

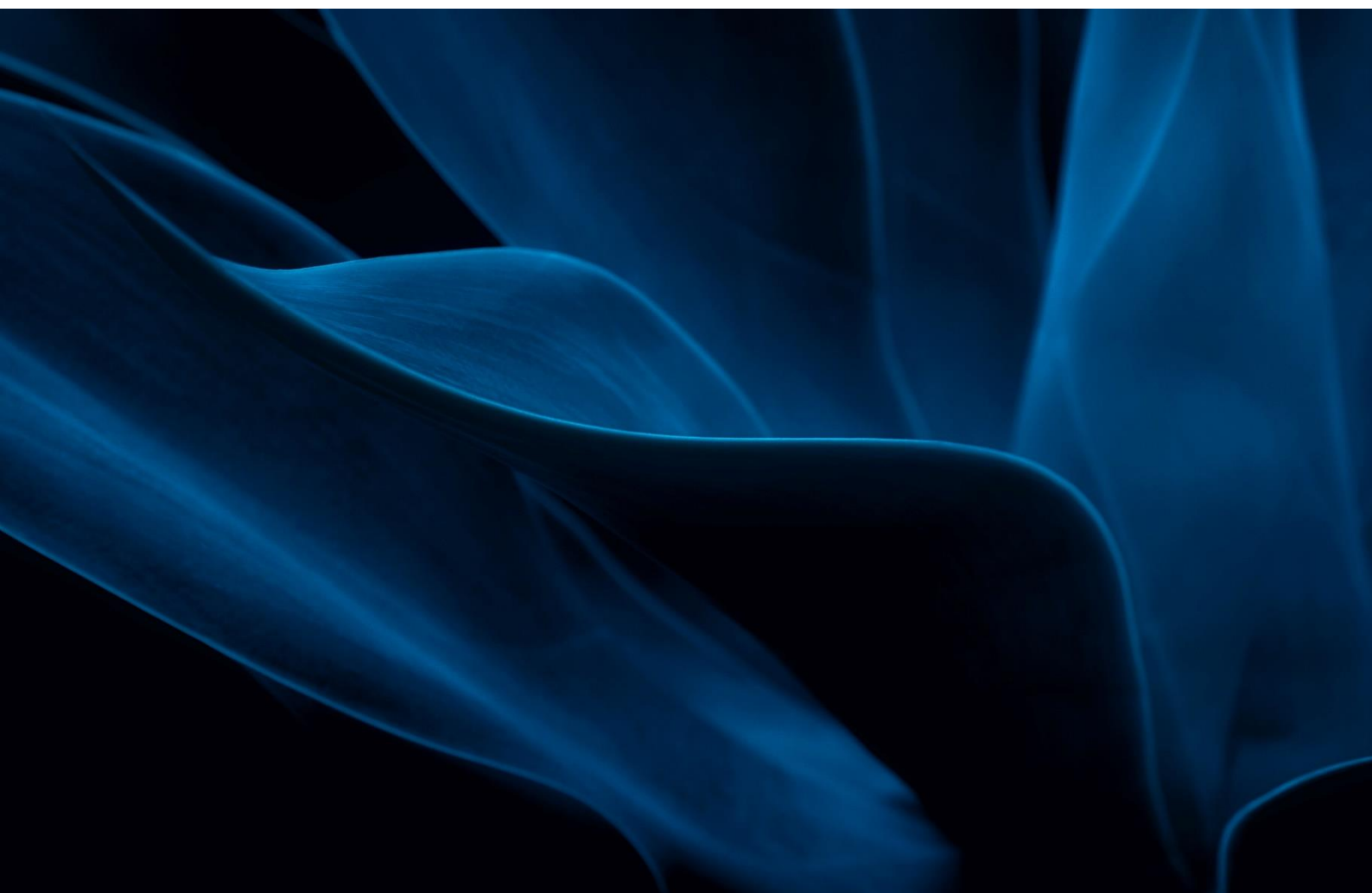


NNB Generation Company Ltd

Hinkley Point C - Permit Number EPR/ZP3238FH

Air Quality Modelling Addendum Report



February 2026



Document Control Sheet

Identification	
Client	NNB Generation Company (HPC) Ltd
Document Title	Hinkley Point C – Permit Number EPR/ZP3238FH - Air Quality Modelling Addendum Report V1.1
Bureau Veritas Ref No.	AIR13252516

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Executive Summary

Purpose of Report

Bureau Veritas was commissioned by NNB Generation Company (HPC) Limited (NNB GenCo HPC) to undertake a dispersion modelling exercise assessing impacts at human health and ecological receptors from operational emission sources at the Hinkley Point C nuclear power station (HPC).

This assessment was undertaken to support the Environmental Permit variation application for combustion activities during the operational period of the plant. It used detailed dispersion modelling, using ADMS 6, to undertake an assessment of emissions produced from operational emission sources at the Site, which comprise emissions from on-site emergency power generators, which are diesel powered.

This report provides an addendum to the HPC Operation Modelling Report, addressing the Environment Agency's Request for Further Information (RFI). Primarily, the addendum includes an additional assessment of Local Wildlife Sites within a 2 km boundary of the Hinkley Point C Site.

This addendum addresses only those points raised in the RFI. The report is structured as follows:

- Sections with additions: These are detailed in full
- Sections requiring no amendments: A statement confirms no changes have been made

The following assessment scenarios have been maintained for the purpose of the addendum:

- Scenario 1: Commissioning (inclusive of emissions arising from ongoing construction activities). This scenario assesses all potential releases to air from the back-up generators during the commissioning of the power station;
- Scenario 2: Routine Testing. This scenario presents the likely potential impacts to be expected as a result of the standard generator testing, which will be scheduled throughout the lifetime of the power station; and
- Scenario 3: Emergency Loss of Off-site Power. This scenario will cover a loss of off-site power (LOOP) situation where grid connection for both reactor units is lost, and the station is unable to operate under house load.

