



# CWL11/CWL12 Environmental Permit Variation Application

Air Quality Impact Assessment

PREPARED FOR



Vantage Data Centres UK Ltd

DATE

25<sup>th</sup> October 2024

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SIGNATURE PAGE

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Air Quality Impact Assessment

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## CONTENTS

REPORT STRUCTURE	1
<b>1. INTRODUCTION</b>	<b>2</b>
1.1 GENERAL	2
1.2 SITE LOCATION AND DESCRIPTION	3
<b>2. LEGAL FRAMEWORK</b>	<b>5</b>
2.1 GUIDANCE	5
2.2 AIR QUALITY STANDARDS	5
2.3 SIGNIFICANCE OF IMPACT	8
<b>3. BACKGROUND AIR QUALITY</b>	<b>10</b>
3.1 NO <sub>2</sub> AND PM <sub>10</sub>	10
3.2 OZONE (AOT40) AND SO <sub>2</sub>	11
<b>4. ASSESSMENT METHODOLOGY FOR OPERATIONAL PHASE</b>	<b>12</b>
4.1 ENGINE OPERATION	12
4.2 MODEL PARAMETERS AND INPUTS	13
4.3 EMISSION PARAMETERS	14
4.4 RECEPTOR PARAMETERS	18
4.4.1 Sensitive Human Receptors	18
4.4.2 Sensitive Ecological Receptors	21
4.5 SENSITIVITY ANALYSIS	25
<b>5. MODELLED IMPACTS</b>	<b>26</b>
5.1 SCREENING ASSESSMENT FOR PM <sub>10</sub>	26
5.2 SCREENING ASSESSMENT FOR SO <sub>2</sub>	27
5.3 DETAILED ASSESSMENT FOR NO <sub>2</sub> , NO <sub>x</sub> , AND NO	27
5.3.1 Testing Regime	27
5.3.2 Emergency Outage Scenarios	34
<b>6. IN-COMBINATION ASSESSMENT</b>	<b>44</b>
<b>7. CONCLUSION</b>	<b>46</b>
APPENDIX A MODEL PARAMETERS	
APPENDIX B CONTOUR PLOTS	
APPENDIX C MODELLED RESULTS OF THE POTENTIAL IMPACT ON ECOLOGY	
APPENDIX D MODELLED RESULTS OF THE POTENTIAL IMPACT ON NON-STATUTORY ECOLOGICAL SITES	
APPENDIX E IN-COMBINATION IMPACT	

## LIST OF TABLES

TABLE 2.1: APPLICABLE AIR QUALITY STANDARDS	6
TABLE 2.2: ACUTE EXPOSURE GUIDELINE LEVELS FOR NO <sub>2</sub> (µg/m <sup>3</sup> )	6
TABLE 2.3: APPLICABLE CRITICAL LOADS FOR NUTRIENT NITROGEN AND ACID DEPOSITION	7
TABLE 2.4: SIGNIFICANCE CRITERIA FOR POTENTIAL IMPACTS ON RECEPTORS	8
TABLE 3.1: LOCAL MONITORING DATA	10
TABLE 3.2: DEFRA BACKGROUND MAP CONCENTRATIONS (µg/m <sup>3</sup> )	10
TABLE 3.3: BACKGROUND OZONE AND SO <sub>2</sub>	11
TABLE 4.1: ANTICIPATED ENGINE OPERATIONS	12
TABLE 4.2: AIR DISPERSION MODEL METHODOLOGY AND PARAMETERS	13
TABLE 4.3: MODELLED EMISSIONS PARAMETERS	15
TABLE 4.4: DISCRETE SENSITIVE HUMAN RECEPTORS	18
TABLE 4.5: ECOLOGICAL DESIGNATED SITES	21
TABLE 5.1: MODELLED 24-HOUR MEAN CONCENTRATIONS FOR PM <sub>10</sub>	26
TABLE 5.2: MODELLED MAXIMUM CONCENTRATIONS OF QUARTERLY TEST (µg/m <sup>3</sup> )	29
TABLE 5.3: MODELLED MAXIMUM CONCENTRATIONS OF BLACK BUILDING TEST (µg/m <sup>3</sup> )	30
TABLE 5.4: MODELLED ANNUAL MEAN CONCENTRATIONS OF FOR THE TESTING REGIME (µg/m <sup>3</sup> )	32
TABLE 5.5: MODELLED MAXIMUM CONCENTRATIONS OF EMERGENCY OUTAGE SCENARIOS (µg/m <sup>3</sup> )	36

## LIST OF FIGURES

FIGURE 1.1: SITE LOCATION	4
FIGURE 4.1: AIR EMISSION SOURCE	17
FIGURE 4.2: SENSITIVE HUMAN RECEPTORS	20
FIGURE 4.3: DESIGNATED ECOLOGICAL SITES	23

## ACRONYMS AND ABBREVIATIONS

Acronyms	Description
AEGL	US EPA Acute Exposure Guideline Levels
AOT40	Accumulated Ozone exposure over a Threshold of 40 parts per billion
APIS	Air Pollution Information System
AQS	Air Quality Standard
AQMA	Air Quality Management Area
AW	Ancient Woodland

Acronyms	Description
Breached, breaching, breach	Used when the predicted ambient concentration of a pollutant at a receptor will not comply with the air quality standard. For example, if the 1-hour mean NO <sub>2</sub> standard is modelled to be exceeded 20 times at a receptor, a breach of the NO <sub>2</sub> 1-hour mean is therefore expected as there would be more than the 18 allowed exceedances of this standard.
CL	Critical Load
°C	Degrees Celsius
DEFRA	Department for Environment, Food & Rural Affairs
EA	Environment Agency
EAL	Environmental Assessment Level
EP	Environmental Permit
ERM	Environmental Resources Management Limited
EU	European Union
Exceeded, exceedance, exceed	Used when a predicted concentration is above an air quality standard threshold. For example, a 1-hour mean NO <sub>2</sub> modelled environmental contribution of 220 µg/m <sup>3</sup> exceeds the 200 µg/m <sup>3</sup> air quality standard.
g/s	Grams per second
K	Degrees Kelvin
keq/ha/yr	Kiloequivalents per hectare per year
LNR	Local Nature Reserve
LWS	Local Wildlife Site
MCPD	Medium Combustion Plant Directive
m/s	Metres per second
m <sup>3</sup> /s	Cubic metres per second
mg/m <sup>3</sup>	Milligrams per cubic metre
MWth	Megawatt thermal
NCC	Newport City Council
NH <sub>3</sub>	Ammonia
NRW	Natural Resources Wales
NO	Nitrogen monoxide
NO <sub>2</sub>	Nitrogen dioxide
NO <sub>x</sub>	Oxides of nitrogen (mixture of NO and NO <sub>2</sub> )
PC	Process Contribution
PEC	Predicted Environmental Concentration
PM <sub>2.5</sub>	Particulate Matter of diameter below or equal to 2.5 µm
PM <sub>10</sub>	Particulate Matter of diameter below or equal to 10 µm
SAC	Special Area of Conservation

<b>Acronyms</b>	<b>Description</b>
SCR	Selective Catalytic Reduction
SINC	Sites of Importance for Nature Conservation
SO <sub>2</sub>	Sulphur dioxide
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
µg/m <sup>3</sup>	Micrograms per cubic metre
US EPA	United States Environmental Protection Agency
VDC	Vantage Data Centres

## REPORT STRUCTURE

Requirement <sup>1</sup>	Report Section Reference
Purpose of the study	Section 1.1
Describe the site	Section 1.2
Modelled emission scenarios, duration and frequency	Section 4.1
Location map (proposed site, site boundary, landuse)	Section 1.2 and Figure 1.1 of site location
Relevant environmental standards	Section 2
Background levels	Section 3
Explain the model	Section 4.2
Explain emission parameters	Section 4.3 and Figure 4.1 of modelled source location
Explain the modelled domain and receptors	Section 4.2 and Section 4.4
Explain meteorological data and surface characteristics	Section 4.2
Explain terrain and building treatments	Section 4.2
Special treatment	Section 4.2
Sensitivity analysis	Section 4.5
Impact assessment	Section 5
Model input files	Appendix A
Contour plots	Appendix B

<sup>1</sup> Environmental Agency, 2014, Environmental permitting: air dispersion modelling reports, <https://www.gov.uk/guidance/environmental-permitting-air-dispersion-modelling-reports>

# 1. INTRODUCTION

## 1.1 GENERAL

Vantage Data Centres (UK) Limited (VDC) operates the Newport Data Centre (CWL11/12) (referred to as the Site) located at Celtic Way, Marshfield, Duffryn, Newport, NP10 8BE. The facility holds an Environmental Permit (EP), number EPR/BB3599CW/V003, issued by Natural Resources Wales (NRW) on 7<sup>th</sup> December 2022. The current EP relates to the operation of 202 emergency generators for backup power supply and the associated testing regime, with a total permitted thermal input of 520 MW<sub>th</sub>. VDC is now proposing to vary the EP at the Site to accommodate generator engine replacements and improvements in technology. VDC is supported in this environmental permit variation application by Environmental Resources Management Ltd (ERM).

Version 1 of this document was issued to NRW as part of an application to vary VDC's permit in August 2024. Further information and clarification was requested by NRW in a letter dated 9<sup>th</sup> October 2024. This version (v2) addresses those questions and supersedes the previous version.

The Site is currently permitted for 202 emergency generators, of which 123 are installed. VDC is proposing to install 71 new generators (18 at CWL11 and 53 at CWL12), bringing the total number on Site to 194. These new generators will be equipped with Selective Catalytic Reduction (SCR) for NO<sub>x</sub> emissions abatement.

Although the total number of generators is within the permitted number and thermal input capacity, a variation to the EP is required to update the specifications of the new generators being installed. Additionally, VDC wishes the current 75% load constraint in place for most of the engines installed under the previous variation (except cell TF5), and the 71 new engines, to be lifted.

An application for a variation to the EP is being made to accommodate the proposed changes. It covers the installation of 71 new generators with changes of engine models, abatement arrangements as well as the removal of load constraint for most of the installed generators and the 71 new generators at the Site.

VDC also operates another nearby data centre, CWL13, located at North Lake Drive, Celtic Lakes, Newport, NP10 8UL. This facility, permitted under EP number EPR/CB3895HY, issued by NRW on 6<sup>th</sup> June 2023, houses 60 emergency generators with a permitted thermal input of 179 MW<sub>th</sub>. CWL13 is situated southeast of the CWL11/12 facility. It is treated as a standalone installation with its own permit and is not part of this variation application.

A detailed Air Quality Impact Assessment (AQIA) has been carried out using an air dispersion model to evaluate the potential air quality impact of the Site's emissions during routine testing and emergency scenarios in relation to human health and ecology. Emission parameters have been updated to include the full load operation for most of the installed generators and the installation of new SCR-fitted engines at the Site. The assessment primarily focuses on Nitrogen Oxides (NO<sub>x</sub>) emissions associated with diesel engine operations as per the previous EP application. NO<sub>x</sub> emissions generated by the Site's existing and proposed new engines have been assessed and compared with the statutory NO<sub>2</sub> Air Quality Standards (AQS) and NO Environmental Assessment Levels (EAL), the US EPA Acute Exposure Guidance Levels (AEGs) in relation to human health impact and statutory NO<sub>x</sub> AQS, nitrogen and acid depositions in relation to designated ecological sites-specific critical loads. Potential particulate matter (PM)

emissions from diesel engines operation have also been assessed, with a screening exercise undertaken for the potential short-term impact of PM<sub>10</sub>. Long term PM<sub>10</sub> and PM<sub>2.5</sub> have not been assessed as the engines are only expected to operate for a small number of hours per year. Sulphur Dioxide (SO<sub>2</sub>) emissions are not expected to be a material issue since the Site will use ultra-low sulphur diesel or Hydrotreated Vegetable Oil (HVO) as fuel. The assessment of potential air quality impacts includes emissions to air from the Site, both independently and cumulatively with the 60 generators at CWL13.

All details of current and expected future operations used in this report have been provided to ERM by VDC.

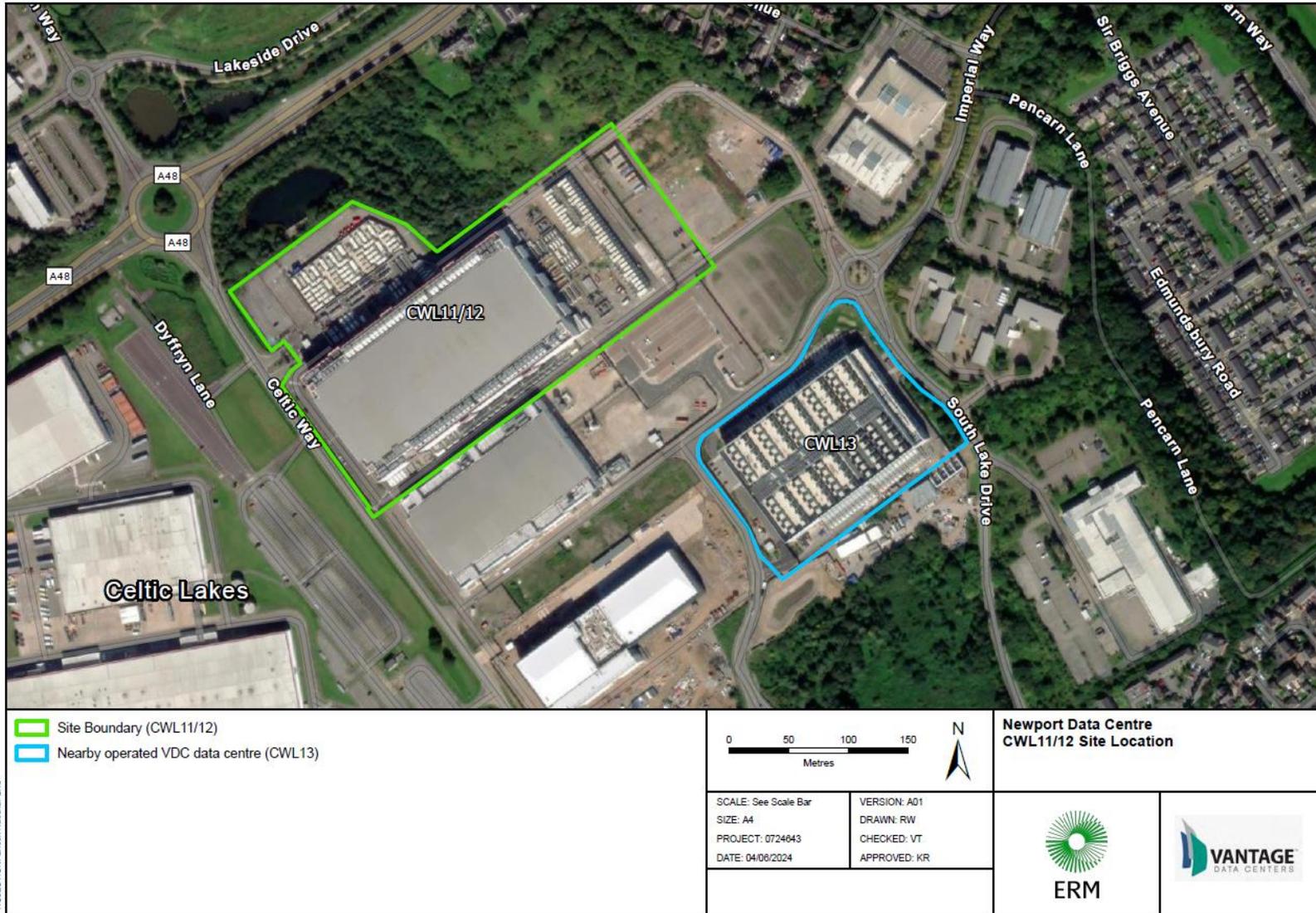
## 1.2 SITE LOCATION AND DESCRIPTION

The Site location and boundary is unchanged from the previous EP application (presented in Figure 1.1). The surrounding area of the Site remains unchanged from the previous EP application.

The Site is located in a mixed-use area with industry, residential and sensitive habitats nearby. This site is in the Imperial Park commercial and business park, approximately three miles to the South-West of Newport City Centre. Imperial Park houses a number of industrial, distribution and administration facilities which are located to the south and west of the Vantage facilities. There is a pond with trees, bushes and a public park to the immediate north of the Site, with some residential land-use to the northeast and industrial/commercial buildings to the south, west and east of the Site. The terrain in the area is flat with no steep slopes. The Site is located south of the M4 and A48. The nearest residential properties are on Pencarn Avenue, approximately 50 meters to the northeast of the nearest engine at the Site. Some residential properties to the east and southeast on Edmundsbury Road and Powis Close within 275 meters and 500 meters, and to the north west on Nant-Y-Moor Close within 151 meters. The Celtic Springs Guest House is within 150 meters to the north of the nearest engine. A school is 600 meters to the east of the Site.

