Recycle materials back into the process whenever possible, e.g. re-using partially reacted lime.* *6. Where recycling or re-use is not possible, then consider regeneration of other materials or return to the manufacturer e.g.:* *• ion exchange resins* *• reverse osmosis membranes* *• molecular sieves* *• catalysts*	The installation will have appropriate procedures in place outlining identification of waste streams and how they must be handled, including appropriate segregation and storage within designated waste storage areas on site. This will be detailed within the operational Waste Management Plan. NNB GenCo will apply waste hierarchy principles for the management of any waste produced on site. However, in relation to the combustion plant, due to the inherent nature of the site operations and fuel used, the installation is expected to produce minor quantities of waste, primarily associated with generator maintenance. Where possible, the waste generated on site will be sent off for recycling, with any hazardous waste streams sent off site for appropriate treatment and/or disposal. There will not be any storage of dusty material such as ash. Similarly, there not be any waste from ash, PFA, FGD gypsum and fused slags.
Indicative BAT - Operations	
1. You should inform us, and the local authority, when standby fuel is used, and when you return to gas firing.	Not Applicable
Indicative BAT - Point source emissions to water	

Oil storage *1. Fit a high-level alarm to oil tanks.* *2. Drain decanted water from oil storage tanks and storm water from bunded areas to a water treatment plant, or direct it to an appropriate disposal facility. You should deal with liquid effluents generated during periodic tank cleaning in a similar way.* *3. Use oil removal facilities such as partition chambers or plate separators for water contaminated with oil.*	Emissions to water are covered within the water discharge permit ref: EPR/HP3228XT. The current permit acknowledges the potential for uncontaminated surface water and contaminated water from oil storage areas. On-site storage of diesel would be within the diesel buildings in bunded rooms. There will be no internal drains within the diesel rooms and any spills would be captured in a sump and pumped out and disposed off-site as hazardous waste. Forecourt oil/water separators are to be provided at all locations where fuel handling will take place. All operations will comply with the Oil Storage Regulations, with clear spill prevention and response procedures. All oily water drains on site will be routed through an oi l/water separator (this is covered in detail in the EP for water discharge activities).
Coal storage *4. Where there is a significant risk of pollution of water or groundwater, you should collect and treat leachate.*	Not applicable
De-ionisation effluent *5. Neutralise water de-ionisation plant regeneration effluent before discharge.*	Not applicable
Process water (e.g. wet scrubbing) *6. Chemically treat, neutralise and settle the effluent from wet scrubbing before discharge.* *7. Quantify organics, including dioxins, furans and PAHs in the treated effluent. At low levels they are normally most effectively treated in a biological plant, usually by the sewerage undertaker.* *8. Discharge volumes for sea water scrubbing make most treatment impracticable. Since contaminants are likely to be present in very low concentrations, focus your effort on minimising mass releases where practicable.*	Not applicable
Ash handling *9. Handle ashes in a solid state and not as slurry. Hydraulic transport of ashes produces a wastewater stream that is likely to contain metal salts and organic compounds. If there is a market for the ash, you should not use a handling technique that will prevent its re-use.*	Not applicable

Cleaning liquids *10. Neutralise or treat wash waters and cleaning-out solutions to produce an acceptable waste before discharge or disposal.* *11. Boiler cleaning wastes require appropriate disposal.*	Emissions to water are covered within the water discharge permit ref: EPR/HP3228XT. Cleaning chemicals used for housekeeping purposes may be used and minor volumes of washings generated, but these are not directly process related.
Site drainage including rainwater *12. Use an efficient oil/water separation/interceptor system. Further treatment may be required to remove dissolved hydrocarbons.* *13. Direct discharge to controlled waters will only be allowed where discharges will meet discharge requirements under all conditions.*	Emissions to water are covered within the water discharge permit ref: EPR/HP3228XT.
Indicative BAT 14 - 17	Not Applicable
Indicative BAT - Point source emissions to air: NO_X control	
1. Control emissions of NO_X by a combination of the following, as applicable: *• combustion control systems* *• combustion temperature reduction* *• low NO_X burners* *• over fire air (OFA)* *• flue/exhaust gas recycling* *• reburn* *• selective catalytic reduction (SCR)* *• selective non catalytic reduction (SNCR).*	There is no abatement technology installed at the Site. Emissions to air are reduced through minimal operation of the back-up generators, in particular through the scheduling of testing regimes.
2. Use low NO_X burners for coal- and oil-fired plant.	See above
3. Use OFA or equivalent for existing coal-fired plant above 100 MWth	Not applicable – no coal-fired plant
4. Use dry low NO_X burners in new natural gas-fired gas turbines. For natural gas-fired gas turbines, use water/steam injection, or convert to dry low NO_X burning.	Not applicable – no natural gas plant

5. Where air quality standards or other environmental standards must be met, you must use SCR or SNCR for smaller plant (<100 MW).	See above
6. For new coal and oil-fired plant above 100MW, use SCR or primary measures to achieve equivalent NO_X levels.	Not applicable – no plant above 100 MW
7. Only combustion optimisation and SCR are feasible on >500MW PF plant firing low volatile coal. In these cases you need SCR for new plant. You need a site specific assessment for existing plan	Not applicable – no plant above 500 MW
Indicative BAT - Point source emissions to air: SO_X control	
1. Use low sulphur fuels as a primary measure.	Ultra-low sulphur diesel (below 0.001% w/w sulphur) is used at the Site to minimise emissions of sulphur dioxide. This negates the need for any form of flue gas desulphurisation (FGD). The individual generators fall under emissions requirements for MCPD.
2. For large coal or oil-fired plant, use wet limestone scrubbing or seawater scrubbing for flue gas desulphurisation (FGD).	Not applicable
3. Consider dry sorbent injection for pulverised and liquid fuel furnaces which are too small to justify FGD.	Not applicable
4. For fluidised bed combustors, consider in-bed sulphur capture.	Not applicable
5. Consider IGCC for new large-scale solid and liquid fuel fired plant.	Not applicable
Indicative BAT - Point source emissions to air: Particulate matter control	
1. For coal and oil-fired plant above 100 MWth, electrostatic precipitators (EP) are required. At smaller scale plant, other methods may be acceptable to meet emission limits.	Not applicable – no plant above 100 MW
2. For 'opted in' plant FGD is an appropriate measure, and therefore particulate abatement is FGD + EP.	Not applicable
3. For large (>100 MW) existing plant and where FGD is not required (not 'opted in') EP is an appropriate measure.	Not applicable – no plant above 100 MW

4. Where low sulphur fuel is used with EPs, use sulphur trioxide injection to improve particulate control.	Not applicable
Indicative BAT - Point source emissions to air: Fugitive emissions	
1. Windbreaks should be created by natural terrain, banks of earth or planting of long grass and evergreen trees in open areas. This has aesthetic benefits and such vegetation is able to capture and absorb dust without suffering long-term harm. Hydro seeding should be used to rapidly establish vegetation on waste tips, slag heaps or other apparently infertile ground	Not applicable
2. Where materials are delivered by sea and dust releases could be significant, use self discharge vessels or enclosed continuous unloaders.	Not applicable
3. Minimise dust generated by grab-type ship unloaders by ensuring adequate moisture content of the material as delivered, minimising drop heights and using water sprays or atomised mist at the mouth of the ship unloader hopper	Not applicable
4. Fugitive emissions from fly ash should be prevented by dust suppression, or by enclosing its handling and storage.	Not applicable
5. Intercept rainwater run off from open areas, especially coal and raw materials stocking areas, and remove the suspended solids by settlement or other techniques. Where there are potentially vulnerable receptors, monitor the quality of the water discharged from the storage and blending areas.	Not applicable
6. Plant used to pre-treat and store raw materials should be totally enclosed, with extraction and arrestment plant as appropriate, to prevent emissions to atmosphere. For some gasification processes coal is milled to a very fine dust and needs to be handled with an inert gas blanket.	Not applicable

7. Gasifiers should be coal-charged using a double lock system, whereby the gases released from the reactor during charging are contained within the lock hopper. After closure of the charge valve they are routed either to recompression for re-injection into the crude gas stream or to a vent treatment system. Alternatively, a wet feed (slurry) system may be used with comparable features.	Not applicable
8. You should demonstrate that the potential risks of contamination of land by deposition of dust, leachate or run-off are not significant and that you can comply with the requirements of the Groundwater Directive.	The tanks are contained within a room which is considered as bunded through construction method and painting protection to contain all fuel content in the rooms. The daily tanks are again in bunded concrete rooms (painted containment with transfer/drainage of fuel to the sump in -12.78m, this can be extracted off-site to tankers as required once the sump high level is reached).
Indicative BAT - monitoring	
1. Emissions to air *Many plants in this sector will be subject to the detailed monitoring requirements of Annex VIII of the Large Combustion Plant Directive (LCPD).* *For plants co-incinerating waste, the provisions of Articles 10, 11 and Annexes II and III of the Waste Incineration Directive (WID) should also apply. The monitoring requirements of the LCPD and WID are considered to represent appropriate measures for this sector.*	As all generators at the Site are considered individually to be medium combustion plants, and for the purpose of emergency generation, they are only required to comply with the Medium Combustion Plant Directive requirements for monitoring instead of the LCP BREF. There is no co-incineration of waste
2. Emissions to water and sewer *For combustion plants co-incinerating waste and operating air pollution control equipment with an aqueous discharge, you should comply with Article 8 and Annexes III and IV of the Waste Incineration Directive (WID).*	There is no co-incineration of waste

5 Emissions and Monitoring

5.1 Emissions to Air

Emissions to air from the diesel generators will only occur when the plant is operated for Commissioning, Routine Testing and possible LOOP events, as described in Section 3.1.4.

The existing permit already contains details for the EDGs and UDGs and this variation seeks to include several additional back-up generators to the list of permitted release points to air. Additionally, this permit variation includes the incorporation of rain caps on the EDGs and HDU, as well as horizontal stacks for the SEGs.

Whilst it is not explicitly stated within the relevant BRef[14], it is generally accepted that best practice for stack design comprises vertical and unimpeded release. However, the horizontal stacks and rain caps proposed at HPC are required to prevent the ingress of water and foreign objects, which otherwise may lead to operational issues on combustion plant critical to nuclear safety.

Emissions to air will arise from the combustion of the diesel fuel, with resultant exhaust gases being emitted through individual stacks for each of the back-up generators. The principal pollutants to air associated with combustion of diesel fuel are NO_X, SO_x, CO and PM – these have been quantified and associated impacts assessed. Emissions of CO_2 and VOCs have not been quantified and assessed as part of this EP variation application.

Under normal operation (i.e. not during an unlikely LOOP scenario), the diesel generators will only be operated on an intermittent basis. Therefore, no stack continuous emissions monitoring system (CEMS), which would require maintenance, is proposed. In lieu of this, periodic monitoring of emissions to air will be undertaken, in line with the requirements detailed in Table S3.1 of the EP.

It is important to note that, given the limited operation of the diesel generators, there is limited environmental benefit in using additional abatement systems to reduce emissions from combustion, since longer run times are required in order for abatement systems to run effectively and efficiently. This is discussed further in Sections 3.3 and 4 of this report.

All applicable emission points to air are listed in Table 5.1. Further details regarding the stack and exhaust parameters of all emission points covered by this permit variation are provided in Table 5.2.