All modelling methodologies and assumptions have been developed to represent a reasonable worst case, conservative assessment. Consequently, actual concentrations at nearby receptors are likely to be less than those reported in this assessment.

Summary of Conclusions

At the Local Wildlife Site (LWS) receptors:

- The results for 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.
- The results for annual mean NO_x at ecological receptors show exceedances of the AQAL for Commissioning B Unit 1. In all other scenarios results for annual mean NO_x are below the relevant assessment level. The results for annual mean SO₂ are below the relevant assessment level in all scenarios.



- Additionally, exceedances of the 24-hour mean NO_x AQAL are predicted in all the Scenarios.

1 Introduction

Bureau Veritas was commissioned by NNB Generation Company (HPC) Limited (NNB GenCo HPC) to undertake a dispersion modelling exercise assessing impacts at human health and ecological receptors from operational emission sources at the Hinkley Point C nuclear power station (HPC).

This assessment has been undertaken to support the Environmental Permit variation application for combustion activities during the operational phase of HPC. It used detailed dispersion modelling, using ADMS 6 software, to undertake an assessment of emissions produced from operational emission sources at the Site, which comprise emissions from back-up diesel generators.

This report provides an addendum to the HPC Operation Modelling Report, addressing the Environment Agency's Request for Further Information (RFI). Primarily, the addendum includes an additional assessment of Local Wildlife Sites within a 2 km boundary of the Hinkley Point C Site.

1.1 This addendum addresses only those points raised in the RFI. Scope of the Report

This addendum provides detail on the following:

- Assessment of Local Wildlife Sites
- Further detail on how emission rates have been calculated – see Appendix A
- Typographic corrections to Table C.7.2 of the Air Quality Modelling Report – see Appendix A, Table A.2
- Total background values used in the assessment (2027 Defra mapped background levels plus the expected annual process contributions (PCs) from construction and commissioning of Unit 2) – see Section 2.3

2 Methodology

The methodologies adopted for undertaking the emissions modelling assessment are outlined in the following sections.

2.1 Choice of Model

The atmospheric dispersion model used for assessment of emissions at the HPC Site is ADMS 6 (version 6.0.2), developed by Cambridge Environmental Research Consultants (CERC).

2.2 Pollutants Assessed

No amendments have been made to this section in response to the RFI.

2.3 Background Concentrations

Annual mean background concentrations at the assessed human and ecological receptor locations have initially been derived from the Defra background maps for the 1 km grid square in which they are located. These background concentrations do not include the concentrations of pollutants which are anticipated to be emitted by site operations during the Unit 1 and Unit 2 construction phases. Therefore, the Defra background maps have been uplifted to include the on-site emissions during the construction phase.

The emissions to air associated with HPC construction activities have been previously modelled and assessed in support of the Combustion Activity Permit required for the construction phase. The results of this modelling are discussed elsewhere, however the process contributions associated with the predicted construction phase emissions have been utilised as the basis to uplift the background pollutant concentrations for this assessment. At the time the construction phase modelling work was undertaken, the assumed total aggregated on-site monthly generator capacity was 5,605 kW_{th} (calculated as a monthly average of a 12-month period). In 2027, when Unit 1 is being commissioned, it is estimated that there will be 8,242 kW_{th} total aggregated on-site monthly generator capacity (calculated as a monthly average of a 12-month period) related with the ongoing construction of Unit 2. This is a factor of 1.47 greater than the capacity assumed at the time that the construction phase modelling work was undertaken. A factor of 1.47 was therefore applied to the process contributions from the construction phase emissions model outputs and the scaled construction phase process contribution added to the 2027 Defra background map concentrations, which are detailed below in Table 2.1. This approach of uplifting the background concentrations was only applied to the Commissioning scenarios for Unit 1 (2027), as these are the only scenarios understood to coincide with the construction phase of Unit 2.

The annual average process contribution associated with each of the operational scenarios is added to the annual average background concentration to give a total concentration at each receptor location. This total concentration can then be compared against the relevant Air Quality Standard/Objective (AQS/O) and the likelihood of an exceedance determined.

It is not technically rigorous to add predicted short-term or percentile concentrations to ambient background concentrations not measured over the same averaging period, since peak contributions from different sources would not necessarily coincide in time or location. Without hourly ambient background monitoring data available it is difficult to make an assessment against the achievement or otherwise of the short-term AQS/O. For the current assessment, conservative short-term ambient levels have been derived by applying a factor of two to the annual mean background data as per the recommendation in Environment Agency guidance. Short-term or percentile concentrations to ambient background concentrations not measured over the same averaging period, since peak contributions from different sources would not necessarily coincide in time or location. Without hourly ambient background monitoring data available it is difficult to make an assessment against



the achievement or otherwise of the short-term AQS/O. For the current assessment, conservative short-term ambient levels have been derived by applying a factor of two to the annual mean background data as per the recommendation in Environment Agency guidance.

The Defra background annual mean concentrations used in the assessment of the Commissioning Scenario for Unit 2 are detailed in Table 2.1, with the uplifted background concentrations Commissioning Scenario for Unit 2 detailed in Table 2.2.

Table 2.2 presents uplifted background concentrations with an important distinction based on receptor type. For grid squares that contain human receptors, the table provides NO₂, PM₁₀, and PM_{2.5} concentration data. In contrast, grid squares where ecological receptors are located present only NO_x data rather than the full suite of pollutants shown for human receptors. SO₂ and CO data are taken from 2001 based maps so are not included within this table.

This difference in data presentation reflects the specific pollutants most relevant to each receptor type.