The CWL11 data centre comprises an existing data hall building and the CWL12 data centre comprises four data halls. The CWL13 data centre comprises one data hall building. The data hall buildings contain the data storage equipment, all have ancillary equipment designed to provide back-up power in the event of the external power supply failing. CWL11/12 will have 194 diesel backup generators (141 generators at CWL11 and 53 generators at CWL12), CWL13 has 60 generators installed, bringing the total across CWL11/12/13 to 254 diesel backup generators.

FIGURE 1.1: SITE LOCATION



## 2. LEGAL FRAMEWORK

### 2.1 GUIDANCE

This impact assessment and report have been carried out following the relevant guidance and published documents. The guidance originally developed by the Environment Agency (EA) for England, has been adopted by NRW.

- Environment Agency, last updated December 2023, Air emissions risk assessment for your environmental permit, <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit>;
- Environment Agency, last updated March 2024, Environmental permitting: air dispersion modelling reports, <https://www.gov.uk/guidance/environmental-permitting-air-dispersion-modelling-reports>;
- Environment Agency, last updated March 2023, Guidance, Specified generators: dispersion modelling assessment, <https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment>;
- Environment Agency AQMAU, 2016, Diesel generator short term NO<sub>2</sub> impact assessment; [https://consult.defra.gov.uk/airquality/medium-combustion-plant-and-controls-on-generators/supporting\\_documents/Generator%20EA%20air%20dispersion%20modelling%20report.pdf](https://consult.defra.gov.uk/airquality/medium-combustion-plant-and-controls-on-generators/supporting_documents/Generator%20EA%20air%20dispersion%20modelling%20report.pdf); and
- Environment Agency, 2022, Data Centre FAQ, 15/11/2022- DRAFT version 21.0 to Tech UK for Discussion.

### 2.2 AIR QUALITY STANDARDS

- The protection of human health and of designated conservation areas from adverse air quality is regulated through the use of Air Quality Standards (AQS) transposed in UK law<sup>2</sup> from EU standards<sup>3</sup> as well as Environmental Assessment Levels (EAL) which are part of UK permitting guidance<sup>4</sup>. The statutory criteria of relevance for this assessment are set out in Table 2.1. Since the engines are only to be operated for a few hours per year, only short-term AQS have been scoped-in for PM<sub>10</sub>.
- To assist in the assessment of significance of short-term process contributions, Acute Exposure Guideline Levels (AEGL), defined by the United States Environmental Protection Agency (EPA), have also been considered. The AEGLS are set out Table 2.2. Whilst the AEGLS do not have legal standing in the UK, these have been adopted by EA as well as NRW as an indication for the potential for acute harm to health to arise.
- For sensitive ecological receptors, nutrient nitrogen and acid depositions are assessed against site-specific critical loads (CL). These were obtained from the Air Pollution Information System (APIS<sup>5</sup>) website, consulted 30 May 2024, based on the site relevant critical loads tool. APIS is an online database detailing critical loads and background

<sup>2</sup> The Air Quality Standards Regulations 2010 Statutory Instrument 2008/301, <https://www.legislation.gov.uk/ukSI/2010/1001/contents/made>

<sup>3</sup> European Union Air Quality Standards, <http://ec.europa.eu/environment/air/quality/standards.htm>

<sup>4</sup> Environment Agency, last updated December 2023, Air emissions risk assessment for your environmental permit, <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit>

<sup>5</sup> UK Air Pollution Information System (APIS), [www.apis.ac.uk](http://www.apis.ac.uk)

concentrations for sensitive ecological sites, developed in partnership by the UK conservation agencies and regulatory agencies and the Centre for Ecology and Hydrology. It is important to note that APIS periodically updates or removes CL figures without providing notifications or maintaining records of these changes. The baseline conditions for site-specific CL referenced in this assessment represent the available data at the time the assessment was conducted, as noted by the consultation date. The information used is believed to be sufficiently representative considering the low PC values for most sites for nutrient nitrogen and acid deposition.

Table 2.3 presents the critical loads which were used in this impact assessment.

**TABLE 2.1: APPLICABLE AIR QUALITY STANDARDS**

Applicability	Pollutant	Averaging Period	Assessment Criterion ( $\mu\text{g}/\text{m}^3$ )	Percentile
Sensitive Human Receptor	NO <sub>2</sub>	1-hour mean, not to be exceeded more than 18 times per year	200	99.79 <sup>th</sup>
		Annual mean	40	N/A
	PM <sub>10</sub>	24-hour mean, not to be exceeded more than 35 times per year	50	90.4 <sup>th</sup>
	NO	1-hour mean	4,400	N/A
		Annual mean	310	N/A
Sensitive Ecological Receptor	NO <sub>x</sub>	24-hour mean	200 <sup>a</sup>	100 <sup>th</sup>
		Annual mean	30	N/A

<sup>a</sup> The EA Permitting guidance<sup>6</sup> advises that a higher AQS of 200  $\mu\text{g}/\text{m}^3$  should be used instead of 75  $\mu\text{g}/\text{m}^3$  for detailed assessments where ozone is below the AOT40 critical level and sulphur dioxide is below the lower critical level of 10  $\mu\text{g}/\text{m}^3$ .

**TABLE 2.2: ACUTE EXPOSURE GUIDELINE LEVELS FOR NO<sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )**

AEGL <sup>a</sup>	10 minute	30 minute	1 hour	4 hour	8 hour
AEGL-1 (non-disabling)	940	940	940	940	940
AEGL-2 (disabling)	38,000	28,000	23,000	15,000	13,000
AEGL-3 (lethal)	64,000	47,000	38,000	26,000	21,000

<sup>a</sup> The AEGL thresholds are sourced from the US Environment Protection Agency (US EPA) and have no regulatory significance in the UK. The results of the air quality assessment have been compared against the AEGL thresholds following the Data Centre FAQ Headline Approach published 15/11/22.

<sup>6</sup> Environment Agency, 2016, Air emissions risk assessment for your environmental permit, <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit>

TABLE 2.3: APPLICABLE CRITICAL LOADS FOR NUTRIENT NITROGEN AND ACID DEPOSITION

Ecological Site Name and Designation	Nitrogen Deposition kgN/ha/yr	Acid Deposition					
		Low Range (min), keq/ha/yr			High Range (max), keq/ha/yr		
		CLmaxS	CLminN	CLmaxN	CLmaxS	CLminN	CLmaxN
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	n/a	n/a					
Coed-y-Darren (SSSI)	n/a	n/a					
Dan y Graig Quarry Risca (SSSI)	n/a	n/a					
Gwent Levels St Brides (SSSI)	n/a	0.280	0.321	0.601	0.901	0.321	1.222
Gwent Levels Rumney (SSSI)	n/a	0.280	0.321	0.601	0.901	0.321	1.222
Gwent Levels - Nash and Goldcliff (SSSI)	n/a	0.280	0.321	0.601	0.901	0.321	1.222
Gwent Levels - Whitson (SSSI)	n/a	0.280	0.321	0.601	0.901	0.321	1.222
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	10	4	1.071	5.071	4	1.071	5.071
Henllys Bog (SSSI)	n/a	n/a					
Lisvane Reservoir (SSSI)	10	n/a					
Plas Machen Wood (SSSI)	10	n/a			1.906	0.142	2.048
Rhymney River Section (SSSI)	n/a	n/a					
Rumney Quarry (SSSI)	n/a	n/a					
Ruperra Castle and Woodlands (SSSI)	n/a	n/a					
Severn Estuary (SAC, SPA, SSSI)	10-20	4	0.856	4.856	4	1.071	5.071
River Usk (SAC, SSSI)	5-15	1.171	0.142	1.313	8.652	0.5	9.009

Data accessed from APIS website dated 30 May 2024. Critical Levels and Loads for nutrient Nitrogen and Acidity information marked n/a were not available from the APIS website for these sites on this date.

## 2.3 SIGNIFICANCE OF IMPACT

The potential impacts of the emissions from the diesel generators at the Site are assessed by comparison against applicable standards on the basis of the:

- Process Contribution (PC); and
- Predicted Environmental Concentration (PEC), the PEC being the Process Contribution (PC) added to the baseline.

The EA<sup>7</sup> criteria for significance of the potential impact on sensitive human and ecological receptors, which have been adopted by NRW, are presented in Table 2.4.

**TABLE 2.4: SIGNIFICANCE CRITERIA FOR POTENTIAL IMPACTS ON RECEPTORS**

Applicability	PC, as % of AQS or CL	PEC, as % of AQS or CL	Significance
<b><i>Sensitive Human Receptor</i></b>			
Short-term Impact			
Any sensitive human receptor	<10%	-	Insignificant
	>10%	AND <100%	Insignificant
	>10%	AND >100%	Potentially Significant
Long-term Impact			
Any sensitive human receptor	<1%	-	Insignificant
	>1%	AND <100%	Insignificant
	>1%	AND >100%	Potentially Significant
<b><i>Sensitive Ecological Receptor</i></b>			
Short-term Impact			
Ramsar, SAC, SPA or SSSI	<10%	-	Insignificant
	>10%	-	Potentially Significant
AW, LWS, LNR or NNR	<100%	-	Insignificant
	>100%	-	Potentially Significant
Long-term Impact			
Ramsar, SAC, SPA or SSSI	<1%	-	Insignificant
	>1%	<70%	Insignificant
	>1%	>70%	Potentially Significant
AW, LWS, LNR or NNR	<100%	-	Insignificant
	>100%	-	Potentially Significant

<sup>7</sup> Environment Agency, last updated December 2023, Air emissions risk assessment for your environmental permit, <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit>

If the PEC at specified receptors indicates that the short-term hourly standard for NO<sub>2</sub> has the potential to be breached more than 18 times a year, then the EA guidance on dispersion modelling for oxides of nitrogen assessment from specified generators requests to perform a statistical analysis. The likelihood of actual exceedances is classified as follows:

- ≤1%, highly unlikely;
- <5%, unlikely within 20 years of operation; and
- ≥5%, likely potential for significance. In this case, further proposals to reduce the risk of the exceedance are required.

For this assessment, the potential human health impacts are also compared against the AEGL thresholds outlined in Table 2.2. The AEGL thresholds have no regulatory basis in the UK, however these have been adopted by the EA <sup>8</sup> as an indicator of the risk of acute severe health effects primarily during emergency running scenarios, and subsequently also adopted by NRW.

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<sup>8</sup> Environment Agency for England (2022) Data Centre FAQ Headline Approach DRAFT version 21.0 to TeckUK for Discussion 15/11/22

### 3. BACKGROUND AIR QUALITY

#### 3.1 NO<sub>2</sub> AND PM<sub>10</sub>

The background air quality of the Site was reviewed from local monitoring reports published by Newport City Council (NCC) and Defra background maps:

- NCC has declared eleven Air Quality Management Areas (AQMA) related to breaches of the NO<sub>2</sub> annual mean AQS. The nearest AQMAs to the Site are the Caerphilly Road and the Glasllwch which are approximately 2.4km North of the Site. Table 3.1 presents the closest identified relevant local monitoring points to the Site and their reported diffusion tubes concentrations.
- The Defra background maps<sup>9</sup> (base year 2018) for 2022 provide information on the annual mean concentrations of NO<sub>2</sub>, NO<sub>x</sub> and PM<sub>10</sub> for each 1km x 1km square. Table 3.2 presents the data for the square covering the Site.
- According to the latest NCC Air Quality Progress Report<sup>10</sup>, the majority of NO<sub>x</sub> emissions in the County are a result of road traffic. The local monitoring sites are specifically placed to identify road traffic emissions hot spots. As such, they are not likely to be representative of the immediate environment and emission sources at the Site, most of which are quiet commercial and suburban streets. The Defra mapping value was therefore considered applicable and valid for this assessment. The baseline concentrations used in this assessment for long-term NO<sub>2</sub> and PM<sub>10</sub> were 11.9 µg/m<sup>3</sup> and 14.4 µg/m<sup>3</sup> respectively, and these were multiplied by two for short-term averages, as per EA guidance<sup>11</sup>.

**TABLE 3.1: LOCAL MONITORING DATA**

Site <sup>a</sup>	Type	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> )				
		2018	2019	2020	2021	2022
NCC30B – Caerphilly	Roadside	28.9	30.5	22.7	23.7	22.1
NCC48D – Caerphilly	Roadside	44.9	42.5	34.9	35.0	33.8
NCC49C – Caerphilly	Roadside	29.7	28.3	23.9	24.7	23.3
NCC18C – Glasllwch	8m away from road	39.5	27.8	22.4	20.9	19.8
NCC41B – Glasllwch	11.5m away from road	25.4	22.4	17.8	22.8	22.1

<sup>a</sup> Annual mean for PM<sub>10</sub> are not available at these monitoring sites.

**TABLE 3.2: DEFRA BACKGROUND MAP CONCENTRATIONS (µg/m<sup>3</sup>)**

Grid Square (X, Y in National Grid)	Annual Mean		
	NO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>
328500, 184500	11.9	15.8	14.4

<sup>9</sup> DEFRA, 2018, Background Mapping data for local authorities -2018, <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>

<sup>10</sup> Newport City Council, June 2023, 2023 Air Quality Progress Report (2022 data year), <https://www.newport.gov.uk/documents/Transport-and-Streets/Pollution-and-Noise-Control/Newport-air-quality-annual-progress-report-2023.pdf>

<sup>11</sup> Environment Agency, 2016, Air emissions risk assessment for your environmental permit, <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit>

### 3.2 OZONE (AOT40) AND SO<sub>2</sub>

The 24-hourly NO<sub>x</sub> AQS of 200 µg/m<sup>3</sup> for assessing air quality impacts on the ecological designated sites is justified by the levels of ozone (as in AOT40, Accumulated Ozone exposure over a Threshold of 40 parts per billion) and SO<sub>2</sub> in the local areas as tabulated in Table 2.1.

Ozone is not monitored in Newport. The Cwmbran Crownbridge Automatic Urban and Rural Network (AURN)<sup>12</sup> monitoring site was instead used to obtain background ozone. This site is considered the most representative of the Site as it is similarly an urban background site and is the closest relevant to the Site location (approximately 11.2 km north of the Site).

SO<sub>2</sub> is not monitored in Newport or Cwmbran, and instead, the Cardiff Centre AURN<sup>13</sup> monitoring site was used to obtain background SO<sub>2</sub>. The site is in the middle of Cardiff Centre and is located approximately 12.7 km southwest of the Site.

Table 3.3 presents the reported background ozone and SO<sub>2</sub> levels from the AURN sites.

**TABLE 3.3: BACKGROUND OZONE AND SO<sub>2</sub>**

AURN Site	Threshold (µg/m <sup>3</sup> )	Pollutants Monitored	Baseline (µg/m <sup>3</sup> )	Notes
Cwmbran Crownbridge	6,000	Ozone	1,228, as the AOT40	AOT40 accumulated hourly value (01 May – 31 July 2023, 08.00:20.00)
Cardiff Centre	10	SO <sub>2</sub>	1.35	Annual mean from 2023

<sup>12</sup> DEFRA, Site Information for Cwmbran Crownbridge, [https://uk-air.defra.gov.uk/networks/site-info?site\\_id=CWMC&view=View](https://uk-air.defra.gov.uk/networks/site-info?site_id=CWMC&view=View)

<sup>13</sup> DEFRA, Site Information for Cardiff Centre, [https://uk-air.defra.gov.uk/networks/site-info?site\\_id=CARD&view=View](https://uk-air.defra.gov.uk/networks/site-info?site_id=CARD&view=View)

## 4. ASSESSMENT METHODOLOGY FOR OPERATIONAL PHASE

### 4.1 ENGINE OPERATION

In total, CWL11/12 will have 194 diesel backup generators (141 generators at CWL11 and 53 generators at CWL12). In addition to CWL11/12, this assessment also considers the potential cumulative impact of emissions from CWL13, where 60 generators are installed and permitted to operate under a separate EP (EPR/CB3895HY), bringing the total across CWL11/12/13 to 254 diesel backup generators. All these diesel backup generators are installed to provide emergency power in the event of a grid supply failure. No routine operation is anticipated, but the engines are regularly tested to ensure that they are capable of reliably fulfilling the backup supply requirements.

The testing regimes for the existing engines and new engines remain unchanged from the current EP. The engines will be tested using two types of tests: Quarterly test and Black Building test. All testing regimes and two potential emergency outage scenarios of 1 hour and 72 hours have been included in this impact assessment. The modelled scenarios for the assessment are presented in Table 4.1. Detailed changes in engine operation relevant to this EP variation application for this assessment are outlined in Section 4.3.