[14] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021D2326

Table 5.1 – Point Source Emissions to Air

Emission Point Reference	Reactor	Plant Type	Grid Reference (X, Y)
EDG_U1.1	1	Emergency back-up diesel generator	320285, 145817
EDG_U1.2	1	Emergency back-up diesel generator	320285, 145827
EDG_U1.3	1	Emergency back-up diesel generator	320458, 145817
EDG_U1.4	1	Emergency back-up diesel generator	320458, 145827
UDG_U1.1	1	Emergency back-up diesel generator	320285, 145837
UDG_U1.2	1	Emergency back-up diesel generator	320458, 145837
SEG_U1.1	1	Emergency back-up diesel generator	320179, 145602
SEG_U1.2	1	Emergency back-up diesel generator	320179, 145582
SEG_U1.3	1	Emergency back-up diesel generator	320179, 145560
EDG_U2.1	2	Emergency back-up diesel generator	320053, 145817
EDG_U2.2	2	Emergency back-up diesel generator	320053, 145827
EDG_U2.3	2	Emergency back-up diesel generator	320227, 145817
EDG_U2.4	2	Emergency back-up diesel generator	320227, 145827
UDG_U2.1	2	Emergency back-up diesel generator	320053, 145837
UDG_U2.2	2	Emergency back-up diesel generator	320227, 145837
SEG_U2.1	2	Emergency back-up diesel generator	320083, 145601
SEG_U2.2	2	Emergency back-up diesel generator	320083, 145581
SEG_U2.3	2	Emergency back-up diesel generator	320083, 145561
HDU	General	Emergency back-up diesel generator	320655, 145790
SMDG_1	General	Emergency back-up diesel generator	320600, 145831
SMDG_2	General	Emergency back-up diesel generator	320623, 145831
SMDG_3	General	Emergency back-up diesel generator	320645, 145831
CWI_1	General	Emergency back-up diesel generator	320600, 145811
CWI_2	General	Emergency back-up diesel generator	320624, 145811
BDB_Spare	General	Emergency back-up diesel generator	320646, 145811
LLV	General	Emergency back-up diesel generator	320254, 145970
ESS_1	General	Emergency back-up diesel generator	320065, 145860
ESS_2	General	Emergency back-up diesel generator	320032, 145819
ESS_3	General	Emergency back-up diesel generator	320054, 145760
ESS_4	General	Emergency back-up diesel generator	320112, 145724
ESS_5	General	Emergency back-up diesel generator	320182, 145724
ESS_6	General	Emergency back-up diesel generator	320248, 145732
ESS_7	General	Emergency back-up diesel generator	320252, 145800
ESS_8	General	Emergency back-up diesel generator	320246, 145867
ESS_9	General	Emergency back-up diesel generator	320313, 145869
ESS_10	General	Emergency back-up diesel generator	320262, 145846
ESS_11	General	Emergency back-up diesel generator	320262, 145776
ESS_12	General	Emergency back-up diesel generator	320288, 145724
ESS_13	General	Emergency back-up diesel generator	320358, 145724
ESS_14	General	Emergency back-up diesel generator	320428, 145725
ESS_15	General	Emergency back-up diesel generator	320498, 145725
ESS_16	General	Emergency back-up diesel generator	320522, 145747
ESS_17	General	Emergency back-up diesel generator	320553, 145817
ESS_18	General	Emergency back-up diesel generator	320532, 145871
ESS_19	General	Emergency back-up diesel generator	320462, 145870
LLW	General	Emergency back-up diesel generator	320247, 145497
HBS	General	Emergency back-up diesel generator	320402, 145597
HHA	General	Emergency back-up diesel generator	320004, 145519
HZG	General	Emergency back-up diesel generator	320252, 145669

Table 5.2 – Stack and Exhaust Parameters for Point Source Emissions to Air

Release point ref.	Stack Height (m)	Internal Diameter (m)	Efflux Velocity (m/s)	Total Flow (Am^3/h)	Total Flow (Nm^3/h)	Exhaust Temp (°C)
EDG_U1.1	27.2	1.8	8.6	137,734	78,781	355
EDG_U1.2	27.2	1.8	8.6	137,734	78,781	355
EDG_U1.3	27.2	1.8	8.6	137,734	78,781	355
EDG_U1.4	27.2	1.8	8.6	137,734	78,781	355
UDG_U1.1	27.2	0.8	12.6	61,200	27,273	545
UDG_U1.2	27.2	0.8	12.6	61,200	27,273	545
SEG_U1.1	13.9	0.2	19.6	2,833	1,614	450
SEG_U1.2	13.9	0.2	19.6	2,833	1,614	450
SEG_U1.3	13.9	0.2	19.6	2,833	1,614	450
EDG_U2.1	27.2	1.8	8.6	137,734	78,781	355
EDG_U2.2	27.2	1.8	8.6	137,734	78,781	355
EDG_U2.3	27.2	1.8	8.6	137,734	78,781	355
EDG_U2.4	27.2	1.8	8.6	137,734	78,781	355
UDG_U2.1	27.2	0.8	12.6	61,200	27,273	545
UDG_U2.2	27.2	0.8	12.6	61,200	27,273	545
SEG_U2.1	13.9	0.2	19.6	2,833	1,614	450
SEG_U2.2	13.9	0.2	19.6	2,833	1,614	450
SEG_U2.3	13.9	0.2	19.6	2,833	1,614	450
HDU	23.7	0.5	2.0	15,660	1,695	510
SMDG_1	1.5	0.4	11.1	12,813	4,920	125
SMDG_2	1.5	0.4	11.1	12,813	4,920	125
SMDG_3	1.5	0.4	11.1	12,813	4,920	125
CWI_1	1.5	0.4	0.0	461	16	537
CWI_2	1.5	0.4	0.0	461	16	537
BDB_Spare	1.5	0.4	11.1	12,813	4,920	125
LLV	44.1	0.2	12.4	1,440	1,449	568
ESS_1	13.9	0.2	31.4	396	133	538
ESS_2	13.9	0.2	31.4	396	133	538
ESS_3	13.9	0.2	31.4	396	133	538
ESS_4	13.9	0.2	31.4	396	133	538
ESS_5	13.9	0.2	31.4	396	133	538
ESS_6	13.9	0.2	31.4	396	133	538
ESS_7	13.9	0.2	31.4	396	133	538
ESS_8	13.9	0.2	31.4	396	133	538
ESS_9	13.9	0.2	31.4	396	133	538
ESS_10	13.9	0.2	31.4	396	133	538
ESS_11	13.9	0.2	31.4	396	133	538
ESS_12	13.9	0.2	31.4	396	133	538
ESS_13	13.9	0.2	31.4	396	133	538
ESS_14	13.9	0.2	31.4	396	133	538
ESS_15	13.9	0.2	31.4	396	133	538
ESS_16	13.9	0.2	31.4	396	133	538
ESS_17	13.9	0.2	31.4	396	133	538
ESS_18	13.9	0.2	31.4	396	133	538
ESS_19	13.9	0.2	31.4	396	133	538
LLW	13.9	0.2	51.3	1,598	507	588
HBS	16.9	0.2	51.3	1,598	507	588
HHA	19.9	0.2	51.3	1,598	507	588
HZG	25.9	0.2	51.3	1,598	507	588

5.2 Emissions to Water

NNB GenCo envisages no, or minimal, point source emissions to water from the diesel generators themselves. The current permit acknowledges the potential for uncontaminated surface water and contaminated water from oil storage areas, but monitoring is not required. It is proposed that this position be maintained.

A clearly defined Draining Strategy has been prepared for HPC. This details the provision of all drainage which is required to effectively drain the permanent power station and manage flows which leave the HPC site. With regards to surface water, to summarise the main considerations that relate to the diesel generators themselves are:

- Rainwater drainage. The EDG stack has been designed so that rain will not enter the stack. Rainwater draining from roofs in the installation boundary and collected at the bottom of the UDG stack will be kept free of contamination and will drain, along with the clean rainwater from the rest of HPC to the outfall (with the cooling water). A connection manhole will be provided for each building that generates surface water from roofs.

- Cooling system losses or replacement (water/glycol mix) will be collected over hardstanding and disposed off-site as hazardous waste.

- Surface water runoff. This has the potential to be contaminated with oil from oil storage areas. However, on-site storage of diesel would be within the diesel buildings in bunded rooms. There will be no internal drains within the diesel rooms, and any spills would be captured in a sump and pumped out and disposed off-site as hazardous waste. Forecourt oil/water separators are to be provided at all locations where fuel handling will take place. All operations will comply with the Oil Storage Regulations, with clear spill prevention and response procedures. All oily water drains on site will be routed through an oil/water separator (this is covered in detail in the EP for water discharge activities).

- Cleaning chemicals used for housekeeping purposes may be used and minor volumes of washings generated, but these are not directly process related.

As there are no process related point sources to water of relevance to this EP variation application, no further discussion on releases to water is considered necessary.

5.3 Emissions to Land

There are no planned releases to land from the installation and due to the inherent nature of the site operations and fuel used, the installation is expected to produce minor quantities of waste, primarily associated with maintenance. Where possible, the waste generated on site will be sent off for recycling, with any hazardous waste streams sent off site for appropriate treatment and/or disposal. Predicted waste arisings and the associated management arrangements are described in Section 7.3.

5.4 Fugitive Emissions

A fugitive emission is an emission to air, water or land from an activity at a localised or diffuse source, which is not controlled.

5.4.1 Fugitive Emissions to Air

Given the nature of the installation (i.e. no combustion of solid fuel or waste) the discussion of fugitive emissions to air only considers emissions of VOCs and does not consider dust or litter.

Environment Agency guidance to control and monitor emissions for your environmental permit provides measures to prevent emissions of VOCs and vapour and fluid emissions.

The diesel fuel will be contained within storage tanks; therefore, this will mitigate against most fugitive emissions, but it is anticipated that there will be a small amount of emissions to air of fuel oil vapour from the vents of the fuel oil storage tanks. Additionally, during tanker filling operations, vapour will be displaced from the main storage tanks supplying the diesel generators. There will also be emissions associated with the transfer to day storage tanks from the main tanks. The diesel fuel tanks will be 'closed' vessels equipped with vents for safety purposes.

5.4.2 Fugitive Emissions to Surface Water, Sewer and Groundwater

There will be no fugitive releases to surface water, sewer or groundwater identified as a result of normal operations of the diesel generators.

However, as a result of abnormal or emergency operations, there are a number of sources that could cause emissions to surface water or sewer. There are no pathways to groundwater as the installation, and the wider site will be covered in a hardstanding and the drains will be newly installed as part of a contained drainage system.

Under abnormal operating conditions, the potential sources will be:

- Loss of containment of antifreeze/cooling fluid.
- Loss of containment from fuel tanks.
- Oil leaks from engines and pipeline.
- Loss of containment of lubricating oil.
- Loss of containment from a fuel tanker and flexible hose during delivery.
- Firefighting run off.

As discussed in the previous Combustion Activity EP application (EPR/ZP3238FH), NNB GenCo has made the commitment to comply with best practice management, maintenance and control of these potential fugitive releases. Unlike other UK reactor sites, the fuel tanks for the diesel generators will be housed in the same building as the engines. In order to reduce the impact of a spillage, the tanks will be located in a self-contained area of the diesel building, which will significantly reduce the potential of a fugitive release to the environment.

5.5 Odour

The operation of the diesel generators is not considered to have a significant potential odour effect. This was demonstrated in the previous Combustion Activity EP application (EPR/ZP3238FH) by means of a qualitative odour assessment, accounting for complaints history at HPB and Sizewell B (SZB).

Based on experience of operating combustion plant at HPB and SZB, the HPC installation is not expected to cause odour related impacts. This position is consistent with that observed at the other operational reactor sites managed by EDF Energy.

In addition, the diesel generators are operated infrequently and, in the event that the plant is needed to safely operate or shut down the reactor operations, any associated odour release would be of minor concern.

If NNB GenCo are notified by the Environment Agency that the activities are giving rise to significant offsite odour, an odour management plan which identifies and minimises the risks of odorous releases will be submitted to the Environment Agency for approval.

5.6 Noise and Vibration

Nuclear power stations emit sound during normal operation. Sources include systems such as back-up diesel generators, transformers, turbine generator units, heating ventilation, air conditioning systems and pumps. The sound sources associated with the operation of the reactor are outside of the scope of this submission.

With respect to the diesel generators, the vast majority will be located within buildings or steel container units (the only exception being the HHE backup generators. The primary sources from the backup diesel generator buildings are as follows:

- Emissions from the discharge stacks;
- Running of diesel generators and pumps; and
- Maintenance.

The operation of the diesel generators as a standby facility means that they are only intermittently operational for test purposes, and noise associated with their activity is therefore intermittent.

Test run frequency and duration is a requirement of the nuclear safety case. The foreseen cumulated duration of all diesel generator running during commissioning at HPC is 5,461 hours in total, whilst for routine testing during the operational phase it is expected that operational hours will be no more than 978 hours per year. Although wherever possible test runs will be scheduled during the daytime, the diesel generators may operate at night during LOOP conditions.