Table 2.1 – 2027 Defra Background Mapped Annual Mean Pollutant Concentrations used in the Commissioning Scenarios

Grid square (E, N)	2027 Defra Annual Mean Pollutant Concentrations ($\mu\text{g}/\text{m}^3$)					
	NO _x ^a	NO ₂ ^a	PM ₁₀ ^a	PM _{2.5} ^a	CO ^b	SO ₂ ^b
313500,135500	3.74	3.04	10.58	5.87	163.0	1.7
315500,141500	3.86	3.14	9.30	5.59	156.0	1.9
315500,142500	3.87	3.14	9.97	5.74	154.0	2.1
317500, 145500	3.54	2.88	9.05	5.46	161.0	2.7
318500, 144500	3.67	2.98	9.93	5.68	153.0	2.0
318500, 145500	3.61	2.93	9.40	5.56	161.0	2.1
318500, 146500	3.63	2.95	8.93	5.44	161.0	2.7
319500, 143500	3.88	3.15	9.86	5.74	155.0	2.0
319500, 144500	3.83	3.11	9.53	5.64	153.0	2.1
319500, 145500	3.76	3.05	10.36	5.82	152.0	2.1
319500, 146500	3.63	2.95	8.93	5.44	161.0	2.7
320500, 143500	4.00	3.24	10.02	5.96	156.0	2.1
320500, 144500	3.96	3.21	10.03	5.90	155.0	2.2
320500, 145500	4.02	3.25	9.95	5.86	154.0	2.4
320500, 146500	3.79	3.07	9.04	5.61	161.0	2.7
321500, 143500	3.96	3.21	10.68	6.06	156.0	2.1
321500, 144500	4.14	3.35	10.44	6.00	155.0	2.2
321500, 145500	5.85	4.67	10.08	5.96	161.0	2.7
321500, 146500	4.07	3.30	9.09	5.65	161.0	2.7
322500, 144500	4.04	3.27	10.41	5.99	158.0	2.1
322500, 145500	4.31	3.49	10.11	5.94	157.0	2.6
322500, 146500	4.11	3.32	9.11	5.67	161.0	2.7
322500, 160500	4.12	3.34	8.75	5.68	161.0	2.7
323500, 143500	4.13	3.34	10.25	5.98	161.0	2.0
323500, 144500	4.03	3.27	9.74	5.84	159.0	2.1
323500, 145500	4.08	3.30	9.58	5.82	159.0	2.3
323500, 146500	3.96	3.21	9.07	5.66	161.0	2.7
323500, 147500	3.63	2.95	8.93	5.44	161.0	2.7
324500, 145500	3.98	3.23	9.18	5.70	161.0	2.7
324500, 147500	3.63	2.95	8.93	5.44	161.0	2.7
329500, 145500	4.57	3.69	9.93	6.11	181.0	2.0
329500, 147500	4.46	3.61	9.34	5.99	161.0	2.7
329500, 150500	4.43	3.58	9.32	6.02	161.0	2.1
329500, 159500	4.23	3.42	9.01	5.85	161.0	2.7

^a 2027 Annual mean background concentration of NO₂, NO_x, PM₁₀ and PM_{2.5} taken from Defra's UK Air Quality Archive (1 km x 1 km grid squares) prior to processing (2018 reference year background maps).
^b Background concentration of SO₂ taken from Defra's UK Air Quality Archive (1 km x 1 km grid squares) 2001 background maps prior to processing

Table 2.2 – 2027 Uplifted Background Annual Mean Pollutant Concentrations used in the Unit 1 Commissioning Scenarios

Grid square (E, N)	2027 Uplifted Annual Mean Pollutant Concentrations ($\mu\text{g}/\text{m}^3$)			
	NO _x	NO ₂	PM ₁₀	PM _{2.5}
313500,135500	4.18	-	-	-
315500,141500	4.31	-	-	-
315500,142500	4.3	-	-	-
317500, 145500	3.98	-	-	-
318500, 144500	3.67	-	-	-
318500, 145500	4.04	-	-	-
318500, 146500	4.66	-	-	-
319500, 143500	-	3.59	9.89	5.78
319500, 144500	-	3.83	9.59	5.69
319500, 145500	-	14.11	11.19	6.65
319500, 146500	-	15.45	9.86	6.37
320500, 143500	-	3.45	10.04	5.98
320500, 144500	-	5.22	10.19	6.06
320500, 145500	-	8.21	10.31	6.22
320500, 146500	14.88	-	-	-
321500, 143500	-	3.52	10.71	6.08
321500, 144500	-	4	10.48	6.05
321500, 145500	7.55	-	-	-
321500, 146500	7.88	-	-	-
322500, 144500	-	3.79	10.45	6.03
322500, 145500	-	4.24	10.16	6
322500, 146500	4.96	-	-	-
322500, 160500	4.56	3.34	8.75	5.68
323500, 143500	-	3.55	10.27	5.99
323500, 144500	-	3.66	9.77	5.87
323500, 145500	-	3.77	9.61	5.85
323500, 146500	4.38	-	-	-
323500, 147500	3.97	-	-	-
324500, 145500	4.45	-	-	-
324500, 147500	3.94	-	-	-
329500, 145500	4.99	-	-	-
329500, 147500	4.91	-	-	-
329500, 150500	4.87	-	-	-
329500, 159500	4.66	-	-	-

The grid squares which account for human receptors have NO₂, PM₁₀ and PM_{2.5} concentrations presented whereas those grid squares within which ecological receptors lie only NO_x data is presented.



2.4 Ecological Receptor Deposition Backgrounds

Estimated background deposition rates of nutrient nitrogen and total acid deposition for the UK are available via the Air Pollution Information Service (APIS) website (<http://www.apis.ac.uk>). This provides estimated deposition rates for the ecological receptors considered in this study, as obtained from the APIS website. It should be noted that the level of uncertainty associated with these modelled estimates is relatively high and the results are presented from the model across the UK on a 5 km grid square resolution. The background concentrations included within the Nitrogen and Acid deposition assessments are not inclusive of nitrogen or sulphur deposition associated with the construction phase of the Site, as these are considered to be short-term and reversible contributions.