**TABLE 4.1: ANTICIPATED ENGINE OPERATIONS**

Regime	Frequency	Duration	Scheduling	Number of Engines	Load <sup>c</sup>
<b>Testing Regime – All tests</b>					
Quarterly test	Quarterly <sup>a</sup>	either 15 minutes or 2 hours per generator (in alternating quarters)	Monday to Friday; 0900 to 1700	Individual engines are tested, one engine after the other	100%
Black building test	Twice per year	15 minutes per generator group	Monday to Friday; 0900 to 1700	Groups of engines are tested, one group after the other <sup>b</sup>	100%
<b>Emergency Outage Scenarios</b>					
Emergency outage	Unpredictable, infrequent	1 hour all generators	Any time	All engines together	100%
		72 hours all generators	Any time	All engines together	100%

<sup>a</sup> The quarterly test is undertaken 4 times a year.

<sup>b</sup> No more than one black building test per day.

<sup>c</sup> Engines are operated at 100% except for cell TF5 at 75% load.

## 4.2 MODEL PARAMETERS AND INPUTS

The key elements of the methodology used for carrying out the air dispersion modelling study are set out in Table 4.2. Most of these elements remain unchanged from the current EP, where changes are relevant to this EP variation application these are indicated in **bold** text.

**TABLE 4.2: AIR DISPERSION MODEL METHODOLOGY AND PARAMETERS**

Parameter	Approach	Notes
Dispersion model	Lakes AERMOD View 11.2.0	Gaussian plume model
<b>Number of sources</b>	<b>CWL11: 141; CWL12: 53; CWL13: 60; Total 254</b>	See <i>Figure 4.1</i> for sources locations.
<b>Model domain</b>	<b>20 km x 20 km</b>	Radius from the Site of 10 km to cover protected conservation areas. Map in Appendix A.
<b>Receptor grid resolution</b>	<b>Multi-tier grid: 20 m up to 0.5 km from centre; 50 m between 0.5 km and 4 km from centre; 100 m between 4 km and 10 km from centre</b>	The modelled stack heights ranged from 3.18 m to 21.2 m, as detailed in Table 4.3.
<b>Discrete sensitive receptors</b>	<b>45</b>	See details in Section 4.4.1.
<b>Buildings</b>	<b>4 buildings on Site: CWL11, CWL12, CWL13, IQE facility building</b>	All buildings that are greater than one third of the stack height, within five stack heights of the stack, are included. Buildings footprint and location presented in Appendix A.
<b>Terrain</b>	<b>Not required</b>	There are not sustained gradients of >1:10 in the vicinity of the Site, and therefore terrain was not required.
<b>Surface characteristics</b>	<b>Albedo: 0.37-1.00 Bowen Ratio: 0.9 Surface Roughness: 0.2</b>	As provided with meteorological data.
<b>Meteorological data</b>	Cardiff Airport, 5 years <b>(2017-2021)</b>	Hour-sequential data. Wind roses are presented in Appendix A.
NO <sub>x</sub> to NO <sub>2</sub> conversion ratio	Short-term concentrations: <500 m from source 15% >500 m from source 35% Long-term concentrations: 70%	The Environment Agency <sup>a</sup> states that a short-term conversion ratio of 15% is reasonable within 500 m of a source. For distances of >500 m, ratios are taken from other Environment Agency guidance <sup>b</sup> .
Averaging period conversion rates	1-hour NO <sub>x</sub> concentration to 10-minute NO <sub>x</sub> concentration factor: 1.431 1-hour NO <sub>x</sub> concentration to 30-minute NO <sub>x</sub> concentration factor: 1.149	AERMOD does not allow for modelling shorter averaging periods than 1 hour. To estimate NO <sub>2</sub> concentrations for comparison against the 10-minute and 30-minute AEGs, the power law was used to calculate a factor. These factors were applied to the modelled 1-hour NO <sub>2</sub> concentration to determine a modelled 10-minute and 30-minute NO <sub>2</sub> concentration.

<sup>a</sup> Environmental Agency AQMAU, 2016, Diesel generator short term NO<sub>2</sub> impact assessment, [https://consult.defra.gov.uk/airquality/medium-combustion-plant-and-controls-on-generators/supporting\\_documents/Generator%20EA%20air%20dispersion%20modelling%20report.pdf](https://consult.defra.gov.uk/airquality/medium-combustion-plant-and-controls-on-generators/supporting_documents/Generator%20EA%20air%20dispersion%20modelling%20report.pdf)

<sup>b</sup> Environmental Agency, 2007, Review of methods for NO to NO<sub>2</sub> conversion in plumes at short ranges, [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/290985/scho0907bnhi-e-e.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/290985/scho0907bnhi-e-e.pdf)

### 4.3 EMISSION PARAMETERS

The adopted emission parameters for each modelled source are presented in Table 4.3, with proposed changes from the current permit, relevant to this EP variation application, indicated in **bold** text. The emission parameters have been updated to include the full load operation for most of the installed generators and the installation of new SCR-fitted engines. A map showing the stack locations is presented in Figure 4.1.

- Of the 123 generators installed at CWL11 that have been permitted to operate, the emission parameters for 77 generators (Permit ID A1-A77) remain unchanged as the previous application<sup>14</sup>. The emission parameters for cell TF5 (Permit ID A78-A82), operating at 75% load have been updated according to the engine datasheet provided by VDC to ERM. The emission parameters for 41 generators on CWL11 currently with a 75% load constraint (engine model KD45V20-5DES, Permit ID A83-A93 and A113-A142) have been updated to remove the current 75% load constraint.
- Emission parameters for 18 new generators with SCR-fitted engine model KD1800-F at CWL11 (Permit ID A94-A111) and 53 new generators with SCR-fitted engine model KD1650-E at CWL12 (Permit ID A143-A195) have been updated.
- For this assessment, the SCR is assumed to be designed to meet the Medium Combustion Plant Directive<sup>15</sup> (MCPD) Emission Limit Values (ELVs) of 190 mg/m<sup>3</sup> at standard temperature and pressure (STP), dry and 15% oxygen content (equivalent to 500 mg/m<sup>3</sup> at STP, dry and 5% oxygen content). The SCR systems are expected to require a warm-up period prior to being fully operational. During the warm-up period, NO<sub>x</sub> emissions from the generators are not expected to be substantially abated. To consider the operation of the SCRs, multiple models have been set up to approximate the effects of a 5-minute and 20-minute warm-up time (based on supplier data) of the SCR-fitted engines being installed in CWL11/CWL12 and installed in CWL13, respectively. Potential NO<sub>x</sub> emission rates were developed for each averaging period being assessed (10-minute, 30-minute, 1-hour, 4-hour and 8-hour). Further details are provided in Table 4.3.
- The SCR will be fitted with an Ammonia Slip Catalyst which, the supplier has advised, will capture any unused ammonia. Consequently, an assessment of the impact of ammonia emissions is not required as no emissions are expected. A copy of the statement from the supplier is attached in Appendix F.
- It is intended the new engines will normally run on HVO, but conventional diesel may be used as a secondary backup fuel. This assessment is based on emissions expected from diesel engine operations as this is considered to be conservative by comparison with emissions from HVO.

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<sup>14</sup> Atkins, Vantage Environmental Permit Variation Application CWL11/CWL12 - Supporting Information (Permit Reference EPR/BB3599/CW), August 2021

<sup>15</sup> European Commission, Directive (EU) 2015/2193, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32015L2193>

TABLE 4.3: MODELLED EMISSIONS PARAMETERS

Parameter <sup>a, b</sup>	CWL11						CWL12	CWL13 <sup>c</sup>		
Site	CWL11_original				CWL11_expansion			CWL_12	CWL_13	
Engine Make/Model	Perkins 4006- 23TAG3 A	MTU 12V160 0G20F	Volvo TWD 1642GE	Mitsubish i S12R- F1PTAW2	Kohler KD45V20 -5DEP	Kohler KD45V20- 5DES@75% <sup>b</sup>	<b>Kohler KD45V20- 5DES</b>	<b>Kohler KD1800-F with SCR</b>	<b>Kohler KD1650-E with SCR</b>	Kohler KD45V20- 5DEP with SCR
Number of generators	10	29	18	5	15	5	<b>41</b>	<b>18</b>	<b>53</b>	60
Stack Orientation	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	<b>Vertical</b>	<b>Vertical</b>	<b>Vertical</b>	Vertical
Stack Height above ground level (m)	3.50	3.20	3.18	3.94	3.65	3.65	<b>9.30</b>	<b>10.4</b>	<b>10.4</b>	21.2
Flue Diameter (m)	0.265	0.250	0.215	0.453	0.350	0.350	<b>0.350</b>	<b>0.450</b>	<b>0.350</b>	0.350
Emission Velocity (m/s)	49.8	40.3	49.4	29.8	43.3	<b>31.0</b> <sup>b</sup>	<b>41.3</b>	<b>27.0</b>	<b>41.3</b>	43.3
Actual Flow Rate (m <sup>3</sup> /s)	2.75	1.98	1.79	4.79	4.17	<b>2.98</b> <sup>b</sup>	<b>3.97</b>	<b>4.30</b>	<b>3.97</b>	4.17
Emission Temperature (K)	773.15	753.15	758.15	823.15	772.15	772.15	<b>772.15</b>	<b>771.15</b>	<b>772.15</b>	772.15
NO <sub>x</sub> Concentration (mg/m <sup>3</sup> , no SCR) <sup>d</sup>	2,000	1,507	1,742	2,000	2,000	<b>1,929</b> <sup>b</sup>	<b>3,883</b>	<b>5,589</b>	<b>3,883</b>	2,000
NO <sub>x</sub> Concentration (mg/m <sup>3</sup> , with SCR) <sup>d</sup>	NA	NA	NA	NA	NA	<b>NA</b>	<b>NA</b>	<b>500</b> <sup>e</sup>	<b>500</b> <sup>e</sup>	500 <sup>e</sup>
NO <sub>x</sub> Emission Rate (g/s, no SCR)	1.40	0.783	0.815	2.30	2.13	<b>1.75</b> <sup>b</sup>	<b>4.41</b>	<b>6.87</b>	<b>4.41</b>	2.13
NO <sub>x</sub> Emission Rate (g/s, with SCR) [1hour]	NA	NA	NA	NA	NA	<b>NA</b>	<b>NA</b>	<b>1.14</b> <sup>f</sup>	<b>0.894</b> <sup>f</sup>	1.07 <sup>g</sup>

Parameter <sup>a, b</sup>	CWL11							CWL12	CWL13 <sup>c</sup>	
NO <sub>x</sub> Emission Rate (g/s, 100% load, with SCR) [10-minute]	NA	NA	NA	NA	NA	NA	NA	<b>3.75 <sup>f</sup></b>	<b>2.49 <sup>f</sup></b>	2.13 <sup>g</sup>
NO <sub>x</sub> Emission Rate (g/s, 100% load, with SCR) [30-minute]	NA	NA	NA	NA	NA	NA	NA	<b>1.66 <sup>f</sup></b>	<b>1.21 <sup>f</sup></b>	1.60 <sup>g</sup>
NO <sub>x</sub> Emission Rate (g/s, with SCR) [4hour]	NA	NA	NA	NA	NA	NA	NA	<b>0.753 <sup>f</sup></b>	<b>0.655 <sup>f</sup></b>	0.666 <sup>g</sup>
NO <sub>x</sub> Emission Rate (g/s, with SCR) [8hour]	NA	NA	NA	NA	NA	NA	NA	<b>0.688 <sup>f</sup></b>	<b>0.615 <sup>f</sup></b>	0.600 <sup>g</sup>
PM <sub>10</sub> Concentration (mg/m <sup>3</sup> ) <sup>d</sup>	80	50	29	50	80	<b>4 <sup>b</sup></b>	<b>3</b>	<b>0</b>	<b>3</b>	3
PM <sub>10</sub> Emission Rate (g/s, 100% load)	0.0560	0.0260	0.0135	0.0575	0.0852	<b>0.00278 <sup>b</sup></b>	<b>0.00370</b>	<b>0.0</b>	<b>0.00370</b>	0.00320

<sup>a</sup> The parameters used in the air modelling dispersion study are derived from the relevant engine datasheets provided by VDC to ERM, except for generators installed at CWL11\_original and CWL13, which retain the parameters given in those EP applications<sup>16,17</sup>.

<sup>b</sup> The parameters indicate engines operating at 75% load and are derived from the relevant engine datasheets provided by VDC to ERM.

<sup>c</sup> Emission parameters for the generators installed at CWL13 are included in the air modelling dispersion study to assess the cumulative impact on air quality.

<sup>d</sup> Concentrations were obtained from the relevant engine datasheets provided by VDC to ERM and are at standard conditions: 273.15 K, 101.3 kPa, 5% O<sub>2</sub>, dry basis.

<sup>e</sup> MCPD NO<sub>x</sub> ELV requirement of 190 mg/m<sup>3</sup> at STP, 15% O<sub>2</sub>, dry basis (equivalent to 500 mg/m<sup>3</sup> at 5% O<sub>2</sub>).

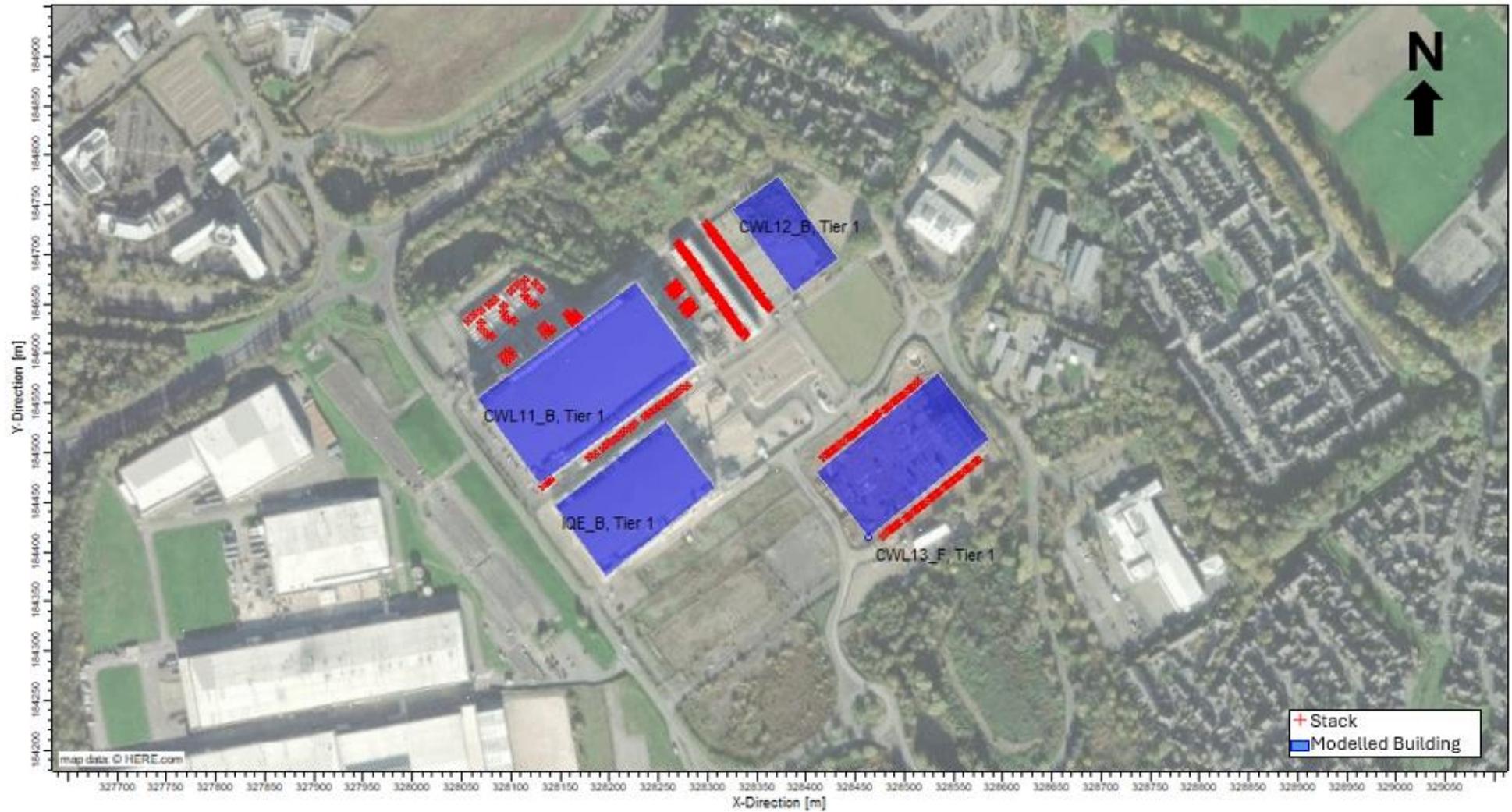
<sup>f</sup> Emission rate calculated from unabated and SCR-abated NO<sub>x</sub> concentrations on an averaging time basis and taking into account of 5-minute warm-up time for SCR.