Only in event of the loss of electricity supplied by either the HPC reactors or from National Grid would the back-up diesel generators be operated continuously until the connection was restored. This could be several days (the diesel storage tanks are sized to provide 72 hours continuous operation); and though the associated noise would thus be continuous over this period, it would not accumulate or increase with time (i.e. the noise levels from a 1-hour run are the same at a receptor as a 72-hour run).

This is also true of the relevant assessment interval (15-minutes) for potential worst-case noise disturbance due to generator operation at night.

As such, the assessment has been undertaken under LOOP conditions, whereby all sources are operating simultaneously and continuously. This is considered to represent a robustly worst-case scenario.

Table 5.3 lists the principal noise sources associated with operation of the back-up diesel generators and their relative estimations of Sound Power Level. Additional sources from normal operations will include tanker deliveries (fuel pumping) and the operation of mobile generator plant during outage periods. Given that tanker delivery sources are relatively minor, will be only operated intermittently, these items have not been considered further. Emergency mobile backup generators have been included within the noise model, based upon the coordinate data provided within Table 5.1 (Point Source Emissions to Air).

Location and height data for point source emissions are presented within Table 5.1 (Point Source Emissions to Air) and Table 5.2 (Stack and Exhaust Parameters for Point Source Emissions to Air) respectively. HDA Hoppers are individually located within in each of the 22 allocated bays indicated within the HDA building layout.

The assessment has been undertaken under LOOP conditions, whereby all sources are operating simultaneously and continuously.

Table 5.3 – Sources and Estimates of Noise Emissions

Noise Source	Sound Power of Equipment (dB L_{WA})	Total Number of Sources
EDGs	80	8
UDGs	80	4
HDA Hoppers	84	88
SEGs	97	6
HDU	100	1
BDB SMDG	108	3
BDB CWI Pumps	60	2
BDB Spare	108	1
LLV / HBX	100	1
ESS	97	19
LLW / HBS / HHA / HZG	97	4

5.7 Monitoring

This section describes the proposed monitoring strategy for emissions monitoring of the plant at HPC, which aligns with what is already contained within the EP for permitted emission points.

5.7.1 Monitoring Emissions to Air

Pollutant emission levels are dependent on the combustion conditions within the plant, as well as the quality and quantity of the fuel used. The emissions are controlled by the plant design, adherence to appropriate operating parameters and the use of ultra-low sulphur diesel. The sampling methodologies for key pollutants are provided in Table 5.4 and align with those contained within the current EP.

All sampling will be undertaken by an MCERTS[15] accredited test team, using approved testing equipment and methodology. Sampling sockets will be compliant with the Environment Agency Technical Guidance Note M1[16] (Monitoring). These sockets will enable appropriate access for the required emissions sampling and appropriate sampling platforms will be provided with suitable access to power, lighting and water, as required by the sampling methodologies. All sampling on the emission points in Table 5.4 will be undertaken with the site operating normally.

Table 5.4 – Sampling Methodologies

Parameter	Reference Methodology	Technique	Monitoring Frequency
NO_X	BS EN 14792	Chemiluminescence or similar	Annual
SO_2	BS EN 15267-3	Ion chromatography or similar	Annual
PM	BS EN 13284-1	Gravimetric	Annual
CO	BS EN 15058	Non-Dispersive Infra-red (NDIR) or similar	Annual

5.7.2 Monitoring Emissions to Water

There is currently no requirement to undertake periodic monitoring of emissions to water in the combustion activity permit. In line with changes to the number of back-up generators proposed at the HPC site, it is considered that this will remain unchanged.

15 https://www.gov.uk/government/collections/monitoring-emissions-to-air-land-and-water-mcerts

16 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/635269/LIT_4736.pdf

Emissions to water are covered within the water discharge permit ref: EPR/HP3228XT.

6 Impact Assessment

An impact assessment has been undertaken for HPC in order to assess the potential environment impact from its emissions and to evaluate those impacts in line with sensitive receptors which may be affected by activities undertaken at the Site.

The impacts of releases from the back-up diesel generators are discussed in this section and include:

- H1 Environmental Risk Assessment for Emissions to Air and subsequent detailed dispersion modelling.
- Detailed assessment of noise emissions based upon noise propagation modelling.

6.1 Air Quality Impact Assessment

This assessment evaluates emissions released from the HPC Site during the operational phase. The air quality impacts associated with the operational phase arise from emissions from fossil fuel combustion, primarily through the use of back-up diesel generators, which exist to provide power in the event that the nuclear power plant loses off-site power.

In addition, since Unit 1 operation is expected to commence prior to the finalisation of construction of Unit 2, construction emissions arising from Unit 2 activities have also been included within the assessment for completeness, in the knowledge that these activities will contribute to overall concentrations. It is important to note, however, that emissions from construction activities are regulated within a separate permit (EPR WP3200PJ A001) and so will not be regulated within the permit for operational activities.

The air pollutants covered by the assessment are as follows:

- Oxides of nitrogen (NO_X).
- Nitrogen dioxide (NO_2).
- Carbon monoxide (CO).
- Sulphur dioxide (SO_2).
- Particulate matter (PM_{10} and $PM_{2.5}$).

The Air Quality Impact Assessment report provided in Appendix B details in full the assessment methodology results and findings in full. The following sections provide for a summary of the more detailed information presented in Appendix B in terms of the following:

- Calculation of Process Contribution (PC).
- Estimation of Predicted Environmental Concentration (PEC).
- Conclusions.

6.1.1 Summary of Emissions to Air

Sources of emissions to air from HPC are described in Section 5.1 of this report, and in further detail within the Air Quality Impact Assessment report provided in Appendix B. Details of the modelled generator pollutant emissions rates for each of the emission points are summarised in Table 6.1.

Table 6.1 – Modelled Generator Emission Rates

System	Building	Thermal Input (MW)	Rating (kW_e)	Number of Generators	NO_x (mg/Nm^3) [e]	PM (mg/Nm^3) [e]	CO (mg/Nm^3) [e]
EDGs	HD	23.11	9,590	8	1900	50	150
UDGs	HDA	8.00	3,600	4	1143	6.4	194
SEGs	HOR	0.47	142	6	9.1[c] (g/kWh)	0.5 [c] (g/kWh)	5.0 [c] (g/kWh)
HDU [a]	HUM	1.34	603	1	2000	80	650
SMDGs [a]	HHE	3.89	1,750	3	2000	80	650
CWI Pumps [a]	HHE	0.10	45	2	2000	80	650
BDB Spare [a]	HHE	3.89	1,750	1	2000	80	650
LLV	HBX	1.28	488	1	3.2 [b, c] (g/kWh)	0.1 [b, c] (g/kWh)	2.3 [b, c] (g/kWh)
ESS[d]	HL	0.14	53	19	5.7 [b, c] (g/kWh)	0.1 [b, c] (g/kWh)	0.7 [b, c] (g/kWh)
LLW	HL	0.53	200	1	3.7 [b, c] (g/kWh)	0.2 [b, c] (g/kWh)	2.1 [b, c] (g/kWh)
HBS	HBS	0.53	200	1	3.7 [b, c] (g/kWh)	0.2 [b, c] (g/kWh)	2.1 [b, c] (g/kWh)
HHA	HHA	0.53	200	1	3.7 [b, c] (g/kWh)	0.2 [b, c] (g/kWh)	2.1 [b, c] (g/kWh)
HZG	HUD	0.53	200	1	3.7 [b, c] (g/kWh)	0.2 [b, c] (g/kWh)	2.1 [b, c] (g/kWh)

[a] Emission rate not provided within technical specification sheet. 2g TA-Luft assumed as a conservative estimate.
[b] Emission rate not provided within technical specification sheet. Assumed to be in line with values from similarly rated generators within the HPC AQ Construction Modelling Assessment (Bureau Veritas, 9th April 2020, Hinkley Point C – Construction Modelling Specification and Results, Issue 10).
[c] Emission rate not provided within technical specification sheet. g/kWh value utilised.
[d] ESS is not allocated to a building on the site, however the ADMS model requires each emissions source to be attributed to a building for the purposes of dispersion calculation. Within the ADMS model, the 'Main' building is defined as HL, therefore the ESS emissions have been associated with the HL 'main' building within the ADMS model.
[e] Reference conditions: 20°C, 101.3 kPa, dry gas, 5% O_2

6.1.2 Summary of Air Quality Assessment Methodology

The Environment Agency's Risk Assessment for a specific activity provides methods for quantifying environmental impacts of emissions to all media. The *air emission risk assessment for your environmental permit guidance* (AER guidance) contains long- and short-term Environment Assessment Levels (EALs) and Environmental Quality Standards (EQSs) for releases to air. For the pollutants considered in this assessment, these assessment levels are equivalent to the Air Quality Standards (AQSs) and Air Quality Objectives (AQOs) set out in legislation in the Air Quality Strategy for England. The AER guidance effectively supersedes the old H1 guidance, using a similar methodology.

The AER guidance provides a three-tiered approach to assessment the significance of emissions to atmosphere. The first stage calculates the appropriate Process Contribution (PC) from each source and "screen out" insignificant emissions to air, which incorporate emission sources that emit in small quantities such that they are unlikely to cause a significant impact at sensitive receptors. The screening criteria is provided in Figure 6.1.

Figure 6.1 – Screening Criteria for Insignificant PCs

To screen out a PC for any substance so that you don't need to do any further assessment of it, the PC must meet both of the following criteria:

- the short-term PC is less than 10% of the short-term environmental standard
- the long-term PC is less than 1% of the long-term environmental standard

If you meet both of these criteria you don't need to do any further assessment of the substance.

If you don't meet them you need to carry out a second stage of screening to determine the impact of the PEC. Record the PCs for your insignificant emissions in your risk assessment.

The second stage is to calculate the Predicted Environmental Concentration (PEC) from each source (incorporating existing background pollutant levels) and to assess the need for detailed dispersion modelling of emissions to air (see Figure 6.2).

Figure 6.2 – Criteria for Detailed Modelling

In the second stage of screening if you meet both of the following requirements you don't need to do any further assessment of that substance. You'll need to do detailed modelling of emissions that don't meet both of the following requirements:

- the short-term PC is less than 20% of the short-term environmental standards minus twice the long-term background concentration
- the long-term PEC is less than 70% of the long-term environmental standards

If the second stage indicates that a more detailed assessment is required, appropriate dispersion modelling software should be used. Detailed dispersion modelling constitutes the third stage of the assessment approach.

Full details of the air quality impact assessment methodology are provided in Appendix B, however by way of summary, the overarching principles of the AER assessment methodology have been followed to provide an updated assessment of potential impacts from emissions to air attributed to operation of the HPC generators. Operational generator emissions at HPC have been assessed using detailed dispersion modelling of emissions to atmosphere. The atmospheric dispersion model ADMS 5 (version 6), developed by Cambridge Environmental Research Consultants (CERC), has been used.

The scope of the study has evolved over time through consideration to various assessment scenarios, ultimately leading to the following scenarios having been considered:

- Scenario 1: Commissioning (inclusive of emissions arising from ongoing construction activities).

- Scenario 2: Routine Testing.
- Scenario 3: Emergency Loss of Off-site Power (LOOP).

Modelled pollutant concentrations and associated impacts have been predicted at specific identified locations (i.e. discrete receptors) and generic locations (i.e. gridded receptors), full details of which are discussed in Appendix B. In terms of human health based receptors, farms and residences in close proximity to the Site have been considered. The locations of the farms, residences and villages were chosen based on inspection of maps, satellite imagery of the area and a visit to the Site and surrounding area. Potential transient receptors have also been included, as has the HPC accommodation campus situated in the southeast corner within the Site boundary. In terms of ecological receptors, and in line with the AER guidance selection criteria, the following ecologically designated sites were considered:

- Severn Estuary (Ramsar, SPA, SAC).
- Bridgwater Bay (SSSI, NNR).
- Exmoor and Quantock Oakwoods (SAC).
- Somerset Wetlands (NNR).

6.1.3 Summary of Air Quality Assessment Results

Appendix B provides for a full assessment of air quality impacts associated with emissions to air from operation of the HPC generators. A summary of those receptors experiencing the highest pollutant concentration as predicted by the model is presented in the following Sections.

6.1.3.1 Human Health Receptors

Results for the assessed human health receptors are provided in this Section.