Table 2.3 - Estimated Background Deposition Rates - LWS

Model Receptor ID	Site Name	X	Y	Background Nitrogen Deposition (kg N ha ⁻¹ y ⁻¹) ^(b)	Nitrogen Oxides (NO _x as NO ₂) µg/m ³	Sulphur Dioxide (SO ₂) µg/m ³
H LWS 1	Hinkley LWS	320710	146180	25.1	1.79	0.15
H LWS 2	Hinkley LWS	320710	146140	25.1	1.79	0.15
H LWS 3	Hinkley LWS	320710	146100	25.1	1.79	0.15
H LWS 4	Hinkley LWS	320710	146060	25.1	1.79	0.15
H LWS 5	Hinkley LWS	320710	146020	25.1	1.79	0.15
H LWS 6	Hinkley LWS	320710	145980	25.1	1.79	0.15
H LWS 7	Hinkley LWS	320710	145940	25.1	1.79	0.15
H LWS 8	Hinkley LWS	320710	145900	25.1	1.79	0.15
H LWS 9	Hinkley LWS	320750	145860	25.1	1.79	0.15
H LWS 10	Hinkley LWS	320750	145820	25.1	1.79	0.15
H LWS 11	Hinkley LWS	320750	145780	25.1	1.79	0.15
H LWS 12	Hinkley LWS	320750	145740	25.1	1.79	0.15
H LWS 13	Hinkley LWS	320790	145700	25.1	1.79	0.15
H LWS 14	Hinkley LWS	320790	145660	13.5	0.96	0.12
H LWS 15	Hinkley LWS	320830	145660	13.5	0.96	0.12
H LWS 16	Hinkley LWS	320870	145620	13.5	0.96	0.12
H LWS 17	Hinkley LWS	320870	145580	13.5	0.96	0.12
H LWS 18	Hinkley LWS	320870	145540	13.5	0.96	0.12
MHC LWS 1	Mud House Copse LWS	321950	144100	26.8	1.02	0.12
WPC LWS 1	Wick Park Covert LWS	321910	143860	27.7	1.98	0.16
CP LWS 1	Cole Pool LWS	319310	143820	26	1.85	0.15
HW LWS/AW 1	Honibere Wood LWS/AW	318470	144300	24.3	1.74	0.15
BA LWS 1	Blue Anchor to Lilstock Cliff LWS	319390	146100	13.1	0.93	0.11

2.5 Scenarios

No amendments have been made to this section in response to the RFI.

2.6 Emissions Parameters

Whilst no changes have been made to the existing emissions parameters in response to the RFI, a clarification is made regarding the emission rate calculations. Full detail of the calculations used is provided within Appendix A.

Typographic corrections to the original Table C.7.2 of the Air Quality Modelling Report are made in Appendix A, Table A.2.

2.7 Discrete Ecological Receptors

The designated site locations around the HPC Site are provided in Figure 2.1 below. No amendments have been made to the assessment of designated ecological sites in response to the RFI, however, Local Wildlife Sites within 2 km of the HPC Site are assessed within this report.

Figure 2.2 shows the designated ecological sites and local wildlife sites within 2 km of the HPC Site. The receptor points for the local wildlife sites included within this addendum are also shown.

The Local Wildlife Sites (LWS) to be assessed are as follows:

- Hinkley LWS
- Blue Anchor to Lilstock Cliff LWS
- Cole Pool Field LWS
- Mud House Copse LWS
- Honibere Wood LWS & AW
- Wick Park Covert LWS