<sup>g</sup> Emission rate calculated from unabated and SCR-abated NO<sub>x</sub> concentrations on an averaging time basis and taking into account of 20-minute warm-up time for SCR.

<sup>16</sup> Atkins, Next Generation Data Ltd Environmental Permit Application Supporting Information (Permit Reference EPR/BB3599/CW), November 2018

<sup>17</sup> Atkins, Vantage CWL13 Environmental Permit Application – Supporting Information Document (EPR/CB3895HY/A001), August 2022

FIGURE 4.1: AIR EMISSION SOURCE



Note: Figure is generated using the Lakes Environmental Software AERMOD View.

## 4.4 RECEPTOR PARAMETERS

### 4.4.1 SENSITIVE HUMAN RECEPTORS

Receptors 1-10, assessed in the previous EP application, were included in the current assessment. Following EA guidance <sup>18</sup>, the impact assessment was carried out for potential discrete sensitive receptor locations at which the public could be expected to be present for one hour, including residential receptors, schools, parks, hospitals, etc. Additional sensitive receptors indicated in **bold** text (presented in Table 4.4) have been added at the locations presented in Figure 4.2. A map of the modelled domain is presented in Appendix A.

**TABLE 4.4: DISCRETE SENSITIVE HUMAN RECEPTORS**

No.	Receptor Name	Type	X, Y (National Grid)	No.	Receptor Name	Type	X, Y (National Grid)
1	47 Powis Close	Residential	328723.0, 184280.0	<b>24</b>	<b>11 Nant-Y-Moor Close</b>	<b>Residential</b>	<b>327520.3, 184684.7</b>
2	18 Pencarn Avenue	Residential	328366.0, 184839.0	<b>25</b>	<b>5 Nant-Y-Moor Close</b>	<b>Residential</b>	<b>327424.3, 184636.7</b>
3	Celtic Springs Guest House	Recreational	328176.0, 184816.0	<b>26</b>	<b>Greggs</b>	<b>Commercial</b>	<b>328235.5, 184978.3</b>
4	Teddies Nursery	Nursery	327822.0, 184790.0	<b>27</b>	<b>Integra House</b>	<b>Office</b>	<b>328176.8, 185103.7</b>
5	11 Pencarn Avenue	Residential	328470.0, 184780.0	<b>28</b>	<b>Holiday Inn Express Newport</b>	<b>Hotel</b>	<b>328280.9, 185085.0</b>
6	24 Pencarn Avenue	Residential	328290.0, 184888.0	<b>29</b>	<b>Ysgol Gyfun Gwent Is Coed</b>	<b>Education</b>	<b>329820.7, 184951.6</b>
7	2 Sir Briggs Avenue	Residential	328705.0, 184766.0	<b>30</b>	<b>The John Frost School</b>	<b>Education</b>	<b>329890.1, 184895.5</b>
8	95 Edmundsbury Road	Residential	328807.0, 184544.0	<b>31</b>	<b>102 Sandpiper Way</b>	<b>Residential</b>	<b>329214.9, 184908.9</b>
9	Tredeggar House Caravan Site	Recreational	328525.0, 185140.0	<b>32</b>	<b>56 Sandpiper Way</b>	<b>Residential</b>	<b>329284.3, 184863.5</b>
10	St Joseph's High School	Education	329080.0, 184750.0	<b>33</b>	<b>5 Craft Workshops</b>	<b>Commercial</b>	<b>328857.3, 185069.0</b>
<b>11</b>	<b>Imperial Way</b>	<b>Industrial</b>	<b>328498.0, 184736.0</b>	<b>34</b>	<b>HSBC</b>	<b>Office</b>	<b>328259.6, 185386.6</b>

<sup>18</sup> Environment Agency, 2019, Guidance, Specified generators: dispersion modelling assessment, <https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment>

No.	Receptor Name	Type	X, Y (National Grid)	No.	Receptor Name	Type	X, Y (National Grid)
12	Imperial Courtyard	Industrial	328590.0, 184574.0	35	Crown Commercial Service	Office	328699.9, 185781.6
13	1 Oxwich Grove	Residential	328767.4, 184182.5	36	Nexperia	Office	329060.2, 185538.7
14	19 Bronllys Grove	Residential	328956.8, 184071.0	37	Fair Orchard Farm	Farm	330118.3, 183887.2
15	Asda Newport Superstore	Commercial	329282.8, 184679.7	38	Red Arch Cattery	Other	327556.2, 183077.1
16	14 Powis Close	Residential	328785.1, 184317.9	39	Ty Eglwys	Residential	327647.2, 183595.2
17	Imperial Park	Industrial	327890.2, 184504.3	40	Cefn Llogell stables	Recreational	326937.6, 184901.4
18	Imperial Park	Industrial	327967.2, 184430.6	41	RUAS	Education	328705.3, 184443.0
19	Imperial Park	Industrial	328047.5, 184337.1	42	Airbus Group	Office	327882.7, 184954.8
20	Imperial Park (Quinn)	Industrial	328090.1, 184238.8	43	Lloyd Banking Group	Office	328451.0, 184967.3
21	The Parc Golf Club	Recreational	327224.1, 183657.3	44	59 Edmundshury Road	Residential	328746.2, 184678.4
22	Welsh Nannies & Carers	Nursery	327424.3, 184239.1	45	42 Grosmont Way	Residential	328915.7, 184395.9
23	SSCL	Office	327808.5, 184706.1				

FIGURE 4.2: SENSITIVE HUMAN RECEPTORS



Note: Figure is generated using the Lakes Environmental Software AERMOD View.

#### 4.4.2 SENSITIVE ECOLOGICAL RECEPTORS

The previous EP application considered the closest ecological receptors and a variety of local wildlife sites, also known as Site of Importance for Nature Conservation (SINC), within the Site's immediate vicinity. In this variation application, the ecological assessment has incorporated a broader radius of 10 km, as per EA guidance<sup>19</sup> that has been adopted by NRW. Protected conservation areas within 10 km radius of the Site for SACs, SPAs and Ramsar sites, as well as non-statutory ecological sites within 2 km radius for AW, LNRs, NNRs, SSSIs and SINC, were included in the impact assessment. Based on the MAGIC website<sup>20</sup>, the designated ecological sites included in the impact assessment are listed in Table 4.5 with additional ecological sites indicated in **bold** text. The locations of these ecological sites within a 10 km and 2 km radius of the Site are shown in Figure 4.3 and Figure 4.4, respectively.

TABLE 4.5: ECOLOGICAL DESIGNATED SITES

Ecological Site Name	Type	Approximate Distance from the Site (km)
<b>Argloddiau Cronfeydd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments <sup>a</sup></b>	SSSI	9.3 west
<b>Coed-y-Darren <sup>a</sup></b>	SSSI	8.6 north west
<b>Dan y Graig Quarry Risca <sup>a</sup></b>	SSSI	7.8 north west
<b>Gwent Levels - Nash and Goldcliff</b>	SSSI	5.7 east
<b>Gwent Levels - Whitson</b>	SSSI	8.9 east
<b>Gwent Levels Rumney</b>	SSSI	3.7 south
Gwent Levels St Brides	SSSI	0.6 south
<b>Gwlyptiroedd Casnewydd / Newport Wetlands</b>	SSSI	5.9 south east
<b>Henllys Bog <sup>a</sup></b>	SSSI	8.2 north west
<b>Lisvane Reservoir <sup>a</sup></b>	SSSI	9.7 west
<b>Plas Machen Wood <sup>a</sup></b>	SSSI	5.2 north west
<b>Rhymney River Section <sup>a</sup></b>	SSSI	9.0 south west
River Usk	SAC, SSSI	3.6 east
<b>Rumney Quarry <sup>a</sup></b>	SSSI	8.8 south west
<b>Ruperra Castle and Woodlands <sup>a</sup></b>	SSSI	5.8 north west
Severn Estuary	SAC, SPA, SSSI	3.4 south east
Ancient woodland C <sup>b</sup>	AW	1.2 south west
Ancient woodland D <sup>b</sup>	AW	0.9 west
Ancient woodland E <sup>b</sup>	AW	1 north west
Ancient woodland F <sup>b</sup>	AW	0.6 north

<sup>19</sup> Environment Agency, 2016, Air emissions risk assessment for your environmental permit, <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit>

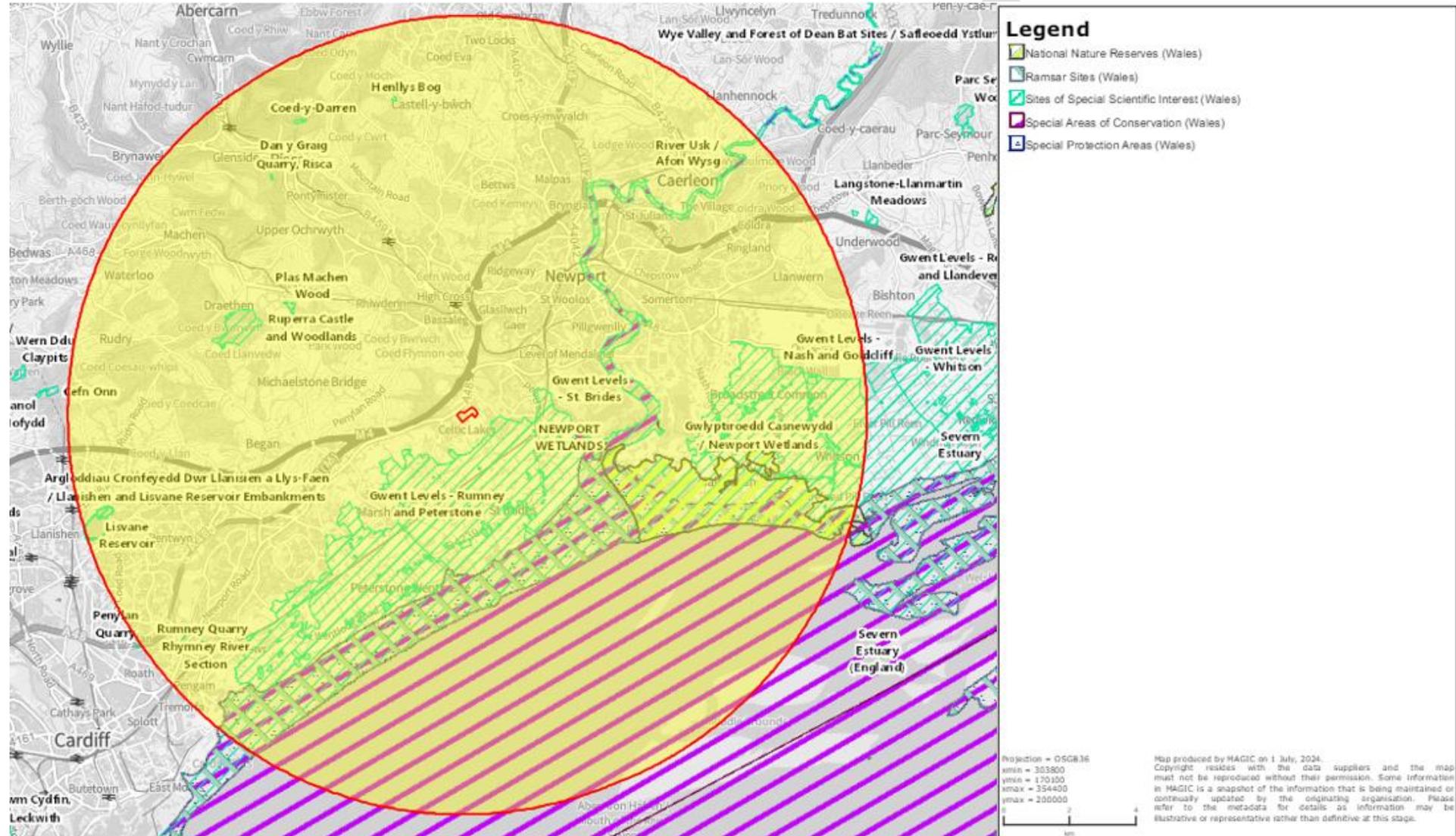
<sup>20</sup> Natural England, 2018, MAGIC Interactive map, <https://magic.defra.gov.uk/magicmap.aspx>

<b>Ecological Site Name</b>	<b>Type</b>	<b>Approximate Distance from the Site (km)</b>
Ancient woodland G <sup>b</sup>	AW	1.1 north east
Ancient woodland H <sup>b</sup>	AW	1.2 east
Celtic Springs <sup>b</sup>	SINC	0.3 north west
LG Duffryn Site 1 and 2 <sup>b</sup>	SINC	0.4 south
Duffryn Pond <sup>b</sup>	SINC	1 east
<b>Coed Ffynon-Oer</b>	SINC	1.9 north west
<b>Court Wood</b>	SINC	1.9 north west
<b>Afon Ebbw River</b>	SINC	1.6 north east
<b>Gaer Fort</b>	SINC	1.7 north east
<b>Cwm Pensidan</b>	SINC	1.6 north west

<sup>a</sup>: These specific sites were not included in the habitat screening assessment for acid deposition as site-specific Critical Loads for acidity information were not available from the APIS website.

<sup>b</sup>: These non-statutory sites have been assessed in the previous EP application.

FIGURE 4.3: DESIGNATED ECOLOGICAL SITES WITHIN 10 KM



Note: Figure is generated using the online MAGIC interactive map <https://magic.defra.gov.uk/magicmap.aspx>. The Site location is indicated as redline.

FIGURE 4.4: NON-STATUTORY ECOLOGICAL SITES WITHIN 2 KM



## 4.5 SENSITIVITY ANALYSIS

This assessment is based on the previous EP application with regards to sensitivity analysis on:

- **Meteorological variation:** Meteorological data recorded at Cardiff Airport from 2011-2015 was used in the previous EP application. The meteorological data recorded at Cardiff Airport from 2017-2021 was used for this assessment, so that the data is up-to-date, using the recent local meteorology characteristics to inform the air quality dispersion model. The data for the year 2021 resulted in the highest modelled concentrations, so the impact assessment was carried out on model results for that year to be conservative.
- **Effect of building downwash:** Four buildings have been included in the dispersion model as per the previous EP application. The proposed air quality dispersion model is considered robust and not prone to under-estimating the impacts.

## 5. MODELLED IMPACTS

The assessment considers the potential impact of the routine testing regimes and the two emergency outage scenarios (noting the likely rarity of these events) outlined in Section 4.1. A screening assessment was undertaken for PM<sub>10</sub> and SO<sub>2</sub> see Section 5.1 and 5.2. A detailed assessment was undertaken for NO<sub>2</sub>, NO and NO<sub>x</sub>, see Section 5.3 for human health and ecological sites. This assessment considers the potential air quality impacts on human health and ecological sites from the Site, both independently and cumulatively with CWL13.

### 5.1 SCREENING ASSESSMENT FOR PM<sub>10</sub>

A screening exercise using modelled data has been undertaken on the basis that the Site is running all the generators at the same time at 100% load (except for cell TF5 at 75% load), which would represent the highest plausible emissions in any one 24-hour period:

- All 254 generators within the CWL11/12 and CWL13 Sites will operate in any one 24-hour period
- The engines operate for no more than 1 hour each
- The engines operate on a maximum load of 100% (except for cell TF5 at 75% load)

The modelled results for this worst-case scenario are presented in Table 5.1. Short-term background concentration for PM<sub>10</sub> of 28.7 µg/m<sup>3</sup> was used, based on the long-term background concentration presented in Table 3.2.

TABLE 5.1: MODELLED 24-HOUR MEAN CONCENTRATIONS FOR PM<sub>10</sub>

PM <sub>10</sub> Concentrations (µg/m <sup>3</sup> ), Maximum Anywhere on the Grid										
24-hour maximum (100 <sup>th</sup> percentile)						24-hour 36 <sup>th</sup> highest hour (90.4 <sup>th</sup> percentile)				
Baseline	PC	PEC	PC as % of AQS	PEC as % of AQS	Significance	PC	PEC	PC as % of AQS	PEC as % of AQS	Significance
28.7	7.71	36.4	15%	73%	Not significant	3.52	32.3	7.0%	65%	Not significant
PM <sub>10</sub> Concentrations (µg/m <sup>3</sup> ), Maximum at any Discrete Receptors										
24-hour maximum (100 <sup>th</sup> percentile)						24-hour 36 <sup>th</sup> highest hour (90.4 <sup>th</sup> percentile)				
Baseline	PC	PEC	PC as % of AQS	PEC as % of AQS	Significance	PC	PEC	PC as % of AQS	PEC as % of AQS	Significance
28.7	3.31	32.0	6.6%	64%	Not significant	1.62	30.3	3.2%	61%	Not significant

The modelled results in Table 5.1 are that the 24-hour PM<sub>10</sub> AQS of 50 µg/m<sup>3</sup> is not expected to be exceeded in the worst-case scenario assessed. On this basis, the PM<sub>10</sub> concentration as a result of testing regime is not expected to exceed the AQS and no further assessment is required.