Table 6.2 – Impact Assessment at Worst-case Human Receptor by Pollutant (µg m-3) – Commissioning Scenario A – Unit 1

Pollutant Averaging Period	AQS/AQO/EAL	Max PC (µg m^{-3})	Max PEC (µg m^{-3})	% Max PC of AQS/AQO/EAL	% Max PEC of AQS/AQO/EAL	% Receptors with exceedances (where applicable)
NO_2 Annual mean	40	0.05	9.41	0.1	23.5	-
NO_2 99.79 Percentile 1-hour mean	200	114.19	145.09	57.1	72.5	-
PM_{10} Annual mean	40	<0.01	10.71	<0.1	26.8	-
PM_{10} 90.41 percentile 24-hour mean	50	3.61	24.23	7.2	48.5	-
$PM_{2.5}$ Annual mean	20	<0.01	6.40	<0.1	32.0	-
CO Maximum 1-hour mean	30,000	27.89	974.90	0.1	3.2	-
CO Maximum 8-hour mean	10,000	25.47	972.48	0.3	9.7	-
SO_2 99.73 percentile 1-hour mean	350	30.85	38.91	8.8	11.1	-
SO_2 99.18 percentile 24-hour mean	125	22.56	29.50	18.1	23.6	-
SO_2 99.9 percentile 15-min mean	266	35.21	42.22	13.2	15.9	-

PC = Process contribution
PEC = Predicted environmental concentration (= PEC + background)
Exceedances use the PEC
Percentage exceedances based on discrete receptors

Table 6.3 – Impact Assessment at Worst-case Human Receptor by Pollutant (µg m^{-3}) – Commissioning Scenario A – Unit 2

Pollutant Averaging Period	AQS/AQO/EAL	Max PC (µg m^{-3})	Max PEC (µg m^{-3})	% Max PC of AQS/AQO/EAL	% Max PEC of AQS/AQO/EAL	% Receptors with exceedances (where applicable)
NO_2 Annual mean	40	0.31	3.65	0.8	9.1	-
NO_2 99.79 Percentile 1-hour mean	200	160.61	166.50	80.3	83.3	-
PM_{10} Annual mean	40	0.01	10.69	<0.1	26.7	-
PM_{10} 90.41 percentile 24-hour mean	50	2.11	22.00	4.2	44.0	-
$PM_{2.5}$ Annual mean	20	0.01	6.06	0.1	30.3	-
CO Maximum 1-hour mean	30,000	38.36	985.38	0.1	3.3	-
CO Maximum 8-hour mean	10,000	33.62	980.64	0.3	9.8	-
SO_2 99.73 percentile 1-hour mean	350	43.07	51.13	12.3	14.6	-
SO_2 99.18 percentile 24-hour mean	125	29.37	37.43	23.5	29.9	-
SO_2 99.9 percentile 15-min mean	266	48.26	54.44	18.1	20.5	-

PC = Process contribution
PEC = Predicted environmental concentration (= PEC + background)
Exceedances use the PEC
Percentage exceedances based on discrete receptors

Table 6.4 – Impact Assessment at Worst-case Human Receptor by Pollutant (μg m^{-3}) – Commissioning Scenario B – Unit 1

Pollutant Averaging Period	AQS/AQO/EAL	Max PC (μg m^{-3})	Max PEC (μg m^{-3})	% Max PC of AQS/AQO/EAL	% Max PEC of AQS/AQO/EAL	% Receptors with exceedances (where applicable)
NO_2 Annual mean	40	0.30	9.54	0.7	23.8	-
NO_2 99.79 Percentile 1-hour mean	200	**228.38**	**259.28**	**114.2**	**129.6**	5.4
PM_{10} Annual mean	40	0.01	10.71	<0.1	26.8	-
PM_{10} 90.41 percentile 24-hour mean	50	7.23	27.84	14.5	55.7	-
$PM_{2.5}$ Annual mean	20	0.01	6.41	0.1	32.0	-
CO Maximum 1-hour mean	30,000	55.77	1,002.79	0.2	3.3	-
CO Maximum 8-hour mean	10,000	50.94	997.96	0.5	10.0	-
SO_2 99.73 percentile 1-hour mean	350	61.70	69.76	17.6	19.9	-
SO_2 99.18 percentile 24-hour mean	125	45.13	52.07	36.1	41.7	-
SO_2 99.9 percentile 15-min mean	266	70.41	77.35	26.5	29.1	-

PC = Process contribution
PEC = Predicted environmental concentration (= PEC + background)
Exceedances use the PEC
Percentage exceedances based on discrete receptors

Table 6.5 – Impact Assessment at Worst-case Human Receptor by Pollutant (µg m^{-3}) – Commissioning Scenario B – Unit 2

Pollutant Averaging Period	AQS/AQO/EAL	Max PC (µg m^{-3})	Max PEC (µg m^{-3})	% Max PC of AQS/AQO/EAL	% Max PEC of AQS/AQO/EAL	% Receptors with exceedances (where applicable)
NO_2 Annual mean	40	0.30	3.64	0.7	9.1	-
NO_2 99.79 Percentile 1-hour mean	200	**228.38**	**234.27**	**114.2**	**117.1**	5.4
PM_{10} Annual mean	40	0.01	10.69	<0.1	26.7	-
PM_{10} 90.41 percentile 24-hour mean	50	7.23	27.84	14.5	55.7	-
$PM_{2.5}$ Annual mean	20	0.01	6.06	0.1	30.3	-
CO Maximum 1-hour mean	30,000	22.77	1,002.79	0.2	3.3	-
CO Maximum 8-hour mean	10,000	50.94	997.96	0.5	10.0	-
SO_2 99.73 percentile 1-hour mean	350	61.70	69.76	17.6	19.9	-
SO_2 99.18 percentile 24-hour mean	125	45.13	52.07	36.1	41.7	-
SO_2 99.9 percentile 15-min mean	266	70.41	77.35	26.5	29.1	-

PC = Process contribution
PEC = Predicted environmental concentration (= PEC + background)
Exceedances use the PEC
Percentage exceedances based on discrete receptors

Table 6.6 – Impact Assessment at Worst-case Human Receptor by Pollutant (µg m^{-3}) – Commissioning Scenario C – Unit 1

Pollutant Averaging Period	AQS/AQO/EAL	Max PC (µg m^{-3})	Max PEC (µg m^{-3})	% Max PC of AQS/AQO/EAL	% Max PEC of AQS/AQO/EAL	% Receptors with exceedances (where applicable)
NO_2 Annual mean	40	0.34	9.56	0.8	23.9	-
NO_2 99.79 Percentile 1-hour mean	200	**266.58**	**297.48**	**133.3**	**148.7**	5.0
PM_{10} Annual mean	40	0.01	10.71	<0.1	26.8	-
PM_{10} 90.41 percentile 24-hour mean	50	7.45	28.06	14.9	56.1	-
$PM_{2.5}$ Annual mean	20	0.01	6.41	0.1	32.0	-
CO Maximum 1-hour mean	30,000	76.76	1,023.78	0.3	3.4	-
CO Maximum 8-hour mean	10,000	68.53	1,015.55	0.7	10.2	-
SO_2 99.73 percentile 1-hour mean	350	61.79	69.85	17.7	20.0	-
SO_2 99.18 percentile 24-hour mean	125	45.18	52.12	36.1	41.7	-
SO_2 99.9 percentile 15-min mean	266	70.51	77.45	26.5	29.1	-

PC = Process contribution
PEC = Predicted environmental concentration (= PEC + background)
Exceedances use the PEC
Percentage exceedances based on discrete receptors

Table 6.7 – Impact Assessment at Worst-case Human Receptor by Pollutant (µg m^{-3}) – Commissioning Scenario C – Unit 2

Pollutant Averaging Period	AQS/AQO/EAL	Max PC (µg m^{-3})	Max PEC (µg m^{-3})	% Max PC of AQS/AQO/EAL	% Max PEC of AQS/AQO/EAL	% Receptors with exceedances (where applicable)
NO_2 Annual mean	40	0.34	3.69	0.8	9.2	-
NO_2 99.79 Percentile 1-hour mean	200	**266.58**	**272.48**	**133.3**	**136.6**	5.0
PM_{10} Annual mean	40	0.01	10.69	<0.1	26.7	-
PM_{10} 90.41 percentile 24-hour mean	50	7.45	27.34	14.9	54.7	-
$PM_{2.5}$ Annual mean	20	0.01	6.06	0.1	30.3	-
CO Maximum 1-hour mean	30,000	76.76	1,023.78	0.3	3.4	-
CO Maximum 8-hour mean	10,000	68.53	1,015.55	0.7	10.2	-
SO_2 99.73 percentile 1-hour mean	350	61.79	69.85	17.7	20.0	-
SO_2 99.18 percentile 24-hour mean	125	45.18	52.12	36.1	41.7	-
SO_2 99.9 percentile 15-min mean	266	70.51	77.45	26.5	29.1	-

PC = Process contribution
PEC = Predicted environmental concentration (= PEC + background)
Exceedances use the PEC
Percentage exceedances based on discrete receptors

Table 6.8 – Impact Assessment at Worst-case Human Receptor by Pollutant (µg m^{-3}) – Routine Testing Scenario

Pollutant Averaging Period	AQS/AQO/EAL	PC (µg m^{-3})	Max PEC (µg m^{-3})	% Max PC of AQS/AQO/EAL	% Max PEC of AQS/AQO/EAL	% Receptors with exceedances (where applicable)
NO_2 Annual mean	40	0.14	3.49	0.4	8.7	-
NO_2 99.79 Percentile 1-hour mean	200	**485.59**	**491.59**	**242.8**	**245.8**	5.4
PM_{10} Annual mean	40	0.03	10.68	0.1	26.7	-
PM_{10} 90.41 percentile 24-hour mean	50	11.50	31.38	23.0	62.8	-
$PM_{2.5}$ Annual mean	20	0.03	4.31	0.1	21.6	-
CO Maximum 1-hour mean	30,000	326.05	1.231.89	1.1	4.1	-
CO Maximum 8-hour mean	10,000	112.33	1,046.43	1.1	10.5	-
SO_2 99.73 percentile 1-hour mean	350	128.13	134.31	36.6	38.4	-
SO_2 99.18 percentile 24-hour mean	125	80.08	88.14	64.1	70.5	-
SO_2 99.9 percentile 15-min mean	266	157.57	163.75	59.2	61.6	-
US EPA AEGL 1 100 percentile 1-hour mean NO_2	956	559.72	562.72	58.5	58.9	-
US EPA AEGL 2 100 percentile 1-hour mean NO_2	22,950	559.72	562.72	2.4	2.5	-
US EPA AEGL 3 100 percentile 1-hour mean NO_2	38,250	559.72	562.72	1.5	1.5	-

PC = Process contribution
PEC = Predicted environmental concentration (= PEC + background)
Exceedances use the PEC
Percentage exceedances based on discrete receptors

Table 6.9 – Impact Assessment at Worst-case Human Receptor by Pollutant (µg m^{-3}) – LOOP A Scenario

Pollutant Averaging Period	AQS/AQO/EAL	Max PC (µg m^{-3})	Max PEC (µg m^{-3})	% Max PC of AQS/AQO/EAL	% Max PEC of AQS/AQO/EAL	% Receptors with exceedances (where applicable)
NO_2 Annual mean	40	0.08	<0.01	0.2	8.7	-
NO_2 99.79 Percentile 1-hour mean	200	**499.85**	**522.43**	**249.9**	**261.2**	7.1
PM_{10} Annual mean	40	0.02	10.68	<0.1	26.7	-
PM_{10} 90.41 percentile 24-hour mean	50	13.59	33.47	27.2	66.9	-
$PM_{2.5}$ Annual mean	20	0.02	4.31	0.1	21.6	-
CO Maximum 1-hour mean	30,000	972.82	1,889.56	3.2	6.3	-
CO Maximum 8-hour mean	10,000	373.48	1,329.92	3.7	13.3	-
SO_2 99.73 percentile 1-hour mean	350	128.82	134.49	36.7	38.4	-
SO_2 99.18 percentile 24-hour mean	125	80.08	88.14	64.1	70.5	-
SO_2 99.9 percentile 15-min mean	266	156.94	163.20	59.0	61.4	-
US EPA AEGL 1 100 percentile 1-hour mean NO_2	956	1,044.59	1,081.50	109.3	113.1	1.8
US EPA AEGL 2 100 percentile 1-hour mean NO_2	22,950	1,044.59	1,081.50	4.6	4.7	-
US EPA AEGL 3 100 percentile 1-hour mean NO_2	38,250	1,044.59	1,081.50	2.7	2.8	-