Figure 2.1 – Designated Ecological Sites around the HPC Site

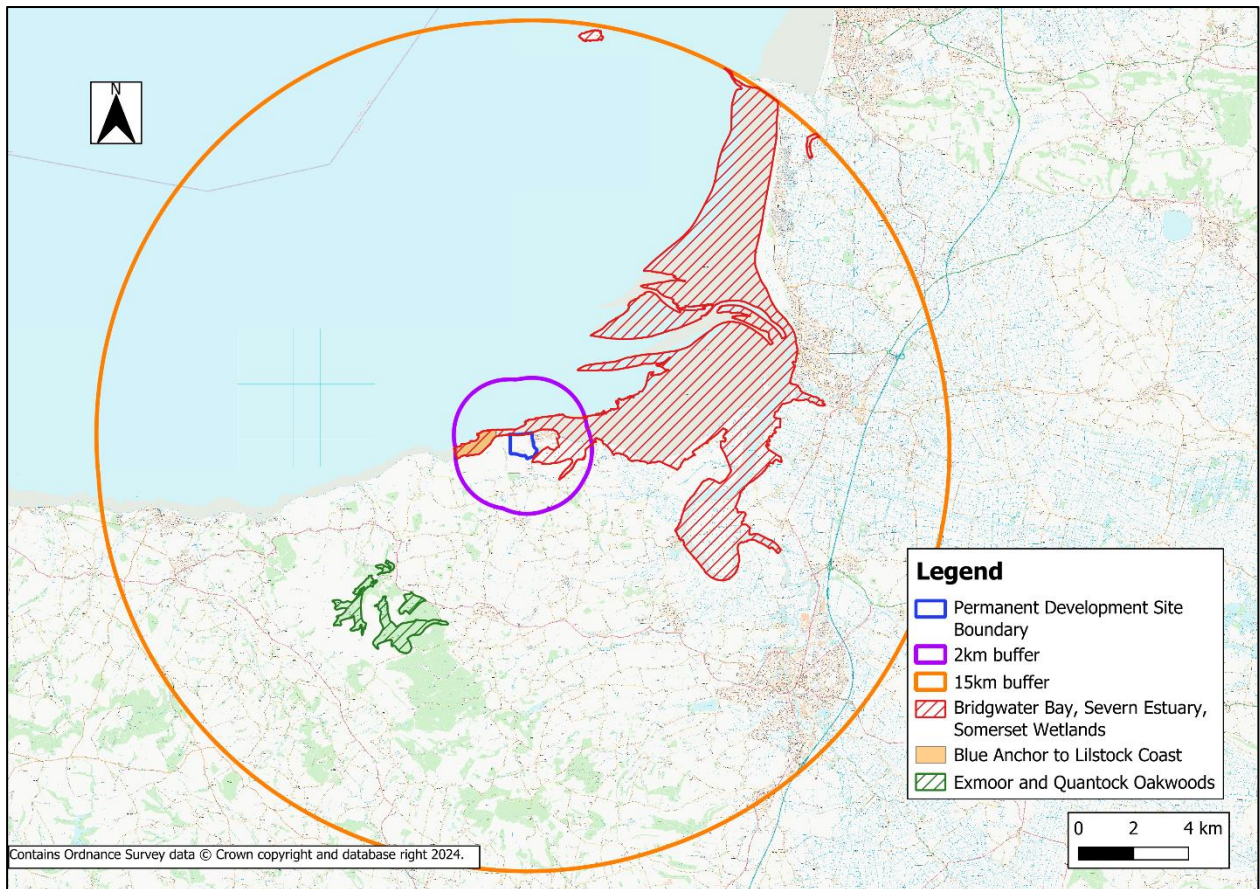
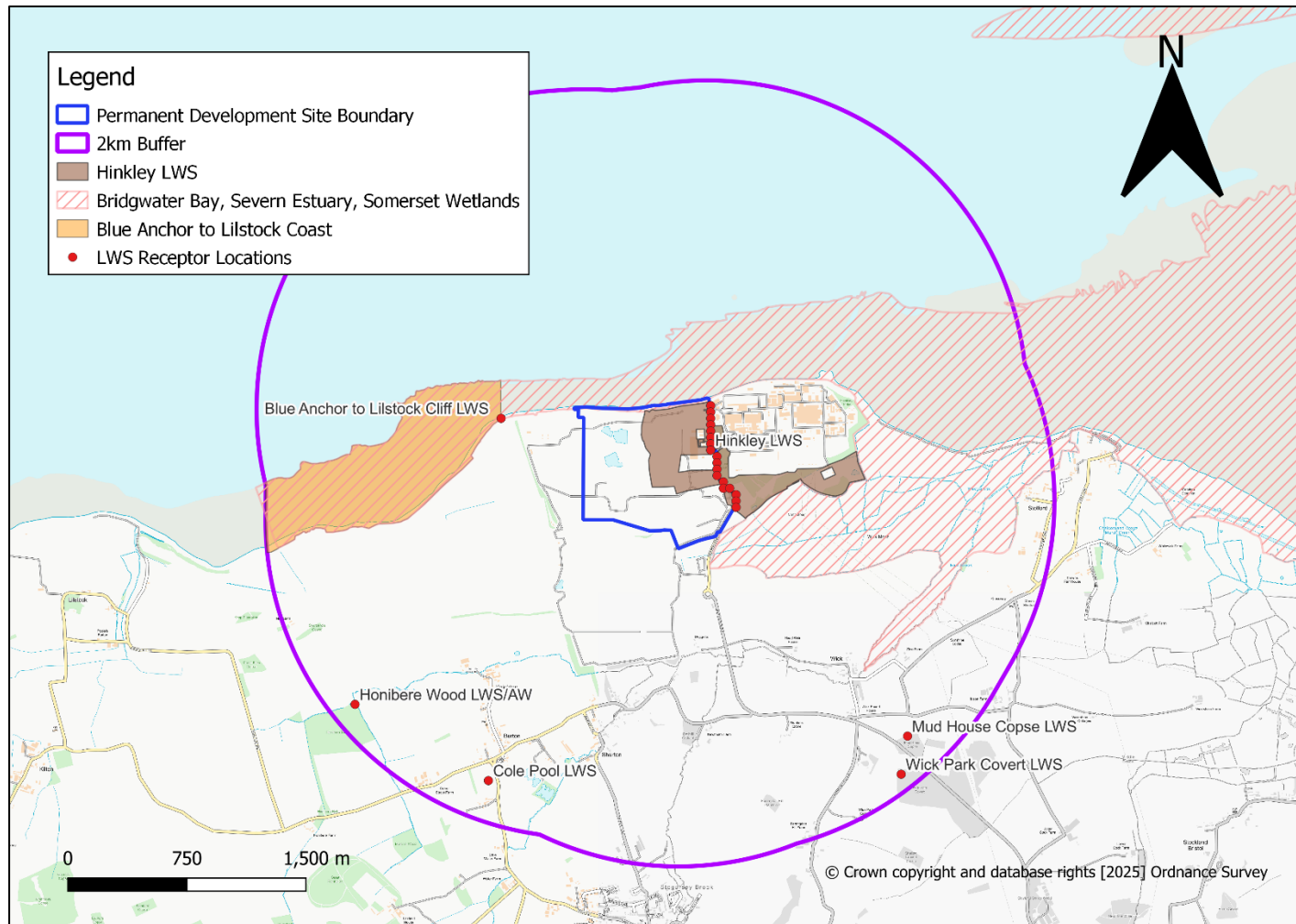


Figure 2.2 – Designated Ecological Sites and Local Wildlife Sites within 2 km of the HPC Site



2.8 Critical Levels and Critical Loads Relevant to the Assessment of Ecological Receptors

A summary of the relevant AQS and EAL that apply to the emissions from the plant and their impact on ecological receptors are given in Table 2.4.

Table 2.4 – Summary of Relevant Air Quality Standards and Environmental Assessment Levels for Ecological Receptors

Pollutant	AQS/EAL	Averaging Period	Value ($\mu\text{g m}^{-3}$)
Oxides of nitrogen (NO _x)	AQS	Annual mean	30
Oxides of nitrogen (NO _x)	EAL	Daily mean	75
Sulphur dioxide (SO ₂)	AQS	Annual mean	20

3 Dispersion Modelling Results

This section contains the modelling results for LWS receptors for all modelled scenarios. The following tables contain the results for those receptors that experience the maximum Process Contribution (PC) and Predicted Environmental Concentration (PEC)¹ for each pollutant modelled. It should be noted that the reported maximum PC and PEC results provided in the following results tables may not necessarily relate to the same receptor, due to individual receptors having a different background concentration for some pollutants. For the ecological receptors, this means the relevant AQAL at the location of the maximum PC and maximum PEC may differ; where relevant, this is detailed in the results tables below.