## 5.2 SCREENING ASSESSMENT FOR SO<sub>2</sub>

A high-level analysis of SO<sub>2</sub> emissions is provided using the results for NO<sub>x</sub> and fuel sulphur content as a basis. This approach has been adopted in the previous EP application.

The ultra-low-sulphur diesel used in the engines is regulated<sup>21</sup> to no more than 0.001% sulphur by mass, which substantially limits the potential for SO<sub>2</sub> emissions from fuel combustion.

Cell DC1MF2 was evaluated to screen for the potential maximum 1-hour SO<sub>2</sub> PC based on the fuel use, as this cell has been modelled to have the highest 1-hour NO<sub>x</sub> PC at any of the sensitive discrete receptors. The expected fuel consumption for the corresponding engine (i.e., Kohler KD45V20-5DES) is 261 kg/h at full load. This equates to a mass emission rate of 0.000724 g/s as sulphur, or 0.00145 g/s as SO<sub>2</sub>, compared with 4.41 g/s for NO<sub>x</sub>.

Applying the ratio of SO<sub>2</sub> to NO<sub>x</sub> emission rates in g/s, this results a maximum 1-hour SO<sub>2</sub> PC of 0.0566 µg/m<sup>3</sup> for a single engine or 0.0763 µg/m<sup>3</sup> for the cell. Both values are significantly lower than the 1-hour SO<sub>2</sub> AQS of 350 µg/m<sup>3</sup>. On this basis, the SO<sub>2</sub> concentration as a result of the generator operation is not expected to exceed the AQS and no further assessment is required.

## 5.3 DETAILED ASSESSMENT FOR NO<sub>2</sub>, NO<sub>x</sub>, AND NO

The potential impact of NO<sub>x</sub> emissions resulting from the following operations as described in Section 4.1 at the Site on human health with reference to the sensitive receptors and the surrounding ecological designated sites located within 10 km of the Site has been assessed:

- Testing regime; and
- Emergency outage scenarios, noting the likely rarity of these events. An outage duration utilising all the Site's engines is expected to be highly unlikely in practice as:
  - Not all the engines would be running the whole time as installed generating capacity intentionally exceeds expected site demand and includes redundancy;
  - The assumed duration of the outage would likely be less than one hour in total.

The maximum modelled concentrations and significance are presented in Table 5.2, Table 5.3 and Table 5.5 for the potential discrete sensitive human receptors assessed. These tables represent the highest modelled effects and therefore expected impacts at the other potential discrete sensitive receptors modelled are lower.

### 5.3.1 TESTING REGIME

#### 5.3.1.1 POTENTIAL IMPACT OF TESTING REGIME ON HUMAN HEALTH

The anticipated testing regime described in Table 4.1 of the Site has been modelled to identify whether the planned testing could potentially result in a PEC >200 µg/m<sup>3</sup> which is the 1-hour NO<sub>2</sub> AQS. The modelled results were compared against the AQS/EAL presented in Table 2.1 and the AEGLs presented in Table 2.2. The criteria outlined in Table 2.4 were used to determine the significance of the modelled results. The modelled maximum PCs and PECs for each of the tests at any of the sensitive discrete receptors resulting from the cumulative emissions of any of the Site's engines are presented in Table 5.2 and Table 5.3. The potential to exceed the annual mean

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<sup>21</sup> Directive 2009/30/EC of the European Parliament and of the Council, 23 April 2009, <https://www.legislation.gov.uk/eudr/2009/30>.

NO EAL and NO<sub>2</sub> AQS resulting from the two tests of the Site has been evaluated based upon the cumulative impacts of all tests undertaken and is presented in Table 5.4. The modelled maximum concentrations at any of the discrete sensitive receptors assessed show the following:

- The maximum 1-hour NO<sub>2</sub> PEC from the quarterly test in Table 5.2 is not modelled to be >200 µg/m<sup>3</sup>. The modelled impact is considered insignificant. No exceedances of the 1-hour NO EAL and AEGLs threshold for 10-minute, 30-minute, 4-hour and 8-hour NO<sub>2</sub> as a result of the quarterly test are expected.

The maximum 1-hour NO<sub>2</sub> PEC from the black building test in Table 5.3 is modelled to be >200 µg/m<sup>3</sup>. Five modelled test groups of generators had a modelled PEC exceeding the 1-hour NO<sub>2</sub> AQS, and six modelled test groups of generators had a modelled PEC above the threshold of 176 µg/m<sup>3</sup>. Based on the testing regime described in Table 4.1, as the black building test occurs twice a year, it is anticipated that this test may result in twelve exceedances of the 1-hour NO<sub>2</sub> AQS in a year, but not a breach of the AQS (18 exceedances are allowed before there is considered to be a breach). Therefore, the anticipated NO<sub>2</sub> emissions from the generator operation are expected to be acceptable from a human health perspective by comparison with the 1-hour AQS.

The maximum modelled concentrations for the discrete sensitive human receptors assessed show that the AQS is not expected to be exceeded.

- In addition, there are thirteen modelled test groups of generators having a modelled PEC above the AEGL-1 threshold for 10-minute NO<sub>2</sub>, with a maximum modelled PEC of 1612 µg/m<sup>3</sup> vs the threshold of 940 µg/m<sup>3</sup>. It is important to note that the modelling is intentionally conservative in assuming the least favourable meteorological conditions from the 2017-2021 data set will prevail. It is highly unlikely in practice that a black building test will actually coincide with such meteorological conditions and therefore the likelihood of air quality at sensitive receptors actually exceeding this threshold is considered low. VDC proposes to undertake ambient monitoring during the black building testing to verify that the AEGL-1 threshold is not exceeded at the Site. No exceedances of the AEGLs threshold for 30-minute, 4-hour and 8-hour NO<sub>2</sub> are expected. A contour plot of the test group at CWL11 and CWL12 with the highest modelled NO<sub>2</sub> concentrations is presented in Appendix B.

**TABLE 5.2: MODELLED MAXIMUM CONCENTRATIONS AT DISCRETE SENSITIVE HUMAN RECEPTORS FOR QUARTERLY TESTS FOR ALL OF CWL11/12/13 ( $\mu\text{g}/\text{m}^3$ )**

Averaging Period	AQS/EAL/AEGL		Baseline	Highest PC	PEC	PC as % of AQS/EAL/AEGL	PEC as % of AQS/EAL/AEGL	Significance
NO 1-hour	EAL	4,400	5.14	552	557	13%	13%	Insignificant
NO <sub>2</sub> 1-hour	AQS 1-hour	200	23.8	172	196	86%	98%	Insignificant
	AQS 1-hour 19 <sup>th</sup> highest	200	23.8	89.1	113	45%	56%	Insignificant
NO <sub>2</sub> 10-minute	AEGL-1	940	23.8	246	270	26%	29%	Insignificant
	AEGL-2	38,000				0.65%	0.71%	Insignificant
	AEGL-3	64,000				0.38%	0.42%	Insignificant
NO <sub>2</sub> 30-minute	AEGL-1	940	23.8	198	222	21%	24%	Insignificant
	AEGL-2	28,000				0.52%	0.58%	Insignificant
	AEGL-3	47,000				0.31%	0.35%	Insignificant
NO <sub>2</sub> 1-hour	AEGL-1	940	23.8	172	196	18%	21%	Insignificant
	AEGL-2	23,000				0.75%	0.85%	Insignificant
	AEGL-3	38,000				0.45%	0.52%	Insignificant
NO <sub>2</sub> 4-hour	AEGL-1	940	23.8	39.3	63.1	4.2%	6.7%	Insignificant
	AEGL-2	15,000				0.26%	0.42%	Insignificant
	AEGL-3	23,000				0.17%	0.27%	Insignificant
NO <sub>2</sub> 8-hour	AEGL-1	940	23.8	14.9	38.7	1.6%	4.1%	Insignificant
	AEGL-2	13,000				0.11%	0.30%	Insignificant
	AEGL-3	21,000				0.071%	0.18%	Insignificant

**TABLE 5.3: MODELLED MAXIMUM CONCENTRATIONS AT DISCRETE SENSITIVE HUMAN RECEPTORS FOR BLACK BUILDING TEST FOR ALL OF CWL11/12/13 ( $\mu\text{g}/\text{m}^3$ )**

Averaging Period	AQS/EAL/AEGL		Baseline	Highest PC	PEC	PC as % of AQS/EAL/AEGL	PEC as % of AQS/EAL/AEGL	Significance
NO 1-hour	EAL	4,400	5.14	643	648	15%	15%	Insignificant
NO <sub>2</sub> 1-hour	AQS 1-hour	200	23.8	232	256	116%	128%	Potentially Significant
	AQS 1-hour 19 <sup>th</sup> highest	200	23.8	107	131	53%	65%	Insignificant
NO <sub>2</sub> 10-minute	AEGL-1	940	23.8	1588	1612	169%	171%	Potentially Significant
	AEGL-2	38,000				4.2%	4.2%	Insignificant
	AEGL-3	64,000				2.5%	2.5%	Insignificant
NO <sub>2</sub> 30-minute	AEGL-1	940	23.8	534	558	57%	59%	Insignificant
	AEGL-2	28,000				1.4%	1.5%	Insignificant
	AEGL-3	47,000				0.83%	0.87%	Insignificant
NO <sub>2</sub> 1-hour	AEGL-1	940	23.8	232	256	25%	27%	Insignificant
	AEGL-2	23,000				1.0%	1.1%	Insignificant
	AEGL-3	38,000				0.61%	0.67%	Insignificant
NO <sub>2</sub> 4-hour	AEGL-1	940	23.8	24.4	48.2	2.6%	5.1%	Insignificant
	AEGL-2	15,000				0.16%	0.32%	Insignificant
	AEGL-3	23,000				0.11%	0.21%	Insignificant
NO <sub>2</sub> 8-hour	AEGL-1	940	23.8	8.75	32.6	0.93%	3.5%	Insignificant
	AEGL-2	13,000				0.067%	0.25%	Insignificant

Averaging Period	AQS/EAL/AEGL		Baseline	Highest PC	PEC	PC as % of AQS/EAL/AEGL	PEC as % of AQS/EAL/AEGL	Significance
	AEGL-3	21,000				0.042%	0.16%	Insignificant

**TABLE 5.4: MODELLED ANNUAL MEAN CONCENTRATIONS AT DISCRETE SENSITIVE HUMAN RECEPTORS OF THE TESTING REGIME ( $\mu\text{g}/\text{m}^3$ )**

Averaging Period	AQS/EAL	Baseline	Highest PC	PEC	PC as % of AQS/EAL	PEC as % of AQS/EAL	Significance	
<b>Testing Regime – All tests of CWL11</b>								
NO Annual mean	EAL Annual mean	310	2.57	0.00554	2.58	0.0018%	0.83%	Insignificant
NO <sub>2</sub> Annual mean	AQS Annual mean	40	11.9	0.0198	11.9	0.050%	30%	Insignificant
<b>Testing Regime – All tests of CWL12</b>								
NO Annual mean	EAL Annual mean	310	2.57	0.00223	2.57	0.00072%	0.83%	Insignificant
NO <sub>2</sub> Annual mean	AQS Annual mean	40	11.9	0.00797	11.9	0.020%	30%	Insignificant
<b>Testing Regime – All tests of CWL11/12/13</b>								
NO Annual mean	EAL Annual mean	310	2.57	0.00964	2.58	0.0031%	0.83%	Insignificant
NO <sub>2</sub> Annual mean	AQS Annual mean	40	11.9	0.0345	11.9	0.086%	30%	Insignificant

- The modelled annual mean NO<sub>2</sub> PEC in Table 5.4 is not modelled to be  $>40 \mu\text{g}/\text{m}^3$  as a result of all tests undertaken at the Site. The impact of the testing regime of the Site is considered insignificant, being below the 1% threshold of significance. No exceedances of the annual mean NO EAL as a result of the cumulative testing regime at the Site are expected.

### 5.3.1.2 POTENTIAL IMPACT OF TESTING REGIME ON ECOLOGY

The potential impact of NO<sub>x</sub> emissions, nitrogen and acid deposition resulting from the testing regime at the Site on the surrounding ecological designated sites located within 10 km has been assessed. The modelled results were compared against the AQS and Critical Loads (CL) presented in Table 2.1. The criteria outlined in Table 2.4 were used to determine the significance of the potential impact. The expected NO<sub>x</sub> emissions resulting from the testing regime at the Site on the non-statutory ecological sites within 2 km have also been assessed.

#### Ambient NO<sub>x</sub> emissions

The modelled results for the 24-hour and annual NO<sub>x</sub> from the Site's testing regime are presented in *Appendix C* and show the following:

- The 24-hour NO<sub>x</sub> PC from the testing regime of the Site in Table C 1 is not modelled to be >10% of the 24-hour maximum Critical Level at any identified ecological designated sites located within 10 km of the Site. Expected ambient impact of 24-hour NO<sub>x</sub> from the Site's testing regime is considered insignificant.
- The annual NO<sub>x</sub> PC from the testing regime of the Site in Table C 2 is not modelled to be >1% of the annual mean Critical Level at any identified ecological designated sites located within 10 km of the Site. Expected ambient impact of annual NO<sub>x</sub> from the Site's testing regime is considered insignificant.
- The modelled results for the 24-hour and annual NO<sub>x</sub> at the non-statutory ecological sites within 2 km from the Site's testing regime are presented in 0, Table D 1 and Table D 2. The modelled 24-hour and annual mean NO<sub>x</sub> PCs from the testing regime are below 100% of the critical level for short-term and long-term concentrations and are considered insignificant.

#### Nitrogen and Acid Deposition

The nitrogen deposition and acid deposition were modelled using factors from the AQTAG06 guidance<sup>22</sup>, based on the annual mean NO<sub>x</sub> concentrations presented in Table C 2. The results for the nitrogen and acid deposition from the Site's testing regime are presented in Appendix C (see Table C 3 and Table C 4), showing the following:

- Potential impacts from the testing regime of the Site on nitrogen and acid deposition are modelled to be insignificant at all of the identified designated ecological sites located within 10 km.

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<sup>22</sup> Habitats Directive, 2014, AQTAG06 Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air, [http://bailey.persona-pi.com/Public-Inquiries/A465-English/8%20Air%20Quality/8.2.2%20-%20AQTAG06 Technical%20Guidance%20Assessment%20emissions%20to%20air%20Mar2014.pdf](http://bailey.persona-pi.com/Public-Inquiries/A465-English/8%20Air%20Quality/8.2.2%20-%20AQTAG06%20Technical%20Guidance%20Assessment%20emissions%20to%20air%20Mar2014.pdf)

## 5.3.2 EMERGENCY OUTAGE SCENARIOS

### 5.3.2.1 POTENTIAL IMPACT OF EMERGENCY OUTAGE SCENARIOS ON HUMAN HEALTH

The two emergency outage scenarios described in Table 4.1 of the Site have been modelled to identify whether the emergency operation could potentially result in a PEC >200 µg/m<sup>3</sup>, i.e. greater than the 1-hour NO<sub>2</sub> AQS. The emergency outage scenarios assumed 1 hour and 72 hours of continuous emissions from all 254 generators (CWL11/12 and CWL13) at 100% load (except TF5 at 75% load). The modelled results were compared against the AQS/EAL presented in Table 2.1 and the AEGLs presented in Table 2.2. The criteria outlined in Table 2.4 were used to determine the significance of the potential impacts. The modelled maximum PCs and PECs for each of the emergency outage scenario at any of the sensitive discrete receptors in case of an emergency of each of the Site and cumulative impacts of all three sites are presented in Table 5.5, with contour plots presented in Appendix B. The modelled maximum concentrations at any of the sensitive receptors show the following:

- In the case of a 1 hour emergency outage at each individual site (CWL11/12 and CWL13) and all sites, the maximum 1-hour NO<sub>2</sub> PEC in Table 5.5 is modelled to exceed the 1-hour NO<sub>2</sub> AQS of 200 µg/m<sup>3</sup>, and the 1-hour NO PEC is modelled to exceed the 1-hour NO EAL of 4,400 µg/m<sup>3</sup>. There is also the possibility that the AEGL-1 thresholds for 10-minute, 30-minute and 1-hour NO<sub>2</sub> could be exceeded. Exceedances of the AEGL-1 threshold for 4-hour NO<sub>2</sub> may occur in the case of a 1-hour emergency outage scenario for CWL11 and all sites but are not expected for CWL12 alone. No exceedances of the annual mean NO<sub>2</sub> AQS of 40 µg/m<sup>3</sup> and AEGLs threshold for 8-hour NO<sub>2</sub>, or the annual mean NO EAL of 310 µg/m<sup>3</sup>, are expected.
- In the highly unlikely case of a 72 hour emergency outage at each individual site and all sites, the maximum 1-hour NO<sub>2</sub> PEC in Table 5.5 is modelled to exceed the 1-hour NO<sub>2</sub> AQS of 200 µg/m<sup>3</sup>, and the 1-hour NO PEC is modelled to exceed the 1-hour NO EAL of 4,400 µg/m<sup>3</sup>. There is also the possibility that the AEGL-1 thresholds for 10-minute, 30-minute and 1-hour NO<sub>2</sub> could be exceeded. Exceedances of the AEGL-1 threshold for 4-hour and 8-hour NO<sub>2</sub> could occur in the case of a 72-hour emergency outage scenario for CWL11 and all sites but are not expected for CWL12 alone. No exceedances of the annual mean NO<sub>2</sub> AQS of 40 µg/m<sup>3</sup> or the annual mean NO EAL of 310 µg/m<sup>3</sup> are expected.