PC = Process contribution
PEC = Predicted environmental concentration (= PEC + background)
Exceedances use the PEC
Percentage exceedances based on discrete receptors

Table 6.10 – Impact Assessment at Worst-case Human Receptor by Pollutant (µg m^{-3}) – LOOP B Scenario

Pollutant Averaging Period	AQS/AQO/EAL	Max PC (µg m^{-3})	Max PEC (µg m^{-3})	% Max PC of AQS/AQO/EAL	% Max PEC of AQS/AQO/EAL	% Receptors with exceedances (where applicable)
NO_2 Annual mean	40	0.24	3.54	0.6	8.8	-
NO_2 99.79 Percentile 1-hour mean	200	**499.85**	**522.43**	**249.9**	**261.2**	7.1
PM_{10} Annual mean	40	0.04	10.68	0.1	26.7	-
PM_{10} 90.41 percentile 24-hour mean	50	13.59	33.47	27.2	66.9	-
$PM_{2.5}$ Annual mean	20	0.04	4.32	0.2	21.6	-
CO Maximum 1-hour mean	30,000	972.82	1,889.56	3.2	6.3	-
CO Maximum 8-hour mean	10,000	373.48	1,329.92	3.7	13.3	-
SO_2 99.73 percentile 1-hour mean	350	128.82	134.49	36.7	38.4	-
SO_2 99.18 percentile 24-hour mean	125	80.08	88.14	64.1	70.5	-
SO_2 99.9 percentile 15-min mean	266	156.94	163.20	59.0	61.4	-
US EPA AEGL 1 100 percentile 1-hour mean NO_2	956	1,044.59	1,081.50	109.3	113.1	1.8
US EPA AEGL 2 100 percentile 1-hour mean NO_2	22,950	1,044.59	1,081.50	4.6	4.7	-
US EPA AEGL 3 100 percentile 1-hour mean NO_2	38,250	1,044.59	1,081.50	2.7	2.8	-

PC = Process contribution
PEC = Predicted environmental concentration (= PEC + background)
Exceedances use the PEC
Percentage exceedances based on discrete receptors

Overall, at human health receptors the air quality impact assessment has demonstrated:

- During the Commissioning scenarios, the results indicate that all long- and the majority of short-term assessment metrics are below the relevant AQALs for both Unit 1 and Unit 2.
- A further probability analysis was then carried out for the Commissioning Scenario, taking into account a worst-case maximum run time. A 192-hour run time was utilised in the hypergeometric distribution, to calculate the number of hours of exceedance. The probability of exceeding the objective more than the 18 allowed exceedances was less than 0.1%. Therefore, the results for the Commissioning Scenario can be considered not significant for human receptors.
- During the Routine Testing scenario, the results indicated that all long-term assessment metrics, and the majority of the short-term metrics are below the relevant AQALs. The 99.79th percentile of 1-hour mean NO_2 was predicted to exceed the relevant AQAL.
- A further probability analysis was then carried out for the Routine Testing scenario, taking into account a worst-case maximum run time. A 144-hour run time was utilised in the hypergeometric distribution, to calculate the number of hours of exceedance. The probability of exceeding the objective more than the 18 allowed exceedances was less than 0.1%. Therefore, the results for the Routine Testing can be considered not significant for human receptors.
- During both LOOP scenarios, the results indicated that all long-term assessment metrics, and the majority of the short-term metrics are below the relevant AQALs. The 99.79th percentile of 1-hour mean NO_2 was predicted to exceed the relevant AQAL.
- A further probability analysis was then carried out for both LOOP scenarios, taking into account a worst-case maximum run time. The probability of exceeding the objective more than the 18 allowed exceedances was less than 0.1%. Therefore, the results for the LOOP Scenarios can be considered not significant for human receptors.

6.1.3.2 Ecological Receptors

Results for the assessed ecological receptors are provided in this Section.

Table 6.11 – Impact Assessment at Worst-case Ecological Receptor by Pollutant (µg m^{-3}) – Commissioning Scenario A – Unit 1

Pollutant Averaging Period	CLe/CL/CL_{min}N	Max PC (µg m^{-3})	Max PEC (µg m^{-3})	% Max PC of CLe/CL/CL_{min}N	% Max PEC of CLe/CL/CL_{min}N	% Receptors with exceedances (where applicable)
NO_X Annual mean	30	0.30	**40.30**	1.0	**134.3**	0.2
NO_X 24-hour mean	75	**386.78**	**422.43**	**515.7**	**563.2**	28.1
SO_2 Annual mean	10[A]	0.03	9.82	0.3	98.2	-
Nitrogen Deposition	10[B]/5[C]	0.04	**27.24**	0.4	**544.7**	100.0
Acid Deposition	1.07[B]/0.14[C]	<0.01	**2.20**	<0.1	**1,547.2**	100.0

Notes:
A AQAL for locations with Lichens and Bryophytes
B Minimum CL for location of max PC
C Minimum CL for location of max PEC
CLe = Critical Level
CL = Critical Load
CL_{min}N = Minimum Critical Load for Nitrogen
PC = Process contribution
PEC = Predicted environmental concentration (= PEC + background)
Exceedances for concentrations in air use PEC. Percentage exceedances based on discrete receptors

Table 6.12 – Impact Assessment at Worst-case Ecological Receptor by Pollutant (µg m^{-3}) – Commissioning Scenario A – Unit 2

Pollutant Averaging Period	$CLe/CL/CL_{min}N$	Max PC (µg m^{-3})	Max PEC (µg m^{-3})	% Max PC of $CLe/CL/CL_{min}N$	% Max PEC of $CLe/CL/CL_{min}N$	% Receptors with exceedances (where applicable)
NO_X Annual mean	30	1.87	7.13	6.2	23.8	-
NO_X 24-hour mean	75	**381.24**	**388.81**	**508.3**	**518.4**	24.3
SO_2 Annual mean	10[A]	0.15	9.87	1.5	98.7	-
Nitrogen Deposition	10[B]/5[C]	0.27	**27.24**	2.7	**544.8**	100.0
Acid Deposition	1.07[B]/0.14[C]	<0.01	**2.20**	0.3	**1,547.5**	100.0

Notes:
A AQAL for locations with Lichens and Bryophytes
B Minimum CL for location of max PC
C Minimum CL for location of max PEC
CLe = Critical Level
CL = Critical Load
$CL_{min}N$ = Minimum Critical Load for Nitrogen
PC = Process contribution
PEC = Predicted environmental concentration (= PEC + background)
Exceedances for concentrations in air use PEC. Percentage exceedances based on discrete receptors

Table 6.13 – Impact Assessment at Worst-case Ecological Receptor by Pollutant (µg m^{-3}) – Commissioning Scenario B – Unit 1

Pollutant Averaging Period	CLe/CL/$CL_{min}N$	Max PC (µg m^{-3})	Max PEC (µg m^{-3})	% Max PC of CLe/CL/$CL_{min}N$	% Max PEC of CLe/CL/$CL_{min}N$	% Receptors with exceedances (where applicable)
NO_X Annual mean	30	2.02	**40.74**	6.7	**135.8**	<0.1
NO_X 24-hour mean	75	**773.57**	**809.21**	**1.031.4**	**1,078.9**	51.6
SO_2 Annual mean	10 [A]	0.19	9.86	1.9	98.6	-
Nitrogen Deposition	10[B]/5[C]	0.29	**27.24**	2.9	**544.8**	100.0
Acid Deposition	1.07[B]/0.14[C]	<0.01	**2.20**	0.3	**1,547.5**	100.0

Notes:
A AQAL for locations with Lichens and Bryophytes
B Minimum CL for location of max PC
C Minimum CL for location of max PEC
Cle = Critical Level
CL = Critical Load
$CL_{min}N$ = Minimum Critical Load for Nitrogen
PC = Process contribution
PEC = Predicted environmental concentration (= PEC + background)
Exceedances for concentrations in air use PEC. Percentage exceedances based on discrete receptors

Table 6.14 – Impact Assessment at Worst-case Ecological Receptor by Pollutant (µg m^{-3}) – Commissioning Scenario B – Unit 2

Pollutant Averaging Period	CLe/CL/$CL_{min}N$	Max PC (µg m^{-3})	Max PEC (µg m^{-3})	% Max PC of CLe/CL/$CL_{min}N$	% Max PEC of CLe/CL/$CL_{min}N$	% Receptors with exceedances (where applicable)
NO_X Annual mean	30	2.02	7.49	6.7	25.0	-
NO_X 24-hour mean	75	**773.57**	**781.14**	**1,031.4**	**1,041.5**	51.23
SO_2 Annual mean	10^A	0.19	9.86	1.9	98.6	-
Nitrogen Deposition	$10^B/5^C$	0.29	**27.24**	2.9	**544.8**	100.0
Acid Deposition	$1.07^B/0.14^C$	<0.01	**2.20**	0.3	**1,547.5**	100.0

Notes:
A AQAL for locations with Lichens and Bryophytes
B Minimum CL for location of max PC
C Minimum CL for location of max PEC
CLe = Critical Level
CL = Critical Load
$CL_{min}N$ = Minimum Critical Load for Nitrogen
PC = Process contribution
PEC = Predicted environmental concentration (= PEC + background)
Exceedances for concentrations in air use PEC. Percentage exceedances based on discrete receptors

Table 6.15 – Impact Assessment at Worst-case Ecological Receptor by Pollutant (µg m^{-3}) – Commissioning Scenario C – Unit 1

Pollutant Averaging Period	CLe/CL/$CL_{min}N$	Max PC (µg m^{-3})	Max PEC (µg m^{-3})	% Max PC of CLe/CL/$CL_{min}N$	% Max PEC of CLe/CL/$CL_{min}N$	% Receptors with exceedances (where applicable)
NO_X Annual mean	30	2.30	**40.83**	7.7	**136.1**	<0.1
NO_X 24-hour mean	75	**888.82**	**924.46**	**1,185.1**	**1,232.6**	55.5
SO_2 Annual mean	10[A]	0.19	9.86	1.9	98.6	-
Nitrogen Deposition	10[B]/5[C]	0.33	**27.24**	3.3	**544.8**	100.0
Acid Deposition	1.07[B]/0.14[C]	<0.01	**2.20**	0.3	**1,547.5**	100.0

Notes:
A AQAL for locations with Lichens and Bryophytes
B Minimum CL for location of max PC
C Minimum CL for location of max PEC
CLe = Critical Level
CL = Critical Load
$CL_{min}N$ = Minimum Critical Load for Nitrogen
PC = Process contribution
PEC = Predicted environmental concentration (= PEC + background)
Exceedances for concentrations in air use PEC. Percentage exceedances based on discrete receptors

Table 6.16 – Impact Assessment at Worst-case Ecological Receptor by Pollutant (µg m^{-3}) – Commissioning Scenario C – Unit 2

Pollutant Averaging Period	$CLe/CL/CL_{min}N$	Max PC (µg m^{-3})	Max PEC (µg m^{-3})	% Max PC of $CLe/CL/CL_{min}N$	% Max PEC of $CLe/CL/CL_{min}N$	% Receptors with exceedances (where applicable)
NO_X Annual mean	30	2.30	7.73	7.7	25.8	-
NO_X 24-hour mean	75	**888.82**	**896.39**	**1,185.1**	**1,195.2**	55.1
SO_2 Annual mean	10[A]	0.19	9.86	1.9	98.6	-
Nitrogen Deposition	10[B]/5[C]	0.33	**27.24**	3.3	**544.8**	100.0
Acid Deposition	1.07[B]/0.14[C]	<0.01	**2.20**	0.3	**1,547.5**	100.0

Notes:
A AQAL for locations with Lichens and Bryophytes
B Minimum CL for location of max PC
C Minimum CL for location of max PEC
CLe = Critical Level
CL = Critical Load
$CL_{min}N$ = Minimum Critical Load for Nitrogen
PC = Process contribution
PEC = Predicted environmental concentration (= PEC + background)
Exceedances for concentrations in air use PEC. Percentage exceedances based on discrete receptors

Table 6.17 – Impact Assessment at Worst-case Ecological Receptor by Pollutant (µg m^{-3}) – Routine Testing Scenario