¹ The PEC is the sum of the PC and the background pollutant concentration.

3.1 Ecological Effects – Commissioning Scenario A

The maximum results for the LWS ecological receptors for the Commissioning Scenario A – Unit 1 are presented in the following table.

Table 3.1 – Impact Assessment at Worst-case Ecological Receptor by Pollutant ($\mu\text{g m}^{-3}$) – Commissioning Scenario A – Unit 1

Pollutant Averaging Period	CL _e /CL/CL _{min} N	Max PC ($\mu\text{g m}^{-3}$)	Max PEC ($\mu\text{g m}^{-3}$)	% Max PC of CL _e /CL/CL _{min} N	% Max PEC of CL _e /CL/CL _{min} N
NO _x Annual mean	30	0.4	4.4	1.4	14.8
NO _x 24-hour mean	75	499.6	507.6	666.1	676.8
SO ₂ Annual mean	10 ^A	<0.1	2.7	0.4	27.4
Nitrogen Deposition	10 ^B	0.1	27.7	1.1	277.1
Acid Deposition	0.295 ^B	<0.1	2.1	5.5	725.8

Notes:

^AAQAL for locations with Lichens and Bryophytes

^BMinimum CL for location of max PC and PEC

CL_e = 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 3.2 – Impact Assessment at Worst-case Ecological Receptor by Pollutant ($\mu\text{g m}^{-3}$) – Commissioning Scenario A – Unit 2

Pollutant Averaging Period	CL _e /CL/CL _{min} N	Max PC ($\mu\text{g m}^{-3}$)	Max PEC ($\mu\text{g m}^{-3}$)	% Max PC of CL _e /CL/CL _{min} N	% Max PEC of CL _e /CL/CL _{min} N
NO _x Annual mean	30	1.7	5.7	5.7	19.1
NO _x 24-hour mean	75	295.2	303.2	393.6	404.3
SO ₂ Annual mean	10 ^A	0.1	2.8	1.3	27.7
Nitrogen Deposition	10 ^B	0.2	27.7	2.5	277.4
Acid Deposition	0.295 ^B	<0.1	2.1	11.0	727.0

Notes:

^AAQAL for locations with Lichens and Bryophytes^BMinimum CL for location of max PC and PECCL_e = 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



3.2 Ecological Effects – Commissioning Scenario B

The maximum results for the LWS ecological receptors for the Commissioning Scenario B – Unit 1 and Unit 2 are presented in the following tables.

Table 3.3 – Impact Assessment at Worst-case Ecological Receptor by Pollutant ($\mu\text{g m}^{-3}$) – Commissioning Scenario B – Unit 1

Pollutant Averaging Period	CLe/CL/CL _{min} N	Max PC ($\mu\text{g m}^{-3}$)	Max PEC ($\mu\text{g m}^{-3}$)	% Max PC of CLe/CL/CL _{min} N	% Max PEC of CLe/CL/CL _{min} N
NO _x Annual mean	30	67.6	71.7	225.5	238.9
NO _x 24-hour mean	75	982.6	990.6	1,310.1	1,320.8
SO ₂ Annual mean	10 ^A	0.3	2.8	2.6	27.6
Nitrogen Deposition	10 ^B	19.5	44.6	194.8	445.8
Acid Deposition	0.295 ^B	1.4	3.4	481.9	1139.6

Notes:

^AAQAL for locations with Lichens and Bryophytes

^BMinimum CL for location of max PC and 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 3.4 – Impact Assessment at Worst-case Ecological Receptor by Pollutant ($\mu\text{g m}^{-3}$) – Commissioning Scenario B – Unit 2

Pollutant Averaging Period	CL _e /CL/CL _{min} N	Max PC ($\mu\text{g m}^{-3}$)	Max PEC ($\mu\text{g m}^{-3}$)	% Max PC of CL _e /CL/CL _{min} N	% Max PEC of CL _e /CL/CL _{min} N
NO _x Annual mean	30	1.3	5.3	4.2	17.6
NO _x 24-hour mean	75	590.0	598.0	786.7	797.4
SO ₂ Annual mean	10 ^A	0.1	2.8	1.2	27.7
Nitrogen Deposition	10 ^B	0.3	27.8	2.9	277.5
Acid Deposition	0.295 ^B	<0.1	2.1	14.3	728.1

Notes:

^AAQAL for locations with Lichens and Bryophytes^BMinimum CL for location of max PC and PECCL_e = 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



3.3 Ecological Effects – Commissioning Scenario C

The maximum results for the LWS ecological receptors for the Commissioning Scenario C – Unit 1 and Unit 2 are presented in the following tables.

Table 3.5 – Impact Assessment at Worst-case Ecological Receptor by Pollutant ($\mu\text{g m}^{-3}$) – Commissioning Scenario C – Unit 1

Pollutant Averaging Period	CLe/CL/CL _{min} N	Max PC ($\mu\text{g m}^{-3}$)	Max PEC ($\mu\text{g m}^{-3}$)	% Max PC of CLe/CL/CL _{min} N	% Max PEC of CLe/CL/CL _{min} N
NO _x Annual mean	30	3.2	7.2	10.7	24.1
NO _x 24-hour mean	75	999.2	1,007.2	1,332.3	1,343.0
SO ₂ Annual mean	10 ^A	0.3	2.8	2.6	27.6
Nitrogen Deposition	10 ^B	0.9	27.8	8.4	277.5
Acid Deposition	0.295 ^B	0.1	2.2	39.2	729.2

Notes:

^AAQAL for locations with Lichens and Bryophytes

^BMinimum CL for location of max PC and 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

The maximum results for the LWS ecological receptors for the Commissioning Scenario C –Unit 2 are presented in the following table.