It is important to note that the modelling is intentionally conservative in assuming that the least favourable meteorological conditions from the 2017-2021 data set will prevail during an emergency. It is highly unlikely in practice that a power outage will actually coincide with such meteorological conditions and therefore actual air quality at sensitive receptors is expected to be better than modelled.

A one-hour emergency outage scenarios is considered unlikely in practice and a 72 hour outage highly unlikely. Whether the 1-hour NO<sub>2</sub> AQS would actually be breached would depend on the duration of operations. For the 1-hour scenario, this would require 19 outage events over a year, which is considered very unlikely. Total outage time up to 72 hours a year is even less likely and therefore the risk of breaching the standard in practice is considered low.

VDC has an Air Quality Management Plan (AQMP) in place to be followed in the event of a power outage and emergency running of generators. The AQMP includes:

- provision to undertake air quality monitoring during the outage

- A communication plan to inform nearby receptors if the air quality is such that it poses an immediate risk to health
- A communication plan for inform NCBC and NRW of the outage, running and air quality monitoring data.

TABLE 5.5: MODELLED MAXIMUM CONCENTRATIONS OF EMERGENCY OUTAGE SCENARIOS ( $\mu\text{g}/\text{m}^3$ )

Averaging Period	AQS/EAL/AEGL	Baseline	Scenario	Highest PC	PEC	PC as % of AQS	PEC as % of AQS	Significance	
<b>Emergency Outage Scenarios of CWL11, all engines running, 100% load</b>									
NO 1-hour	EAL	4,400	5.14	1 hour	17071	17076	388%	388%	Potentially Significant
				72 hour					
NO annual mean	EAL	310	2.57	1 hour	0.0298	2.60	0.0096%	0.84%	Insignificant
				72 hour					
NO <sub>2</sub> 1-hour	AQS 1-hour	200	23.8	1 hour	10026	10050	5013%	5025%	Potentially Significant
				72 hour					
	AQS 1-hour 19 <sup>th</sup> highest	200	23.8	1 hour	4075	4099	2038%	2050%	Potentially Significant
				72 hour					
NO <sub>2</sub> annual mean	AQS	40	11.9	1 hour	0.107	12.0	0.27%	30%	Insignificant
				72 hour					
NO <sub>2</sub> 10-minute	AEGL-1	940	23.8	1 hour	16357	16381	1740%	1743%	Potentially Significant
				72 hour					
	AEGL-2	38,000	23.8	1 hour	16357	16381	43%	43%	Insignificant
				72 hour					
	AEGL-3	64,000	23.8	1 hour	16357	16381	26%	26%	Insignificant
				72 hour					
NO <sub>2</sub> 30-minute	AEGL-1	940	23.8	1 hour	11843	11866	1260%	1262%	Potentially Significant
				72 hour					
	AEGL-2	28,000	23.8	1 hour	11843	11866	31%	31%	Insignificant
				72 hour					

Averaging Period	AQS/EAL/AEGL		Baseline	Scenario	Highest PC	PEC	PC as % of AQS	PEC as % of AQS	Significance
	AEGL-3	47,000	23.8	1 hour	11843	11866	19%	19%	Insignificant
				72 hour					
NO <sub>2</sub> 1-hour	AEGL-1	940	23.8	1 hour	10026	10050	1067%	1069%	Potentially Significant
				72 hour					
	AEGL-2	23,000	23.8	1 hour	10026	10050	44%	44%	Insignificant
				72 hour					
	AEGL-3	38,000	23.8	1 hour	10026	10050	26%	26%	Insignificant
				72 hour					
NO <sub>2</sub> 4-hour	AEGL-1	940	23.8	1 hour	966	989	103%	105%	Potentially Significant
				72 hour	3862	3886	411%	413%	Potentially Significant
	AEGL-2	15,000	23.8	1 hour	966	989	6.4%	6.6%	Insignificant
				72 hour	3862	3886	26%	26%	Insignificant
	AEGL-3	23,000	23.8	1 hour	966	989	4.2%	4.3%	Insignificant
				72 hour	3862	3886	17%	17%	Insignificant
NO <sub>2</sub> 8-hour	AEGL-1	940	23.8	1 hour	307	331	33%	35%	Insignificant
				72 hour	2460	2484	262%	264%	Potentially Significant
	AEGL-2	13,000	23.8	1 hour	307	331	2.4%	2.5%	Insignificant
				72 hour	2460	2484	19%	19%	Insignificant
	AEGL-3	21,000	23.8	1 hour	307	331	1.5%	1.6%	Insignificant
				72 hour	2460	2484	12%	12%	Insignificant
<b>Emergency Outage Scenarios of CWL12, all engines running, 100% load</b>									
NO 1-hour	EAL	4,400	5.14	1 hour	5457	5462	124%	124%	Potentially Significant

Averaging Period	AQS/EAL/AEGL		Baseline	Scenario	Highest PC	PEC	PC as % of AQS	PEC as % of AQS	Significance
				72 hour					
NO annual mean	EAL	310	2.57	1 hour	0.00960	2.58	0.0031%	0.83%	Insignificant
				72 hour	0.691	3.26	0.22%	1.1%	Insignificant
NO <sub>2</sub> 1-hour	AQS 1-hour	200	23.8	1 hour	1477	1500	738%	750%	Potentially Significant
				72 hour					
	AQS 1-hour 19 <sup>th</sup> highest	200	23.8	1 hour	885	909	443%	455%	Potentially Significant
				72 hour					
NO <sub>2</sub> annual mean	AQS	40	11.9	1 hour	0.0344	11.9	0.086%	30%	Insignificant
				72 hour	2.47	14.4	6.2%	36%	Insignificant
NO <sub>2</sub> 10-minute	AEGL-1	940	23.8	1 hour	5885	5909	626%	629%	Potentially Significant
				72 hour					
	AEGL-2	38,000	23.8	1 hour	5885	5909	15%	16%	Insignificant
				72 hour					
	AEGL-3	64,000	23.8	1 hour	5885	5909	9.2%	9.2%	Insignificant
				72 hour					
NO <sub>2</sub> 30-minute	AEGL-1	940	23.8	1 hour	2302	2326	245%	247%	Potentially Significant
				72 hour					
	AEGL-2	28,000	23.8	1 hour	2302	2326	6.1%	6.1%	Insignificant
				72 hour					
	AEGL-3	47,000	23.8	1 hour	2302	2326	3.6%	3.6%	Insignificant
				72 hour					
NO <sub>2</sub> 1-hour	AEGL-1	940	23.8	1 hour	1477	1500	157%	160%	Potentially Significant



Averaging Period	AQS/EAL/AEGL		Baseline	Scenario	Highest PC	PEC	PC as % of AQS	PEC as % of AQS	Significance
				72 hour					
	AEGL-2	23,000	23.8	1 hour	1477	1500	6.4%	6.5%	Insignificant
				72 hour					
	AEGL-3	38,000	23.8	1 hour	1477	1500	3.9%	3.9%	Insignificant
				72 hour					
	NO <sub>2</sub> 4-hour	AEGL-1	940	23.8	1 hour	126	150	13%	16%
72 hour					506	529	54%	56%	Insignificant
AEGL-2		15,000	23.8	1 hour	126	150	0.8%	1.0%	Insignificant
				72 hour	506	529	3.4%	3.5%	Insignificant
AEGL-3		23,000	23.8	1 hour	126	150	0.55%	0.65%	Insignificant
				72 hour	506	529	2.2%	2.3%	Insignificant
NO <sub>2</sub> 8-hour	AEGL-1	940	23.8	1 hour	48.1	71.9	5.1%	7.6%	Insignificant
				72 hour	385	408	41%	43%	Insignificant
	AEGL-2	13,000	23.8	1 hour	48.1	71.9	0.37%	0.55%	Insignificant
				72 hour	385	408	3.0%	3.1%	Insignificant
	AEGL-3	21,000	23.8	1 hour	48.1	71.9	0.23%	0.34%	Insignificant
				72 hour	385	408	1.8%	1.9%	Insignificant

Averaging Period	AQS/EAL/AEGL		Baseline	Scenario	Highest PC	PEC	PC as % of AQS	PEC as % of AQS	Significance
<b>Emergency Outage Scenarios of CWL11/12/13, all engines running, 100% load</b>									
NO 1-hour	EAL	4,400	5.14	1 hour	22197	22202	504%	505%	Potentially Significant
				72 hour					
NO annual mean	EAL	310	2.57	1 hour	0.0414	2.61	0.013%	0.84%	Insignificant
				72 hour	2.98	5.55	0.96%	1.8%	Insignificant
NO <sub>2</sub> 1-hour	AQS 1-hour	200	23.8	1 hour	11089	11113	5544%	5556%	Potentially Significant
				72 hour					
	AQS 1-hour 19 <sup>th</sup> highest	200	23.8	1 hour	5457	5481	2728%	2740%	Potentially Significant
				72 hour					
NO <sub>2</sub> annual mean	AQS	40	11.9	1 hour	0.148	12.1	0.37%	30%	Insignificant
				72 hour	10.7	22.6	27%	56%	Insignificant
NO <sub>2</sub> 10-minute	AEGL-1	940	23.8	1 hour	20813	20837	2214%	2217%	Potentially Significant
				72 hour					
	AEGL-2	38,000	23.8	1 hour	20813	20837	55%	55%	Insignificant
				72 hour					
	AEGL-3	64,000	23.8	1 hour	20813	20837	33%	33%	Insignificant
				72 hour					
NO <sub>2</sub> 30-minute	AEGL-1	940	23.8	1 hour	13663	13687	1454%	1456%	Potentially Significant
				72 hour					
	AEGL-2	28,000	23.8	1 hour	13663	13687	36%	36%	Insignificant
				72 hour					
	AEGL-3	47,000	23.8	1 hour	13663	13687	21%	21%	Insignificant

Averaging Period	AQS/EAL/AEGL		Baseline	Scenario	Highest PC	PEC	PC as % of AQS	PEC as % of AQS	Significance
				72 hour					
NO <sub>2</sub> 1-hour	AEGL-1	940	23.8	1 hour	11089	11113	1180%	1182%	Potentially Significant
				72 hour					
	AEGL-2	23,000	23.8	1 hour	11089	11113	48%	48%	Insignificant
				72 hour					
	AEGL-3	38,000	23.8	1 hour	11089	11113	29%	29%	Insignificant
				72 hour					
NO <sub>2</sub> 4-hour	AEGL-1	940	23.8	1 hour	1441	1465	153%	156%	Potentially Significant
				72 hour					
	AEGL-2	15,000	23.8	1 hour	1441	1465	10%	10%	Insignificant
				72 hour					
	AEGL-3	23,000	23.8	1 hour	1441	1465	6.3%	6.4%	Insignificant
				72 hour					
NO <sub>2</sub> 8-hour	AEGL-1	940	23.8	1 hour	471	495	50%	53%	Insignificant
				72 hour					
	AEGL-2	13,000	23.8	1 hour	471	495	3.6%	3.8%	Insignificant
				72 hour					
	AEGL-3	21,000	23.8	1 hour	471	495	2.2%	2.4%	Insignificant
				72 hour					

### 5.3.2.2 POTENTIAL IMPACT OF EMERGENCY OUTAGE SCENARIOS ON ECOLOGY

The potential impact of NO<sub>x</sub> emissions, nitrogen and acid deposition resulting from the two emergency scenarios at the Site on the surrounding ecological designated sites located within 10 km has been assessed. The modelled results were compared against the AQS and CL presented in Table 2.1. The criteria outlined in Table 2.4 were used to determine the significance of the potential impact. The NO<sub>x</sub> emissions resulting from the two emergency scenarios at the Site on the non-statutory ecological sites within 2 km have also been assessed.

#### Ambient NO<sub>x</sub> emissions

The modelled results for the 24-hour and annual NO<sub>x</sub> from the Site's 1 hour and 72 hour emergency outage scenarios are presented in Appendix C and show the following:

- The 24-hour NO<sub>x</sub> PC in the case of 1 hour and 72 hours emergency outage scenarios of CWL11 and CWL12 (Table C 5 and Table C 6) are modelled to be >10% of the 24-hour maximum CL at some of the identified ecological designated sites located within 10 km of the Site. The River Usk SAC is modelled to have the highest modelled 24-hour NO<sub>x</sub> among all the designated sites due to its proximity to the Site.
- The annual NO<sub>x</sub> PC in the case of a 1 hour emergency outage scenario of CWL11 and CWL12 (Table C 7) is not modelled to be >1% of the annual mean CL at any identified ecological designated sites located within 10 km of the Site. However, in the case of a 72 hour emergency outage scenario of CWL11 and (Table C 8), the modelling suggest that the annual NO<sub>x</sub> PC may be >1% of the annual mean CL at some of the identified ecological designated sites located within 10 km of the Site. The River Usk SAC is modelled to have the highest annual NO<sub>x</sub> among all the designated sites due to its proximity to the Site.

The modelled results for the 24-hour and annual NO<sub>x</sub> at the non-statutory ecological sites within 2 km from the Site's emergency outage scenarios are presented in 0 and show the following:

- In the case of 1 hour emergency outage scenario of CWL11 and CWL12 (Table D 3), the 24-hour mean NO<sub>x</sub> PC is below 100% of the critical level for short-term concentrations and is considered insignificant. In the case of the 72 hour emergency outage scenario of CWL11 and CWL12 (Table D 5), the 24-hour mean NO<sub>x</sub> PC exceeds 100% of the critical level for short-term concentrations at some non-statutory sites. The results are expected to be the highest at Celtic Spring (SINC) due to its proximity to the Site. .
- The annual mean NO<sub>x</sub> PC in the case of 1 hour and 72 hours emergency outage scenarios of CWL11 and CWL12 (Table D 4 and Table D 6) are below 100% of the critical level for long-term concentrations and are considered insignificant.

#### Nitrogen and Acid Deposition

The nitrogen deposition and acid deposition were modelled using AQTAG06 guidance<sup>23</sup>, based on the annual mean NO<sub>x</sub> concentrations of 1 hour emergency outage scenario and 72 hour emergency outage scenario presented in Table C 7 and Table C 8. The modelled results for the nitrogen deposition from the Site's 1 hour and 72 hour emergency outage scenarios are presented in Appendix C (see Table C 9 and Table C 10), and acid deposition from the Site's

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<sup>23</sup> Habitats Directive, 2014, AQTAG06 Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air, <http://bailey.persona-pi.com/Public-Inquiries/A465-English/8%20Air%20Quality/8.2.2%20-%20AQTAG06%20Technical%20Guidance%20Assessment%20emissions%20to%20air%20Mar2014.pdf>

1hour and 72 hours emergency outage scenarios are presented in Appendix C (see Table C 11 and Table C 12), showing the following:

- Potential impacts from the 1 hour emergency outage scenario of CWL11 and CWL12 on nitrogen and acid deposition are expected to be insignificant at any of the identified ecological designated sites located within 10 km of the Site.
- Potential impacts from the 72 hours emergency outage scenario of CWL11 and CWL12 on nitrogen deposition are expected to be insignificant at most of the sites, except Gwent Levels St Brides (SSSI), Rumney Gwent Levels (SSSI) and River Usk (SAC), where modelled results show the potential impact could be significant. Actual impacts on ecology are unlikely due to the rare occurrence of sustained power outages.

## 6. IN-COMBINATION ASSESSMENT

An in-combination assessment has been carried out to evaluate the potential cumulative impacts on ecological receptors, particularly the statutory ecological sites, from existing installations and applications for other installations near the CWL11/12 data centre. As requested by NRW, the in-combination assessment considers the following installations using publicly available information:

- Newport Hyperscale Data Centre operated by Microsoft (application reference PAN-026552), located 350 m west; and
- Newport Semiconductor Facility operated by IQE Silicon Compounds (application reference PAN-024249), located 100 m south; and
- Energy Recovery Facility (ERF) operated by Vital Energi Ltd (application reference PAN-027048), located 3.1 km northeast.