Pollutant Averaging Period	CLe/CL/$CL_{min}N$	PC (µg m^{-3})	Max PEC (µg m^{-3})	% Max PC of CLe/CL/$CL_{min}N$	% Max PEC of CLe/CL/$CL_{min}N$	% Receptors with exceedances (where applicable)
NO_X Annual mean	30	0.84	6.49	2.8	21.6	-
NO_X 24-hour mean	**75**	**1,179.46**	**1,186.90**	**1,572.6**	**1,582.5**	90.9
SO_2 Annual mean	10[A]	0.06	9.83	0.6	98.3	-
Nitrogen Deposition	10[B]/5[C]	0.12	**27.24**	1.2	**340.5**	100.0
Acid Deposition	1.07[B]/0.14[C]	<0.01	**2.20**	0.1	**1,547.3**	100.0

Notes:
A AQAL for locations with Lichens and Bryophytes
B Minimum CL for location of max PC
C Minimum CL for location of max PEC
CLe = Critical Level
CL = Critical Load
$CL_{min}N$ = Minimum Critical Load for Nitrogen
PC = Process contribution
PEC = Predicted environmental concentration (= PEC + background)
Exceedances for concentrations in air use PEC. Percentage exceedances based on discrete receptors

Table 6.18 – Impact Assessment at Worst-case Ecological Receptor by Pollutant (µg m^{-3}) – LOOP Scenario A

Pollutant Averaging Period	CLe/CL/$CL_{min}N$	Max PC (µg m^{-3})	Max PEC (µg m^{-3})	% Max PC of CLe/CL/$CL_{min}N$	% Max PEC of CLe/CL/$CL_{min}N$	% Receptors with exceedances (where applicable)
NO_X Annual mean	30	0.48	6.18	1.6	20.6	-
NO_X 24-hour mean	75	**1,261.52**	**1,310.56**	**1,682.0**	**1,747.4**	97.4
SO_2 Annual mean	10[A]	0.04	9.83	0.4	49.1	-
Nitrogen Deposition	10[B]/5[C]	0.07	**27.24**	0.7	**544.7**	100.0
Acid Deposition	1.07[B]/0.14[C]	<0.01	**2.20**	0.1	**1,547.3**	100.0

Notes:

A AQAL for locations with Lichens and Bryophytes

B Minimum CL for location of max PC

C Minimum CL for location of max PEC

CLe = Critical Level

CL = Critical Load

$CL_{min}N$ = Minimum Critical Load for Nitrogen

PC = Process contribution

PEC = Predicted environmental concentration (= PEC + background)

Exceedances for concentrations in air use PEC. Percentage exceedances based on discrete receptors

Table 6.19 – Impact Assessment at Worst-case Ecological Receptor by Pollutant (µg m^{-3}) – LOOP Scenario B

Pollutant Averaging Period	CLe/CL/CL_{min}N	Max PC (µg m^{-3})	Max PEC (µg m^{-3})	% Max PC of CLe/CL/CL_{min}N	% Max PEC of CLe/CL/CL_{min}N	% Receptors with exceedances (where applicable)
NO_X Annual mean	30	1.40	6.95	4.7	23.2	-
NO_X 24-hour mean	75	**1,261.52**	**1,310.56**	**1,682.0**	**1,747.4**	97.4
SO_2 Annual mean	10[A]	0.12	9.85	1.2	49.3	-
Nitrogen Deposition	10[B]/5[C]	0.20	**27.24**	2.0	**544.8**	100.0
Acid Deposition	1.07[B]/0.14[C]	<0.1	**2.20**	<0.1	**1,547.4**	100.0

Notes:

A AQAL for locations with Lichens and Bryophytes

B Minimum CL for location of max PC

C Minimum CL for location of max PEC

CLe = Critical Level

CL = Critical Load

CL_{min}N = Minimum Critical Load for Nitrogen

PC = Process contribution

PEC = Predicted environmental concentration (= PEC + background)

Exceedances for concentrations in air use PEC. Percentage exceedances based on discrete receptors

Overall, at ecological receptors the air quality impact assessment has demonstrated:

- The results for the Nitrogen and Acid Deposition show exceedances at all ecological receptors considered in the assessment, in all Scenarios. This is mainly due to the existing background concentrations at the receptors, however when the additional PC is considered, further assessment from an ecologist is required.
- The results for both annual and 24-hour NO_X at ecological receptors have multiple exceedances in all scenarios due to the additional PC from the generators. Further assessment is required at these receptors in all considered scenarios.
- Further ecological assessment of the air quality modelling results for nitrogen deposition and NO_X has since been undertaken by an ecologist, the findings of which are presented in Appendix C. The evaluation identified:
  - Any increases in nitrogen deposition would not have an impact on qualifying habitats associated with both Severn Estuary Ramsar/SPA/SAC and Bridgwater Bay SSSI.
  - Although estuaries may be prone to vulnerability from NO_X, due to the high tidal ranges and velocity experienced in the Severn Estuary, the habitat is likely to be unaffected.
  - Similarly, for the qualifying bird species and littoral sediment, it is expected that the flushing effect of the tides within the Severn Estuary will negate any impacts of nitrogen deposition and NO_X.
  - The neutral grassland within Bridgwater Bay SSSI would be subject to negligible levels of nitrogen deposition and as a result it is not anticipated to have a significant detrimental effect. The NO_X impact on the neutral grassland condition is not considered to be significant and is not a qualifying feature of the SSSI. The grassland has been assessed by Natural England as ‘unfavourable, recovering’ (Neutral Grassland), and given the low NO_X deposition rate (less than 1% critical loading), it is unlikely that the PC would cause a change in plant composition or visible signs of plant stress such as leaf discolouration.
  - Exceedance areas on both the Severn Estuary Ramsar/SPA and Bridgwater Bay SSSI/NNR amount to only 33.8ha (0.14%) and on the Severn Estuary SAC to 28ha (on the northern seaward aspect) which equates to 0.04% of the designated site. As this does not exceed 1% of the qualifying habitats for each designation, any adverse impacts are deemed to be negligible.

6.2 Noise Impact Assessment

This assessment evaluates the noise impacts at nearby sensitive ecological and residential receptors arising from operation of the HPC back-up diesel generators.

6.2.1 Summary of Noise Sources

Sources of noise associated with operation of HPC generators are described in Section 5.6 of this report. Table 5.3 lists the principal noise sources that have been considered in this assessment, which includes the direct noise associated with the generator operation and noise associated with the various hoppers that are used to cool the diesel generators.

In total, there are 137 sources ranging between 60 and 108 dB L_{WA} that have been included within the noise impact assessment.

6.2.2 Summary of Noise Impact Assessment Methodology

The operational noise propagation model for the HPC site has been updated to the latest design layout, including the back-up diesel generator related noise sources as detailed in Section 5.6. CadnaA noise prediction modelling software (Version 2025) has been used for the purposes of this study.

ISO 9613-2:2024, as embedded with the CadnaA noise prediction modelling software, specifies methods for the description of sound outdoors in community environments. ISO 9613 can be applied to a wide variety of sound sources and includes methods to determine most of the major mechanisms of sound attenuation, such as:

- Geometric divergence (A_{div}) – spherical spreading of sound energy;
- Atmospheric absorption (A_{atm}) – attenuation of sound due to interaction with the air (dependant on frequency of sound and negligible at short distances);
- Ground effect (A_{gr}) – sound reflecting by the ground surface interfacing with the sound propagating directly from source to receiver;
- Reflection from surfaces (image source method, included in A_{gr} calculation) – sound is reflected from hard surfaces such as building facades due to atmospheric impedance of the surface. This effect increases the sound level when compared to a location free of buildings (i.e. free field); and
- Screening by obstacles (A_{bar}) – Hard obstacles such as close boarded timber fences and varying topography, including hills attenuate the sound from a source due to the insertion loss properties of the obstacle. However, there is an element of the sound which will diffract around the obstacle, especially at lover frequencies. The diffraction effect is determined using the path differences between the direct and diffracted sound. It should be noted that the screening effect provided by trees and foliage is negligible in the majority of cases; the exception is large areas of dense forest or plantations.

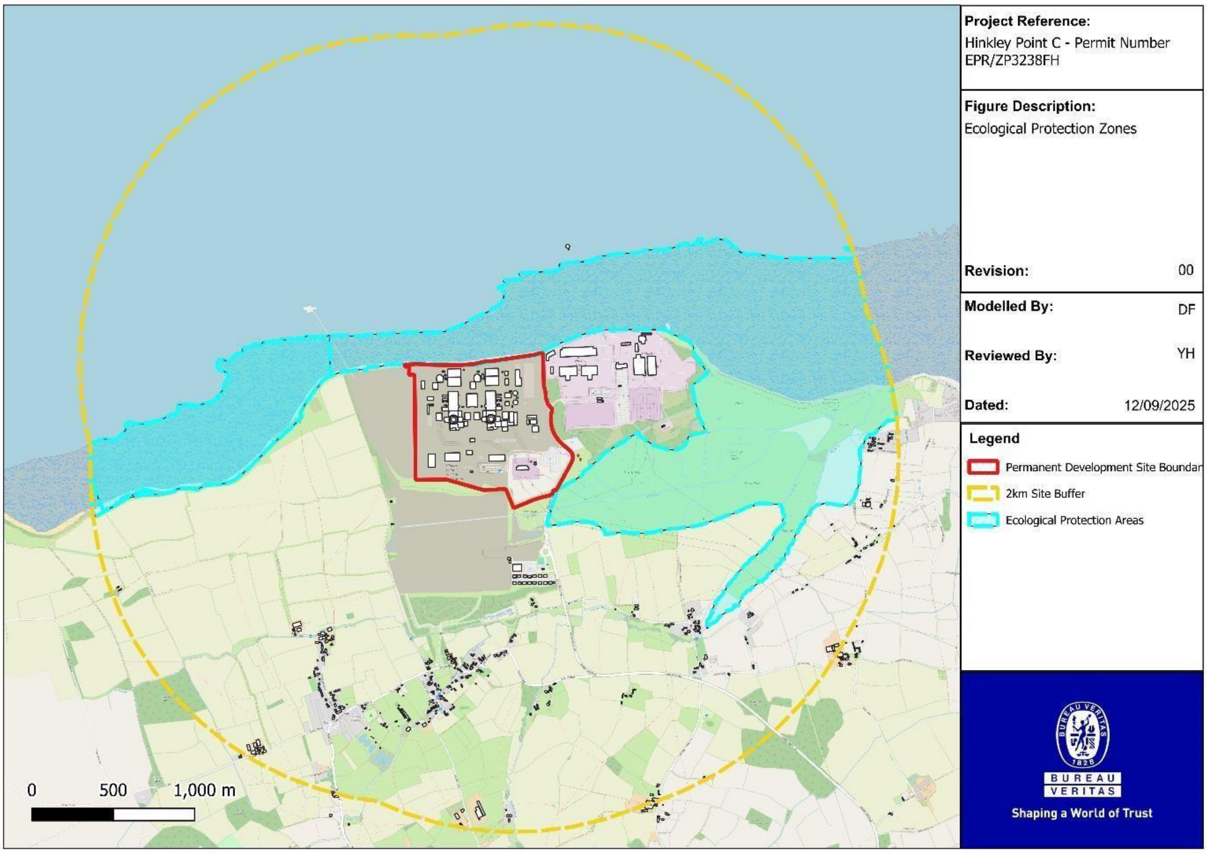
The location of HPC is such that it is in proximity to areas of environmental protection, which have been considered within this assessment. The ecologically designated sites within the 2km study area are as follows:

- Severn Estuary (Ramsar, SPA, SAC);
- Bridgewater Bay (SSSI, NNR); and
- Somerset Wetlands (NNR).

Whilst the Blue Anchor to Lilstock Coast SSSI is within 2 km of the Site boundary, it is designated in relation to geological features rather than ecological features and is therefore not sensitive to air or noise pollution impacts. Consequently, it has been scoped out from further consideration within this assessment.

The locations of environmental protection areas within the 2km study area are presented illustratively within Figure 6.3.