Table 3.6 – Impact Assessment at Worst-case Ecological Receptor by Pollutant ($\mu\text{g m}^{-3}$) – Commissioning Scenario C – Unit 2

Pollutant Averaging Period	CL _e /CL/CL _{min} N	Max PC ($\mu\text{g m}^{-3}$)	Max PEC ($\mu\text{g m}^{-3}$)	% Max PC of CL _e /CL/CL _{min} N	% Max PEC of CL _e /CL/CL _{min} N
NO _x Annual mean	30	1.5	5.5	4.9	18.3
NO _x 24-hour mean	75	590.4	598.4	787.2	797.9
SO ₂ Annual mean	10 ^A	0.1	2.8	1.2	27.7
Nitrogen Deposition	10 ^B	0.3	27.8	3.3	277.6
Acid Deposition	0.295 ^B	<0.1	2.2	15.3	729.7

Notes:

^AAQAL for locations with Lichens and Bryophytes

^BMinimum CL for location of max PC and PEC

CL_e = 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

3.4 Ecological Effects – Routine Testing Scenario

The maximum results for the LWS ecological receptors for the routine testing scenario are presented in the following tables.

Table 3.7 – Impact Assessment at Worst-case Ecological Receptor by Pollutant ($\mu\text{g m}^{-3}$) – Routine Testing Scenario

Pollutant Averaging Period	CLe/CL/CL _{min} N	Max PC ($\mu\text{g m}^{-3}$)	Max PEC ($\mu\text{g m}^{-3}$)	% Max PC of CLe/CL/CL _{min} N	% Max PEC of CLe/CL/CL _{min} N
NO _x Annual mean	30	3.5	7.5	11.7	25.1
NO _x 24-hour mean	75	5,509.9	5,517.2	7,346.5	7,356.2
SO ₂ Annual mean	10 ^A	0.2	2.8	2.2	27.8
Nitrogen Deposition	10 ^B	1.0	27.7	10.1	277.5
Acid Deposition	0.295 ^B	0.1	2.1	41.8	727.6

Notes:

^AAQAL for locations with Lichens and Bryophytes

^BMinimum CL for location of max PC and 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

3.5 Ecological Effects – LOOP Scenario A

The maximum results for the LWS ecological receptors for the LOOP scenario are presented in the following tables.

Table 3.8 – Impact Assessment at Worst-case Ecological Receptor by Pollutant ($\mu\text{g m}^{-3}$) – LOOP Scenario A

Pollutant Averaging Period	CL _e /CL/CL _{min} N	Max PC ($\mu\text{g m}^{-3}$)	Max PEC ($\mu\text{g m}^{-3}$)	% Max PC of CL _e /CL/CL _{min} N	% Max PEC of CL _e /CL/CL _{min} N
NO _x Annual mean	30	0.8	4.9	2.8	16.2
NO _x 24-hour mean	75	2,439.0	2,465.9	3,252.1	3,287.9
SO ₂ Annual mean	10 ^A	<0.1	2.7	0.5	13.5
Nitrogen Deposition	10 ^B	0.2	27.7	2.4	277.1
Acid Deposition	0.295 ^B	<0.1	2.1	9.1	726.1

Notes:

^AAQAL for locations with Lichens and Bryophytes

^BMinimum CL for location of max PC and PEC

CL_e = 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

3.1 Ecological Effects – LOOP Scenario B

The maximum results for the LWS ecological receptors for the LOOP scenario B are presented in the following tables.

Table 3.9 – Impact Assessment at Worst-case Ecological Receptor by Pollutant ($\mu\text{g m}^{-3}$) – LOOP Scenario B

Pollutant Averaging Period	CLe/CL/CL _{min} N	Max PC ($\mu\text{g m}^{-3}$)	Max PEC ($\mu\text{g m}^{-3}$)	% Max PC of CLe/CL/CL _{min} N	% Max PEC of CLe/CL/CL _{min} N
NO _x Annual mean	30	2.5	6.5	8.3	21.7
NO _x 24-hour mean	75	2,439.0	2,465.9	3,252.1	3,287.9
SO ₂ Annual mean	10 ^A	0.1	2.7	1.4	13.6
Nitrogen Deposition	10 ^B	0.7	27.7	7.2	277.4
Acid Deposition	0.295 ^B	<0.1	2.1	26.4	727.4

Notes:

^AAQAL for locations with Lichens and Bryophytes

^BMinimum CL for location of max PC and 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

4 Discussion of Results

4.1 Commissioning Scenario

The results indicate that the concentrations for the long-term assessment metrics of SO₂ are below the relevant AQALs in all the Commissioning Scenarios. The NO_x annual mean AQAL is predicted to be below in all the Commissioning Scenarios, except for Commissioning Scenario B - Unit 1.

For Nitrogen and Acid Deposition, 100% of the assessed LWS ecological receptors are predicted to exceed the relevant AQAL as a result of the Commissioning Scenario operations. The NO_x 24-hour mean is predicted to be exceeded in all Commissioning Scenarios.

4.2 Routine Testing Scenario

The results indicate that the concentrations for the long-term assessment metrics of NO_x and SO₂ are below the relevant AQALs.

For Nitrogen and Acid Deposition, 100% of the assessed LWS ecological receptors are predicted to exceed the relevant AQAL as a result of the Routine Testing Scenario operations. The NO_x 24-hour mean is also predicted to be exceeded.

4.3 LOOP Scenario

The results indicate that the concentrations for the long-term assessment metrics of NO_x and SO₂ are below the relevant AQALs under LOOP Scenarios A and B.

For Nitrogen and Acid Deposition, the LWS ecological receptors are predicted to exceed the relevant AQAL as a result of the LOOP Scenario operations. The NO_x 24-hour mean is also predicted to be exceeded.

5 Conclusions

The report provides an addendum to the HPC Operation Modelling Report, addressing the Environment Agency's Request for Further Information (RFI). Primarily, the addendum includes an additional assessment of Local Wildlife Sites (LWS) within a 2 km boundary of the Hinkley Point C Site.

At LWS receptors:

- The results for 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.
- The results for annual mean NO_x at ecological receptors show exceedances of the AQAL for Commissioning B Unit 1. In all other scenarios results for annual mean NO_x are below the relevant assessment level. The results for annual mean SO₂ are below the relevant assessment level in all scenarios.
- Additionally, exceedances of the 24-hour mean NO_x AQAL are predicted in all the Scenarios.