The in-combination assessment first identifies whether the modelled pollution footprint of these facilities overlap with that from the Site. If overlap is anticipated, the potential combined impact is calculated by adding the applicable PC results from the Site and the identified nearby facilities. The combined operations of the Site and the identified nearby datacentre facilities also undertaking testing operations has been evaluated based upon the anticipated total cumulative impacts of all tests undertaken, assuming coincident operation for a conservative basis.

The potential cumulative impacts of ambient NO<sub>x</sub>, nutrient nitrogen deposition and acid deposition have been assessed in relation to the statutory ecological sites (i.e. SSSI, SAC and SPA) specified in Table 4.5. The combined PC results are presented in Appendix E and were compared against the EA significance criteria outlined in Table 2.4. The in-combination assessment of the testing operations for the identified facilities shows the following:

- Annual mean NO<sub>x</sub>: Potentially significant impacts may occur at River Usk (SAC, SSSI) and Severn Estuary (SAC, SPA, SSSI) however the expected contribution from the Site would be a very low percentage of the overall PC (i.e. 2.6% of the total PC at River Usk and 0.12% of the total PC at Severn Estuary). The ERF is the largest expected contributor to this impact as it is assumed to operate continuously at full load throughout the year.
- 24-hour mean NO<sub>x</sub>: Potentially significant impacts may occur at River Usk (SAC, SSSI) and Gwent Level St Brides (SSSI), primarily due to generator testing emissions from the Site and the adjacent Newport Hyperscale data centre, respectively, based on EA significance criteria of 10% of the critical level. However, the calculated 24-hour PEC remains less than the critical level. These two ecological sites have relatively high baseline levels of NO<sub>x</sub> and are close to the two data centres. Significant ecological impacts are, however, considered unlikely in practice as this would require actual coincident testing operations at CWL11/12/13 and Newport Hyperscale, which is unlikely as testing is both infrequent and of short duration, and would also require this testing to be during unfavourable meteorological conditions.
- Nutrient nitrogen deposition: Potentially significant impacts may occur at River Usk (SAC, SSSI) and Gwent Level St Brides (SSSI), with the overall in-combination modelled PC exceeding 1% of the critical loads. However the expected percentage contribution to the PC from the Site is relatively low (i.e. 3.1% of the total PC at River Usk and 1.1% of the

total PC at Gwent Level St Brides). The ERF emissions are the expected primary contributor, given its assumed continuous operation at full load.

- Acid deposition: Individual modelled PCs for the Site and the adjacent Newport Hyperscale data centre are a very low percentage of the critical loads at all ecological sites assessed. For sites that were assessed for the ERF (Newport Wetlands SSSI and Severn Estuary SAC, SPA, SSSI) this project (the ERF) showed the largest PC percentages. Significant impacts are not expected at any of the ecological sites considered. Further detailed assessment of acid deposition is not considered necessary due to the low PC values relative to critical loads for sulphur and nitrogen. Additionally, there is limited data available to fully assess acid deposition across the sites.

In summary, the annual mean NO<sub>x</sub> is driven mainly by expected emissions from the ERF, and the Site will contribute a very small percentage to the total PC. For the 24-hour mean NO<sub>x</sub>, the in-combination impact is considered potentially significant based on EA significance criteria of 10% of the critical level, however it is below the critical level. The expected nutrient nitrogen deposition and acid deposition are driven mainly by the ERF.

## 7. CONCLUSION

A detailed AQIA has been carried out to support the application for a variation to the current EP for CWL11/12 data centre. An air dispersion model has been used to assess the potential air quality impacts of the Site's emissions during the routine testing regime and two emergency scenarios in relation to human health and ecology. The assessment envisages the following proposed changes: installation of 71 new generators with changes of engine models, abatement arrangements, and the removal of load constraint. It also considers the potential impacts from the Site independently and cumulatively with the nearby CWL13 data centre.

The key findings of the AQIA are:

- The screening assessment for potential PM<sub>10</sub> emissions from the generators concluded that the 24-hour PM<sub>10</sub> AQS of 50 µg/m<sup>3</sup> is not expected to be breached.
- The screening assessment for SO<sub>2</sub> emissions from the generators concluded that the 1-hour SO<sub>2</sub> AQS of 350 µg/m<sup>3</sup> is not expected to be breached.
- NH<sub>3</sub> emissions were not assessed as, based on supplier data, ammonia slip from the SCR abatement on engines is not expected.
- The assessment of potential impact of NO<sub>x</sub> emissions on human health and ecology resulting from the modelled testing regime of CWL11, CWL12 and for CWL11/12/13 combined shows that:
  - The quarterly testing of single generators at the Site is not modelled to result in a significant impact on air quality at any of the sensitive human receptors by comparison with relevant EAL, AQS and AEGLs guideline thresholds. No significant impacts are anticipated.
  - The black building test of generators in groups at the Site is modelled to exceed the 1-hour NO<sub>2</sub> AQS and 10-minute NO<sub>2</sub> AEGL-1 threshold. It is unlikely that this testing has the potential to breach the AQS per year, given that a breach requires more than 18 exceedances in a year and the total duration of black building testing will be 14.5 hours in a year.
  - The modelling is intentionally conservative in its choice of meteorological data and the possibility of the black building test actually coinciding with the least favourable meteorological conditions assumed is highly unlikely. Therefore, potential exceedance of the 10-minute AEGL-1 threshold is considered unlikely in practice. VDC proposes to undertake ambient monitoring during testing to verify that the AEGL-1 threshold is not exceeded at the Site.
  - With reference to the ecological designated sites located within 10 km of the Site, the modelled impacts of ambient 24-hour NO<sub>x</sub>, ambient annual NO<sub>x</sub>, nitrogen and acid deposition from the testing regime of the Site are considered insignificant.
- The potential impact of NO<sub>x</sub> emissions on human health and ecology resulting from the modelled two emergency outage scenarios of CWL11, CWL12 and all of CWL11/12/13 have been modelled with results as follows:
  - In both scenarios, an exceedance of the 1-hour NO<sub>2</sub> AQS is modelled to occur; whether the standard would be breached would depend on the duration of operations. For the 1 hour scenario, this would require 19 outage events, which is considered very unlikely in

a year. Total outage time up to 72 hours a year is even less likely and therefore the risk of breaching the 1-hour NO<sub>2</sub> AQS is considered very low in practice.

- AEGL-1 thresholds are modelled to be exceeded in either emergency scenario. Again, the intentional conservatism in the modelling means that this exceedance may not occur in practice. VDC will action its AQMP in the event of a sustained outage and will work with relevant authorities to manage the event.
- In the case of a 1 hour emergency scenario, significant impacts on the ambient 24-hour NO<sub>x</sub> are modelled, but no significant impacts on the annual mean NO<sub>x</sub>, nitrogen and acid deposition are expected. In the case of a 72 hour emergency scenario, there may potentially be significant impacts on the ambient 24-hour and annual mean NO<sub>x</sub>, nitrogen and acid deposition at designated ecological sites in close proximity to the Site. Again, either scenario, but especially the 72 hour scenario, are considered unlikely to occur in practice.
- An in-combination assessment has been carried out to evaluate the potential cumulative impacts on ecological receptors from the Site and other installations nearby. The in-combination assessment has shown that the annual mean NO<sub>x</sub> is driven mainly by expected emissions from an Energy Recovery Facility, and the Site will contribute a very small percentage to the total PC. For the 24-hour mean NO<sub>x</sub>, the in-combination impact is considered potentially significant based on EA significance criteria of 10% of the critical level, however it is below the critical level. The expected nutrient nitrogen deposition and acid deposition are driven mainly by the ERF.



## APPENDIX A MODEL PARAMETERS

FIGURE A 1 MODELLED AREA



FIGURE A 2 MODELLED BUILDINGS LOCATIONS

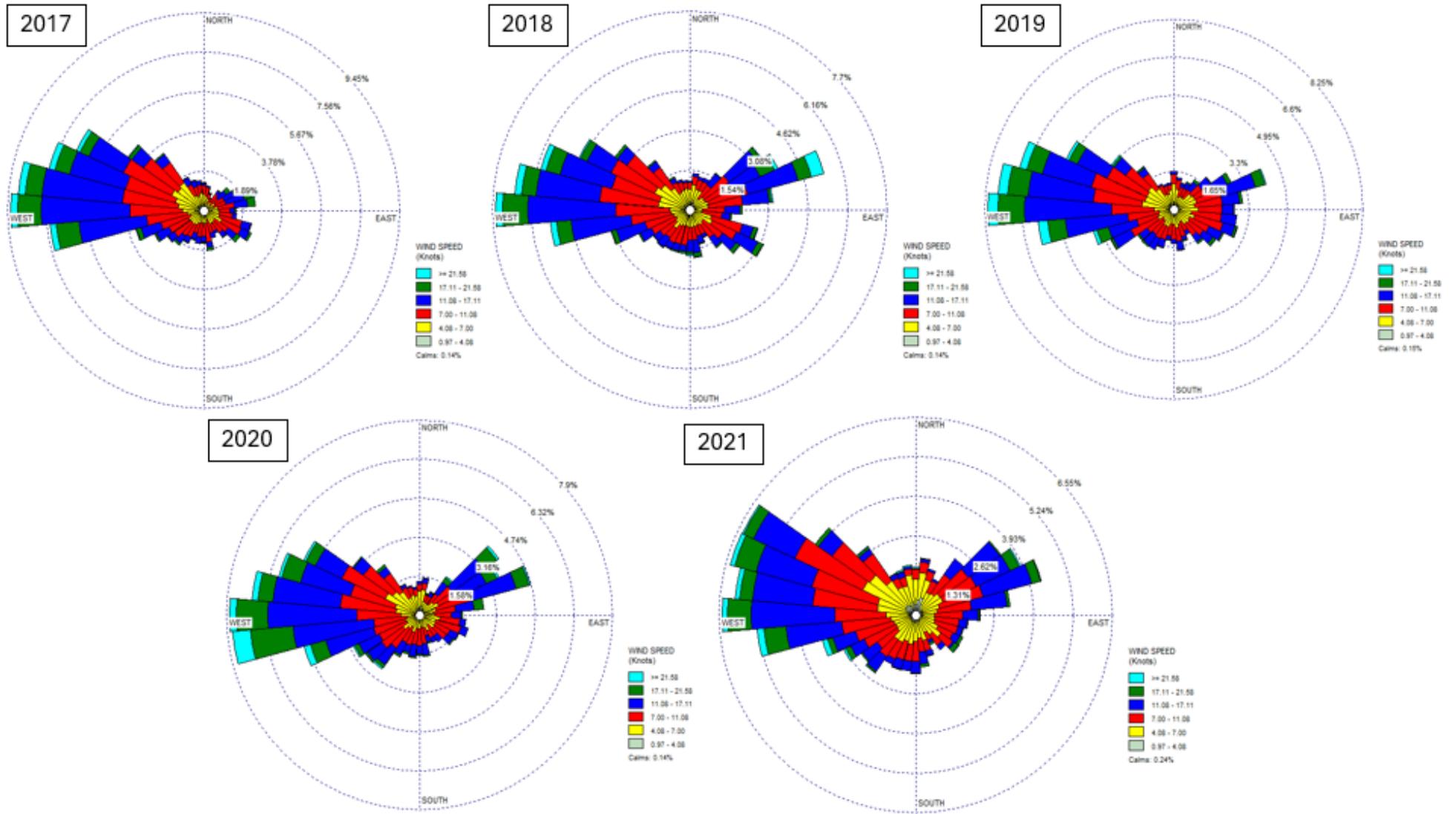


TABLE A 1 MODELLED BUILDINGS HEIGHTS

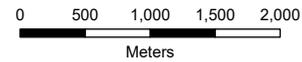
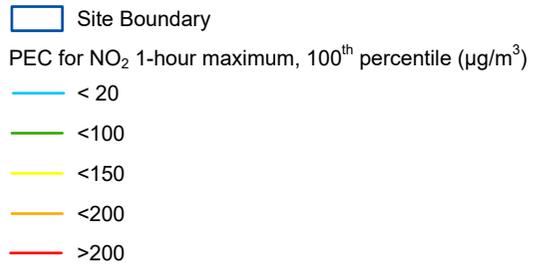
Building	Height (m)
CWL11	23.5
CWL12	24.1

<b>Building</b>	<b>Height (m)</b>
CWL13	20.2
IQE	17.6

FIGURE A 3 WIND ROSE DATA FROM CARDIFF AIRPORT MET STATION (2017-2021)



## APPENDIX B CONTOUR PLOTS



**Figure A1**  
**PEC for NO<sub>2</sub> 1-hour maximum, 100<sup>th</sup> percentile (µg/m<sup>3</sup>) - Black Building Test CWL11**

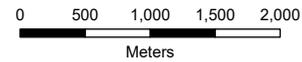
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 SIZE: A4  
 PROJECT: 0724643  
 DATE: 10/07/2024

VERSION: A01  
 DRAWN: RW  
 CHECKED: CW  
 APPROVED: KR





- Site Boundary
- PEC for NO<sub>2</sub> 1-hour maximum, 100<sup>th</sup> percentile (µg/m<sup>3</sup>)
- < 20
- < 100
- < 150
- < 200
- > 200

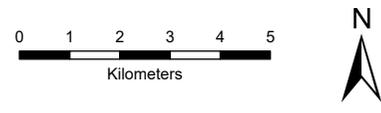
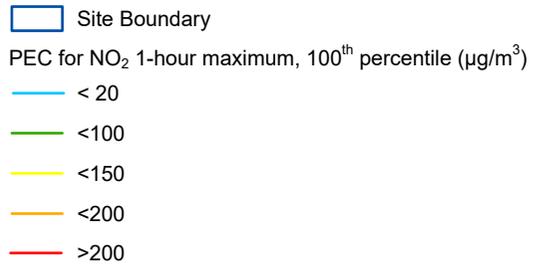
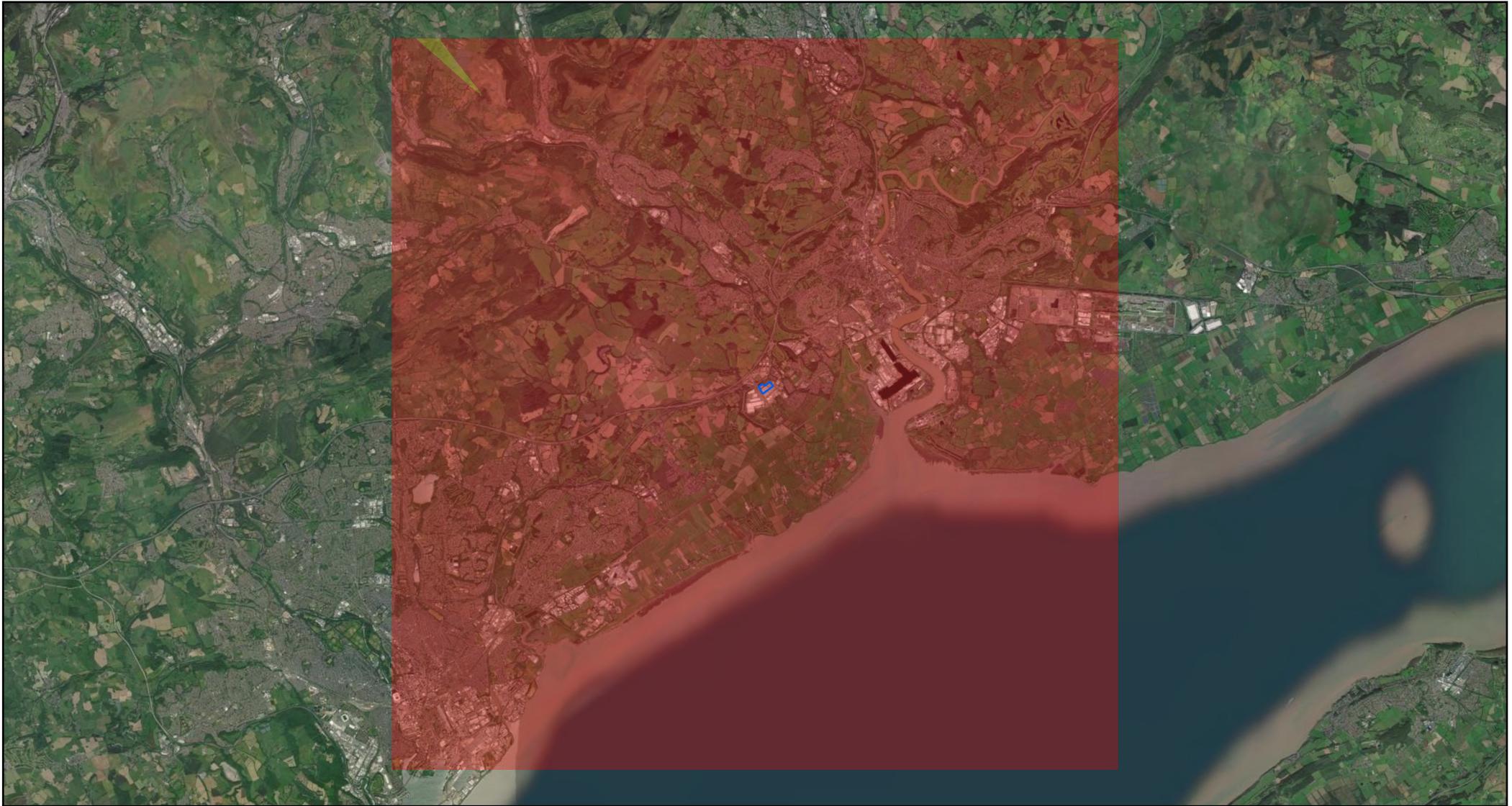