Figure 6.3 Ecological Protection Zones



In addition to ecological protection areas, modelling has been undertaken at the three residential receptor locations included within the previous permit application report. These locations are as follows:

- Knighton Farm (319380, 144548)
- Doggets (nearest residential dwelling in Shurton) (320590, 144666)
- Wick House (321578, 144620)

A single worst-case operational scenario has been considered as part of the HPC noise propagation modelling. The assessment has been undertaken under LOOP conditions, whereby all sources are identified within Table 5.3 are operating simultaneously and continuously. In reality, commissioning and maintenance operations (which are considered to represent the most representative operational scenarios for backup generator items) will likely only occur on one EPR unit at a time. Plug-in point sources (ESS, LLW, HBS, HHS & HZG) have no formal commissioning or maintenance schedule and so will generally not operate unless during a LOOP scenario.

It is therefore considered that noise emissions during commissioning and maintenance scenarios shall be at least 3-10dB lower than those considered within the assessment (3dB reduction assuming 50% of modelled total sound power level for 1 EPR unit at any one time, greater reduction for maintenance and/or commissioning of individual generators).

6.2.3 Summary of Noise Assessment Results

Figures 6.4 and 6.5 present noise emission contours for emergency diesel generators with regard to the following TIDE Toolbox Waterbird disturbance criteria:

- Low Risk: Prolonged Noise below 60dB L_{Aeq} (noise emissions below 30dB omitted from figures for ease of presentation)

- Medium Risk: Prolonged Noise between 60-72dB L_{Aeq}
- High Risk: Prolonged Noise exceeding 72dB L_{Aeq}

Whilst noise due to diesel generators is not predicted to be constant, it is considered that the ‘prolonged’ noise criterion is most appropriate due to the lack of temporal variation and/or impulsivity within generator emissions once active.

Figure 6.4 LOOP Noise Emission Contours

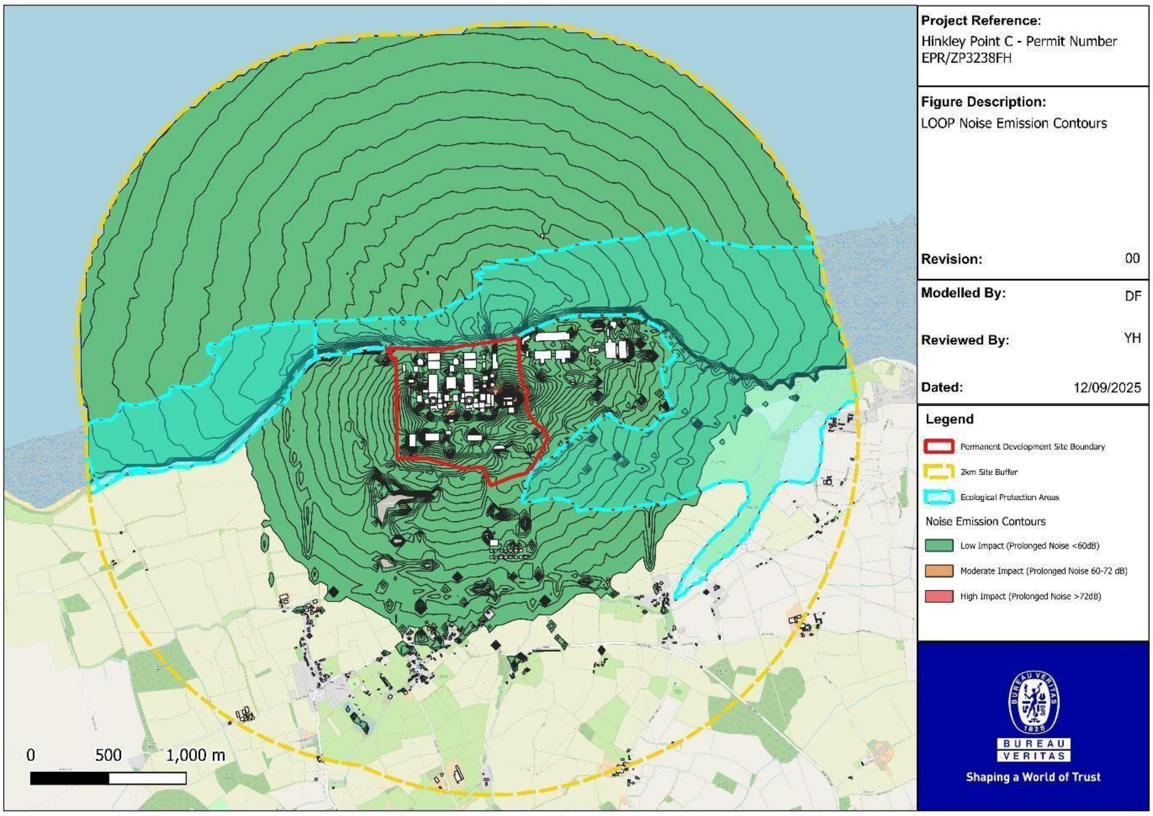
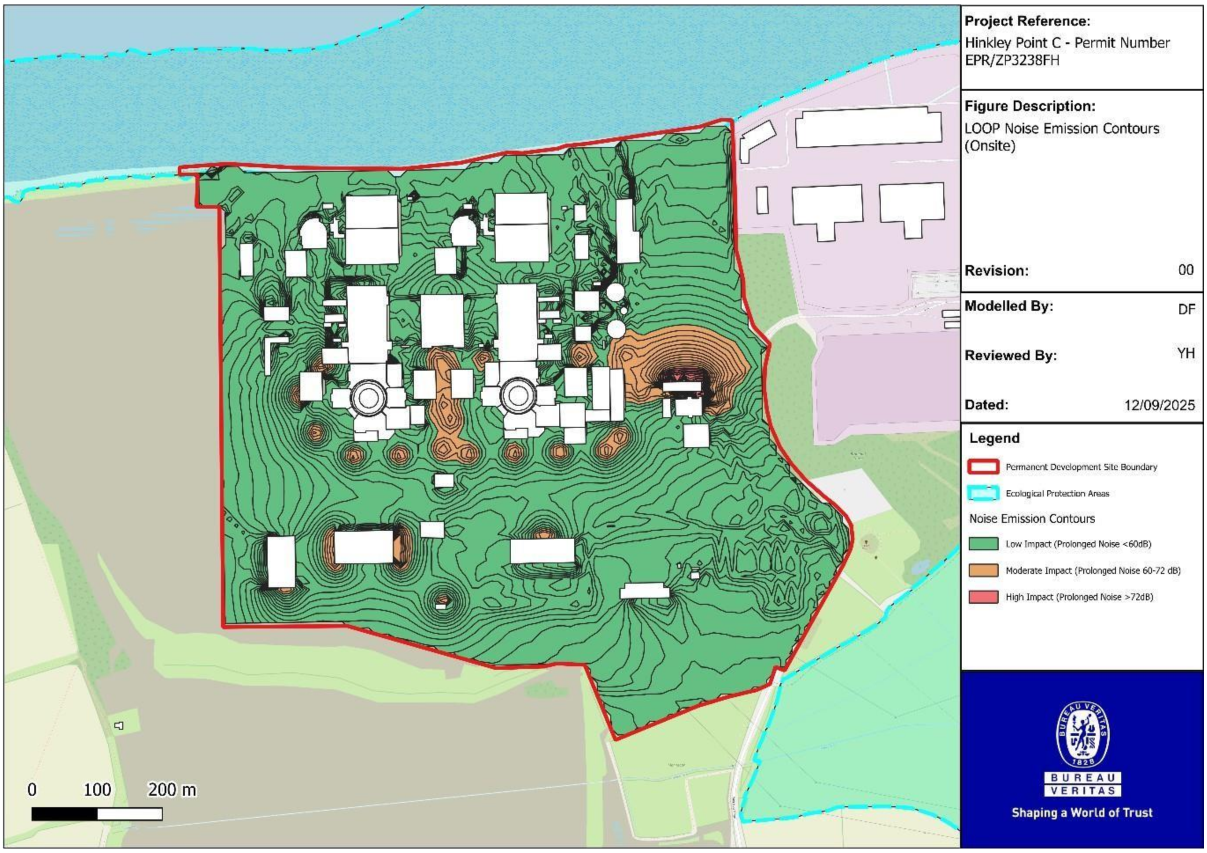


Figure 6.5 LOOP Noise Emission Contours (Onsite)



As demonstrated within Figures 6.4 and 6.5, noise emissions from emergency generators are significantly below the TIDE Toolbox ‘Moderate’ risk level within Ecological Protection Areas.

Table 6.20 presents the predicted noise levels due to emergency generators at the three residential receptor locations included within the previous permit application report.

Table 6.20 Assessment of Specific Noise Levels against Lowest Measured Background Sound Levels at Residential Receptor Locations

Receptor	Sound Pressure Level (dB, Free-Field)			Difference (dB)		Predicted Noise Level Less than 5dB above Background?
	Predicted Specific Noise Level ($L_{Aeq,T}$, Neutral Wind)	Lowest Measured Background Sound Level (LA90,T)				
		Day	Night	Day	Night	
Knighton Farm	33	30*	30*	+3	+3	Yes
Doggets	34	32	30*	+2	+4	Yes
Wick House	33	37	36	-4	-4	Yes
*Minimum value of 30dB $L_{A90,T}$ due to limitations of BS4142 methodology.						

As demonstrated within Table 6.20, predicted impacts have not significantly increased since the previous permit application, despite inclusion of additional mobile generator sources.

As discussed in Section 6.2.2, the above results represent an absolute worst-case scenario assuming LOOP conditions, with all generators operating simultaneously and continuously. Operation of the noise sources attributed to only a single EPR unit (which would be typical during Commissioning and Maintenance conditions) would give rise to a reduction of approximately 3 dB as a minimum, relative to the predicted noise levels detailed in Table 6.20.

In conclusion, the modelling and assessment indicate that the predicted noise levels associated with operation of the generators at HPC will not result in an adverse impact at the nearest ecological or residential sensitive receptors. This is based on the absolute worst-case scenario, with all generators operating. As discussed above, generators will be run intermittently during the respective commissioning phase for each EPR unit, and during short-term routine testing scheduled and conducted annually. During these activities, operation will predominantly be restricted to daytime only.

In order to further substantiate the noise propagation model results and potential noise impacts associated with operation of the HPC generators, complaint histories have been reviewed for SZB as the operator with the most recently installed diesel generators, and HPB due to its comparable proximity to the same receptors as the HPC installation.

In the last 5 years, neither HPB nor SZB has received any noise complaints associated with the operation of diesel generators at the Site. The mobile generators currently operated on the HPC Site are discrete, individual pieces of plant that are by their nature located away from each other and rarely in clusters. In the unlikely event of a noise complaint at the HPC Site, NNB GenCo will follow its established complaints procedure. When following the procedure, the complaint will be investigated and appropriate further action taken as necessary.

7 Resource Efficiency

7.1 Raw Materials Consumption

The proposed changes will not add any new raw materials relative to those already considered in the Environmental Permit.

The raw materials associated with the operation of the generators are:

- Diesel fuel – Fuel consistent with BS 2869:2017 and the SCOLF (England and Wales) Regulations 2007 (or relevant standards at time of procurement and operation) will be used for all standby diesel generators. Based upon the operational hours associated with the Routine Testing of the generators (as per Table 3.2), the approximate total fuel consumption per annum is estimated to be 721 tonnes.

- Lubricating oil – Standard lubricating oil type SAE 40 is recommended. The amount of lubricating oil used per annum depends on the chemical analysis performed on samples that will be taken regularly; these results will be used to determine the frequency of oil replacement. Each of the EDGs holds approximately 1.8m^3 of lubricating oil and each of the UDGs holds 0.335m^3. The amount required for the other HPC generators will be significantly less.

- Antifreeze – The proposed material used in the diesel generators cooling system is consistent with that detailed in the UK EPR reference design, i.e. a ready-to-use mixture of ethylene glycol and water, stored on site in drums. For the EDGs, the cooling system capacity is approximately 14.2 m^3 in total. The cooling system capacity for UDGs is approximately 15.8 m^3 in total.

- Batteries - these components are used to supply the speed governor of the UDGs. The demand for replacement batteries will be determined by the manufacturer's recommendations, which is estimated to be annually (to ensure they continue to hold/provide power). On this basis, 4 batteries per UDG may be required per year.

Other materials, including detergents/cleaning chemicals for the plant, water for cleaning and demineralisation to replace cooling fluid losses, ignition gases for engine start-up, and maintenance spare parts are likely to also be required in limited quantities to ensure effective operation of the generators.