6 Glossary

ADMS	Atmospheric Dispersion Modelling System
APIS	Air Pollution Information System
AQAL	Air Quality Assessment Level
AQO	Air Quality Objective
AQS	Air Quality Standard
CERC	Cambridge Environmental Research Consultants (developers of the ADMS model)
CL	Critical Load
Cle	Critical Level
CO	Carbon monoxide
CWI Pumps	Cooling Water Injection Pumps (diesel driven pumps)
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EAL	Environmental Assessment Level
EDG	Emergency Diesel Generator
EQS	Environmental Quality Standards
ESS	External Site Systems
EU	European Union
HBS	Simulator Training Centre
HHA	Framatome Warehouse
HDU	Emergency Response Training Centre
HPC	Hinkley Point C
HZG	Oil and Grease Storage
LLV	HBX Building backup power supply
L _{MO}	Monin-Obukhov length
MW	Megawatt
NNB	Nuclear New Build Generation Company Ltd
NO	Nitric oxide
NO ₂	Nitrogen dioxide
NO _x	Nitrogen oxides; a collective term used to represent nitric oxide (NO) and nitrogen dioxide (NO ₂)
NWP	Numerical Weather Prediction
O ₃	Ozone
PC _{air}	Process Contribution to air – pollutant concentration arising from the process
PEC	Predicted Environmental Concentration – the PC plus the existing background
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.
RR	Release Rate

SEG	Diversified Ultimate Cooling Water Supply System Generators (diesel driven pumps)
SMDG	Small Mobile Diesel Generator
SPA	Special Protection Area
SO ₂	Sulphur dioxide
SSSI	Site of Special Scientific Interest
UDG	Ultimate Diesel Generator
UKMO	United Kingdom Meteorological Office
ULSD	Ultra-Low Sulphur Diesel
Z ₀	Surface roughness
OLLI	HUB Distribution Board

Appendix A: Emission Rate Calculations

Table A.1 – Example Emissions Calculation - EDGs

Parameter	Parameter ID	Value	Calculation Method
Operational Hours per Year	A	8,760	N/A
Energy Output (kW)	B	9,590	Data from Technical Specification Sheet
Efficiency (%)	C	41.5	Data from Technical Specification Sheet
Thermal Inputs (MW)	D	23.11	Assumed from Sizewell C Information
Stack Discharge Diameter (mm)	E	1800 (theoretical diameter: 22100)	$\sqrt{((R/S)*(1/PI()))*2*1000}$
Net CV Fuel Oil (gas oil) (MJ/unit of supply)	F	44.5	Calorific Value of Diesel Fuels
Fuel Oil Required to provide energy input (kg/s)	G	0.52	D/F
Total Fuel Oil (Unit of Supply/Year)	H	16376350	G*A*3600
Sulphur Content of Fuel (%)	I	0.002	Data from Fuel Specification Sheet
Exhaust Conditions			
Actual O ₂ (%)	J	12	Assumed based on proxy data
Actual Temperature (°C)	K	355	Data from Technical Specification Sheet
Reference O ₂ (%)	L	15	Data from Technical Specification Sheet
CO ₂ Density (kg/m ³)	M	1.86	Library figure
Waste Gas from Fuel (m ³ /Unit of Supply)	N	12.55	Library figure
CO ₂ in Waste Gas (m ³ /kg)	O	1.57	Library figure
Total Waste Gas			
@ 15C 0% O ₂ (m ³ /s)	P	6.517	N*G
@ 15C 15% O ₂ (m ³ /s)	Q	21.884	$((P/(273+15))*273)*(20.9/(20.9-L))$
@ Actual Conditions (m/s)	R	38.26	Data from Technical Specification Sheet
Efflux Velocity (m/s)	S	0.1	Assumed on the basis of rain cap
Emission Concentrations (at Reference O₂)			
NO _x (mg/m ³)	T	1900	Data from Technical Specification Sheet
CO (mg/m ³)	U	150	Data from Technical Specification Sheet
VOC (mg/m ³)	V	0	Data from Technical Specification Sheet
NMVOG (mg/m ³)	W	0	Data from Technical Specification Sheet
CO ₂ (mg/m ³)	X	69295	Data from Technical Specification Sheet
SO _x (mg/m ³)	Y	182	Data from Technical Specification Sheet
Particulates (mg/m ³)	Z	50	Data from Technical Specification Sheet
Mass Emission Rate			
NO _x (g/s)	AA	41.58	T/1000*Q
CO (g/s)	AB	3.28	U/1000*Q
VOC (g/s)	AC	-	Not modelled
NMVOG (g/s)	AD	-	Not modelled
CO ₂ (g/s)	AE	-	Not modelled
SO _x (g/s)	AF	0.0208	Y/1000*Q
Particulates (g/s)	AG	1.09	Z/1000*Q

Table A.2 – Modelled Emissions Rates

Generator Reference	Mass Emission Rate (g/s)					
	NO _x	CO	VOC and NMVOC	CO ₂	SO ₂	Particulates
EDG	41.58	3.28	-	-	3.98	1.09
UDG	8.66	1.47	-	-	0.007	0.05
SEG	0.36	0.197	-	-	0.0004	0.02
HDU	0.94	0.31	-	-	0.001	0.04
BDB SMDGs	2.73	0.89	-	-	0.004	0.11
BDB CWI Pumps	0.009	0.003	-	-	0.00009	0.0004
BDB Spare	2.73	0.89	-	-	0.004	0.11
LLV	0.43	0.31	-	-	0.0014	0.02
ESS	0.08	0.01	-	-	0.0001	0.002
OLLI/LLW	0.21	0.12	-	-	0.0005	0.01
HBS	0.21	0.12	-	-	0.0005	0.01
HHA	0.21	0.12	-	-	0.0005	0.01
HZG	0.21	0.12	-	-	0.0005	0.01



Appendix B: Full Modelled Results

See supporting Excel result files.