The only raw materials to be stored on the dedicated diesel generator buildings are the fuels. All other raw materials will be stored in dedicated site-wide facilities that are beyond the scope of this EP variation application. During the design and operation of these facilities, BAT will be considered both from engineering and procedural perspectives.

Relevant operating personnel will be given appropriate training in order to be able to handle raw materials appropriately and personnel training records will be maintained in accordance with management system procedures.

7.2 Water Consumption

There is no use of water for the operation of the standby diesel generators. Minor volumes may be required for cooling system top-up and cleaning; however, this requirement is not significant (some water will also be used in the initial cooling system fill). No further assessment is required for the EP variation for the generators.

7.3 Avoidance, Recovery and Disposal of Waste

The storage of wastes associated with the operation of the generators will generally be carried out as part of a site-wide activity, with dedicated facilities that are out with the installation boundary. Site-wide procedures will cover all activities on the HPC site; these will be developed as part of the Integrated Management Systems. In preparation, a site Integrated Waste Strategy (IWS) has been produced to develop an approach to the management of all radioactive and non-radioactive waste types across HPC, including those detailed within this EP (non-radioactive).

The IWS shows that waste management strategies have been developed taking into account all relevant factors and key principles, including:

- Minimisation of waste via implementation of the waste hierarchy.
- Application of BAT.
- Review and application of operational experience feedback (OEF) in design, operation and decommissioning.
- Delivery of compliance with relevant regulatory obligations (i.e. the EP).
- Consideration of the full range of health, safety, environmental, security, economic and social issues.

NNB GenCo has developed a policy for environmental optimisation and a series of principles that support its application. These principles apply to all NNB GenCo staff involved with the design, procurement, construction, commissioning, operation and decommissioning where the variation and demonstration of BAT is required. The principles below apply to waste from the installation:

- Determine and implement appropriate techniques at the most appropriate stage (i.e. design, procurement, construction, commissioning, operation, decommissioning and site restoration) of the project lifecycle and promote opportunities for further optimisation during future phases of the project.
- Demonstrate the application of best practice, guidance and standards to select techniques and that where the application of best practice, guidance and standards is not possible, that a meaningful range of alternatives have been considered.
- Demonstrate that the selection of techniques employed to deliver optimised performance are recorded through a series of arguments that, when taken together and underpinned by demonstrable and defensible evidence, support the selection of the techniques.
- Adopt a proportionate approach ensuring the efforts expended match the benefits expected or achieved through an open, transparent, inclusive process which is recorded and maintained.

7.3.1 Waste Handling

The main wastes generated across the installation are:

- Lubricating oil.
- Cooling fluid (water and ethylene glycol).
- Oily cloths/absorbent pads from minor spills/drips.
- Batteries (for starting the UDGs and air compressors).
- Replaced parts due to preventative or reactive maintenance.

The activities covered in this variation will not significantly alter the amount of waste produced on site, nor will it alter the methods of waste disposal and/or recovery.

The IWS will incorporate arrangements for compliance with legal requirements for the storage, management and transfer of wastes from the installation and the Operator will implement best practices waste management across the site through the IMS.

The activities undertaken at the installation are expected generate a small range of waste streams. Wastes will be segregated and stored in appropriate facilities to minimise the potential for environmental impacts. The wastes will be stored within dedicated areas, which will contain appropriate pollution prevention measures. Although these are outside the installation, the indicative BAT requirements will still be considered to implement best practice.

Waste arising from the operation of the standby diesel generators will be handled together with the other non-radioactive waste arising from HPC activities site-wide, and will be subject to segregation, storage, recovery or disposal, as outlined in the IWS.

7.3.2 Waste Recovery or Disposal

The IWS document for HPC will outline the approach to environmental optimisation with respect to waste arisings across the HPC Site and the application of waste hierarchy. The activities covered in this variation will not significantly alter the methods of waste disposal and/or recovery.

7.4 Energy Efficiency

As standby plant, with the exception of the HDU (which will run up to 1.6% of the year), each generator plant will typically operate for no more than 1% of the year, with operation scheduled for Routine Testing and maintenance purposes during periodic nuclear safety tests. Energy efficiency is therefore of much less relevance than it would be to plant operating on a more frequent or continuous basis. NNB GenCo will take steps to adopt relevant basic energy efficiency measures in the design, operation and maintenance of the generators, as far as is practicable and consistent with the key design principles identified in Section 3.

7.4.1 Design

NNB GenCo will take steps to adopt relevant basic energy efficiency measures in the selection and design of the generators, as far as is practicable, including:

- Modern design following current best practices in optimising efficiency.
- High efficiency motors and drives.
- The plant components have been sized appropriately for the design capacity of the plant, so that each element is operating optimally and efficiently.
- Effective insulation of hot surfaces.

7.4.2 Energy Consumption

The volume of diesel fuel to be used by the generators has been calculated on the basis of the generator specifications and fuel throughput; A total of 721 tonnes per annum is estimated based upon the assumed Routine Testing operational hours.

The electricity generated by the combustion plant in Routine Testing will be exported to the grid together with the power station generated output. The electrical efficiency of the generating plant varies by generator, with all generators being in the range of 40-45% based on the thermal input rating. This is broadly in line with the energy efficiency levels associated with the best available techniques (BAT-AEEL) set by the LCP-BATc for reciprocating engines fuelled by gas oil fired operated for more than 1,500 hours a year. However, it should be noted that the diesel generators are excluded from compliance with the energy efficiency levels in the LCP-BATc as it is not intended to be operated for more than 1,500 hours annually.

Annual energy consumption information will be provided and reported to demonstrate compliance with the greenhouse gas EP of the Operators if any.

Small quantities of electrical power may be used to operate the generator facilities, including lighting, powering the air compressors and providing pre-heating. In regard to alternative energy sources for pre-heating it is not possible to utilise waste steam from the nuclear steam supply system (reactor and steam generators) as these systems will be shut down during a LOOP event. In addition, the complexity involved in routing steam from the turbine hall to the diesel generator buildings would be immense. The only other source of steam on site is the auxiliary boiler however this is also electrically powered and only operated for steam raising during start up and shutdown of the reactor units. Electrical use associated with operation of the generator facilities has not been quantified at this stage.

The diesel generators will be serviced and maintained in accordance with the manufacturers' specifications and the efficiency of the combustion process will be demonstrated by emissions testing. Due to the limited operational hours of the diesel generators, it is considered that the investment in any additional energy efficiency measures would be disproportionate and not considered to be BAT.

8 Environmental Management System and Emergency Response

NNB GenCo is preparing an overarching EMS for the operation of the HPC Site, which will be ISO 14001 accredited. The structure of the EMS will follow the framework for the ISO 14001 standard, the five main stages of which are outlined in the sections below. The current EMS associated with the permitted activities as part of the construction phase at the Site (EPR/WP3200PJ) has been included within Appendix E as an example. The current EMS at the Site is certified to both ISO 9001:2015 and ISO 14001:2015 standards covering a range of environmental aspects such as air, noise, water and waste.

8.1 Commitment and Policy

At the initial stage of the EMS, the management of NNB GenCo will commit to environmental improvement and establish the relevant environmental policy. The policy is the main foundation of the EMS.

8.2 Planning

The EMS will identify the overarching environmental aspects associated with the operation of the Site. Consideration will be given in the EMS to specific environmental aspects arising from the operational combustion activities at the Site, such as emissions to air, water and land, and associated waste management. The EMS will identify within these environmental aspects, which are determined to be potentially significant, through utilising the supporting information and assessments. Specific to the combustion activities, to determine the significance of any related environmental aspects, supporting information provided within this permit will be utilised to assist these decisions. Once the specific environmental aspects are determined, NNB GenCo will set objectives and targets. An objective is an overall environmental goal, whilst a target is a detailed, quantified requirement that arises from the objectives (e.g. lower NO_2 emissions, to a set percentage below the relevant AQO). Once the targets and objectives have been set, a plan is devised to meet these. The EMS will set out the designation of responsibilities, a schedule of implementation and clear steps of actions required to meet targets and objectives.

8.3 Implementation

Following the planning stage, the organisation will follow through with an action plan using the necessary resources. During the implementation stage of the EMS, training and awareness for all relevant employees will be undertaken. Other steps will include ensuring operating procedures are followed, documentation of activities, and setting up appropriate communication lines both internally and externally.

8.4 Evaluation

The EMS is a collection of live documents that will continue to be evaluated throughout its lifecycle, to evaluate whether the set objectives and targets are being met. If the objectives and targets are not being met, NNB GenCo will take appropriate corrective action and update the relevant parts of the EMS accordingly.

8.5 Review

In addition to ongoing evaluation of the EMS, upper management will also evaluate the EMS to determine if the original environmental policy is consistent with the organisation’s values. If required, the plan will be revised to optimise the effectiveness of the EMS.

8.6 Emergency Response

The emergency situations that may arise during the operation of the combustion plant at the HPC Site will also be carefully considered within the EMS. The EMS will include relevant Environmental Emergency Plans, which provide written instructions and information to use during an emergency situation. These plans will also provide information to prevent or mitigate environmental impacts and health and safety risks.

9 Information

9.1 Records

Documents are retained electronically where possible, although some records are hard copies (e.g. copies of plant conditions and performance for existing boilers). All records are:

- Legible.
- Compiled as soon as reasonably practicable.
- Document in such a way that, where amendments are made, the original record and any changes are recorded and retrievable.
- Retained for a minimum of four years or until permit surrender.

9.2 Reporting

All reports required to comply with the permit will be provided to the Environment Agency to the address that will be provided. The reports will be retained in accordance with the procedures outlined in the appropriate sections of the permit.

9.3 Notification

NNB GenCo will notify the Environment Agency without delay following the detection of:

- Any malfunction, breakdown or failure of equipment or techniques, accident or emission of a substance not controlled by an emissions limit which has caused or may cause significant pollution.
- Any significant adverse environmental effect.

All notifications will be recorded and reported in line with the appropriate sections of the EP.

Appendix A – Terms and Definitions

Term	Definition
ADMS	Atmospheric Dispersion Modelling System
AQO	Air Quality Objective
AQS	Air Quality Standard
AURN	Automatic Urban and Rural Network
BAT	Best Available Technique
BDB	Beyond Design Basis
BREF	BAT Reference Documents
CERC	Cambridge Environmental Research Consultants
CL	Critical Load
Cle	Critical Level
CO	Carbon Monoxide
CWI Pumps	Cooling Water Injection Pumps
COD	Chemical Oxygen Demand
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EAL	Environmental Assessment Level
EDG	Emergency Diesel Generator
ELV	Emission Limit Value
EMS	Environmental Management System
EPR	Environmental Permitting Regulations
ESS	External Site Systems
EU	European Union
HBS	Simulator Training Centre
HHA	Framatome Warehouse
HHE	Back-up Emergency Equipment Store
HDU	Emergency Response Training Centre
HPC	Hinkley Point C
HZG	Oil and Grease Storage
g/s	Gram per second
kVA	Kilo-volt ampere
LAQM	Local Air Quality Management
LLV	HBX building backup power supply
mg/m^3	Milligram per cubic metre
m/s	Metres per second
MW	Megawatt
NO_2	Nitrogen Dioxide
NO_X	Oxides of Nitrogen
PC	Process Contribution
PEC	Predicted Environmental Concentration
PM_{10}	The fraction of particles with aerodynamic diameters equal to, or less than, 10 µm.
$PM_{2.5}$	The fraction of particles with aerodynamic diameters equal to, or less than, 2.5 µm.
SBDG	Station Blackout Diesel Generator (now referred to as UDG)
SEG	Diversified Ultimate Cooling Water Supply System Generators
SMDG	Small Mobile Diesel Generator
SPA	Special Protection Area
SO_2	Sulphur dioxide
SSSI	Site of Special Scientific Interest
TOC	Total Organic Carbon

UDG	Ultimate Diesel Generator
µg/m^3	Microgram per cubic metre
ULSD	Ultra-Low Sulphur Diesel
0LLI	HUB distribution board

Appendix B – Air Quality Impact Assessment

Appendix C – Ecological Technical Note

Appendix D – BAT Discussion: Choice of Engine

Appendix E – EMS Construction Certificate