**Figure A2**  
**PEC for NO<sub>2</sub> 1-hour maximum, 100<sup>th</sup> percentile (µg/m<sup>3</sup>) - Black Building Test CWL12**

SCALE: See Scale Bar  
 SIZE: A4  
 PROJECT: 0724643  
 DATE: 10/07/2024

VERSION: A01  
 DRAWN: RW  
 CHECKED: CW  
 APPROVED: KR



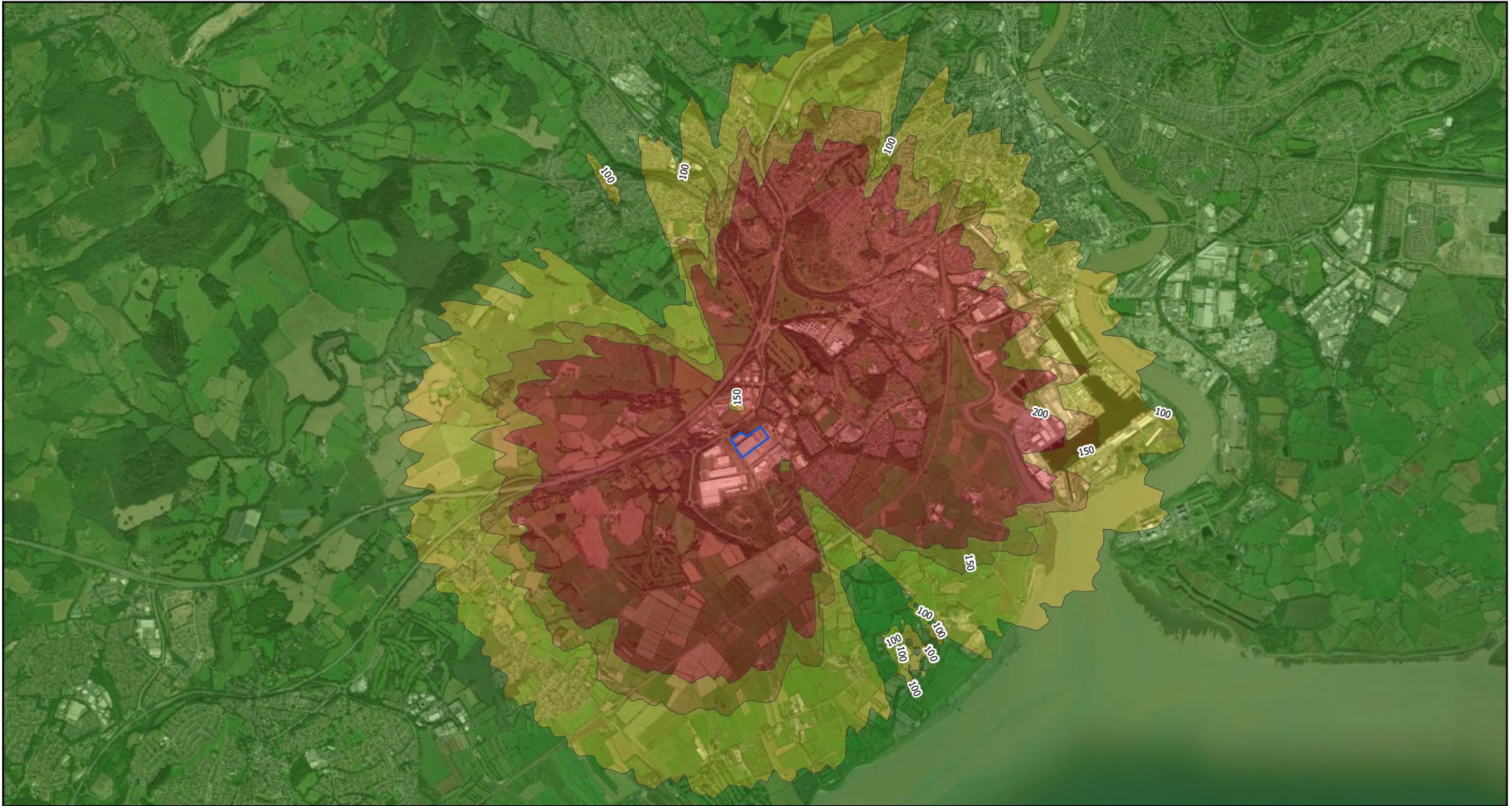


**Figure A3**  
 PEC for NO<sub>2</sub> 1-hour maximum, 100<sup>th</sup> percentile (µg/m<sup>3</sup>) - Emergency Scenario CWL11

SCALE: See Scale Bar	VERSION: A01
SIZE: A4	DRAWN: RW
PROJECT: 0724643	CHECKED: CW
DATE: 10/07/2024	APPROVED: KR



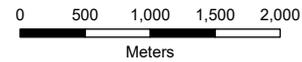
PROJECTION: British National Grid



 Site Boundary

PEC for NO<sub>2</sub> 1-hour maximum, 100<sup>th</sup> percentile (µg/m<sup>3</sup>)

-  < 20
-  <100
-  <150
-  <200
-  >200

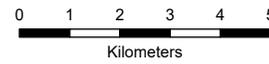
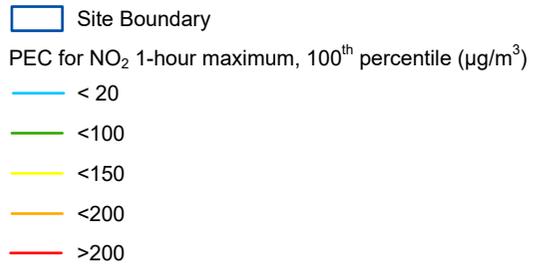


**Figure A4**  
**PEC for NO<sub>2</sub> 1-hour maximum, 100<sup>th</sup> percentile (µg/m<sup>3</sup>) - Emergency Scenario CWL12**

SCALE: See Scale Bar  
 SIZE: A4  
 PROJECT: 0724643  
 DATE: 10/07/2024

VERSION: A01  
 DRAWN: RW  
 CHECKED: CW  
 APPROVED: KR





**Figure A5**  
**PEC for NO<sub>2</sub> 1-hour maximum, 100<sup>th</sup>**  
**percentile (µg/m<sup>3</sup>) - Emergency Scenario**  
**all in-combined**

SCALE: See Scale Bar  
 SIZE: A4  
 PROJECT: 0724643  
 DATE: 10/07/2024

VERSION: A01  
 DRAWN: RW  
 CHECKED: CW  
 APPROVED: KR



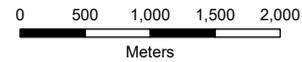
PROJECTION: British National Grid



 Site Boundary

PEC for NO<sub>2</sub> 1-hour maximum, 100<sup>th</sup> percentile (µg/m<sup>3</sup>)

-  <0.4
-  <4
-  <40
-  >40

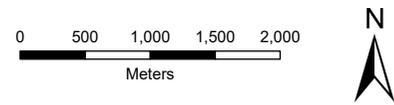
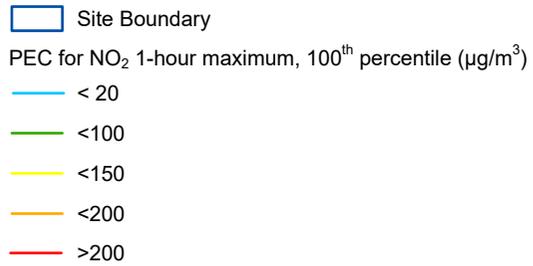


**Figure A6**  
**PC for NO<sub>2</sub> annual mean (µg/m<sup>3</sup>) -**  
**Emergency Scenario all in-combined**

SCALE: See Scale Bar  
 SIZE: A4  
 PROJECT: 0724643  
 DATE: 10/07/2024

VERSION: A01  
 DRAWN: RW  
 CHECKED: CW  
 APPROVED: KR





**Figure A7**  
**PC for NO<sub>x</sub> 24-hour maximum, 100<sup>th</sup> percentile (µg/m<sup>3</sup>) - Emergency Scenario all in-combined**

SCALE: See Scale Bar  
 SIZE: A4  
 PROJECT: 0724643  
 DATE: 10/07/2024

VERSION: A01  
 DRAWN: RW  
 CHECKED: CW  
 APPROVED: KR



PROJECTION: British National Grid

## APPENDIX C MODELLED RESULTS OF THE POTENTIAL IMPACT ON ECOLOGY

TABLE C 1: MODELLED MAXIMUM 24-HOUR MEAN NO<sub>x</sub> CONCENTRATIONS – TESTING REGIME (µg/m<sup>3</sup>)

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
<b>Quarterly test of CWL11/12/13</b>							
Severn Estuary (SSSI)	200	52.2	0.453	0.23%	52.6	26%	Insignificant
Severn Estuary (SAC)		52.2	0.311	0.16%	52.5	26%	Insignificant
Severn Estuary (SPA)		52.2	0.453	0.23%	52.6	26%	Insignificant
Gwent Levels St Brides (SSSI)		36.8	2.71	1.4%	39.5	20%	Insignificant
Gwent Levels Rumney (SSSI)		37.3	0.369	0.18%	37.6	19%	Insignificant
River Usk (SSSI)		43.9	0.265	0.13%	44.2	22%	Insignificant
River Usk (SAC)		43.9	7.50	3.8%	51.4	26%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		30.5	0.0924	<0.01%	30.6	15%	Insignificant
Coed-y-Darren (SSSI)		17.6	0.0780	0.039%	17.7	8.9%	Insignificant
Dan y Graig Quarry Risca (SSSI)		22.6	0.000	<0.01%	22.6	11%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		25.7	0.143	0.072%	25.8	13%	Insignificant
Gwent Levels - Whitson (SSSI)		18.3	0.105	0.052%	18.4	9.2%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		22.1	0.260	0.13%	22.3	11%	Insignificant
Henllys Bog (SSSI)		17.5	0.0676	0.034%	17.5	8.8%	Insignificant
Lisvane Reservoir (SSSI)		30.4	0.0867	0.043%	30.5	15%	Insignificant
Plas Machen Wood (SSSI)		20.2	0.106	0.053%	20.3	10%	Insignificant
Rhymney River Section (SSSI)		41.9	0.110	0.055%	42.0	21%	Insignificant
Rumney Quarry (SSSI)		36.8	0.000	<0.01%	36.8	18%	Insignificant
Ruperra Castle and Woodlands (SSSI)		19.8	0.119	0.059%	19.9	10%	Insignificant

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
<b>Black building test of CWL11/12/13</b>							
Severn Estuary (SSSI)	200	52.2	0.528	0.26%	52.7	26%	Insignificant
Severn Estuary (SAC)		52.2	0.423	0.21%	52.6	26%	Insignificant
Severn Estuary (SPA)		52.2	0.528	0.26%	52.7	26%	Insignificant
Gwent Levels St Brides (SSSI)		36.8	3.65	1.8%	40.4	20%	Insignificant
Gwent Levels Rumney (SSSI)		37.3	0.488	0.24%	37.8	19%	Insignificant
River Usk (SSSI)		43.9	0.357	0.18%	44.3	22%	Insignificant
River Usk (SAC)		43.9	14.4	7.2%	58.3	29%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		30.5	0.131	0.066%	30.6	15%	Insignificant
Coed-y-Darren (SSSI)		17.6	0.109	0.055%	17.7	8.9%	Insignificant
Dan y Graig Quarry Risca (SSSI)		22.6	0.000	<0.01%	22.6	11%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		25.7	0.200	0.10%	25.9	13%	Insignificant
Gwent Levels - Whitson (SSSI)		18.3	0.150	0.075%	18.4	9.2%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		22.1	0.324	0.16%	22.4	11%	Insignificant
Henllys Bog (SSSI)		17.5	0.0989	0.049%	17.6	8.8%	Insignificant
Lisvane Reservoir (SSSI)		30.4	0.125	0.062%	30.5	15%	Insignificant
Plas Machen Wood (SSSI)		20.2	0.141	0.070%	20.3	10%	Insignificant
Rhymney River Section (SSSI)		41.9	0.148	0.074%	42.0	21%	Insignificant
Rumney Quarry (SSSI)		36.8	0.000	<0.01%	36.8	18%	Insignificant
Ruperra Castle and Woodlands (SSSI)		19.8	0.165	0.083%	19.9	10%	Insignificant

TABLE C 2: MODELLED ANNUAL MEAN NO<sub>x</sub> CONCENTRATIONS – TESTING REGIME (µg/m<sup>3</sup>)

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
<b>Testing Regime – All tests of CWL11</b>							
Severn Estuary (SSSI)	30	26.1	4.06x10 <sup>-04</sup>	<0.01%	26.1	87%	Insignificant
Severn Estuary (SAC)		26.1	1.91x10 <sup>-04</sup>	<0.01%	26.1	87%	Insignificant
Severn Estuary (SPA)		26.1	4.06x10 <sup>-04</sup>	<0.01%	26.1	87%	Insignificant
Gwent Levels St Brides (SSSI)		18.4	3.74x10 <sup>-03</sup>	0.012%	18.4	61%	Insignificant
Gwent Levels Rumney (SSSI)		18.6	2.26x10 <sup>-04</sup>	<0.01%	18.6	62%	Insignificant
River Usk (SSSI)		22.0	2.99x10 <sup>-04</sup>	<0.01%	22.0	73%	Insignificant
River Usk (SAC)		22.0	0.0167	0.056%	22.0	73%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		15.2	4.75x10 <sup>-05</sup>	<0.01%	15.2	51%	Insignificant
Coed-y-Darren (SSSI)		8.81	2.83x10 <sup>-05</sup>	<0.01%	8.81	29%	Insignificant
Dan y Graig Quarry Risca (SSSI)		11.3	0.000	<0.01%	11.3	38%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		12.8	1.34x10 <sup>-04</sup>	<0.01%	12.8	43%	Insignificant
Gwent Levels - Whitson (SSSI)		9.14	7.46x10 <sup>-05</sup>	<0.01%	9.14	30%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		11.0	2.29x10 <sup>-04</sup>	<0.01%	11.0	37%	Insignificant
Henllys Bog (SSSI)		8.73	3.38x10 <sup>-05</sup>	<0.01%	8.73	29%	Insignificant
Lisvane Reservoir (SSSI)		15.2	4.58x10 <sup>-05</sup>	<0.01%	15.2	51%	Insignificant
Plas Machen Wood (SSSI)		10.1	5.33x10 <sup>-05</sup>	<0.01%	10.1	34%	Insignificant
Rhymney River Section (SSSI)		20.9	5.60x10 <sup>-05</sup>	<0.01%	20.9	70%	Insignificant
Rumney Quarry (SSSI)		18.4	0.000	<0.01%	18.4	61%	Insignificant
Ruperra Castle and Woodlands (SSSI)		9.88	4.90x10 <sup>-05</sup>	<0.01%	9.88	33%	Insignificant

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
<b>Testing Regime – All tests of CWL12</b>							
Severn Estuary (SSSI)	30	26.1	1.08x10 <sup>-04</sup>	<0.01%	26.1	87%	Insignificant
Severn Estuary (SAC)		26.1	5.14x10 <sup>-05</sup>	<0.01%	26.1	87%	Insignificant
Severn Estuary (SPA)		26.1	1.08x10 <sup>-04</sup>	<0.01%	26.1	87%	Insignificant
Gwent Levels St Brides (SSSI)		18.4	1.31x10 <sup>-03</sup>	<0.01%	18.4	61%	Insignificant
Gwent Levels Rumney (SSSI)		18.6	4.79x10 <sup>-05</sup>	<0.01%	18.6	62%	Insignificant
River Usk (SSSI)		22.0	8.03x10 <sup>-05</sup>	<0.01%	22.0	73%	Insignificant
River Usk (SAC)		22.0	7.98x10 <sup>-03</sup>	0.027%	22.0	73%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		15.2	1.26x10 <sup>-05</sup>	<0.01%	15.2	51%	Insignificant
Coed-y-Darren (SSSI)		8.81	7.34x10 <sup>-06</sup>	<0.01%	8.81	29%	Insignificant
Dan y Graig Quarry Risca (SSSI)		11.3	0.000	<0.01%	11.3	38%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		12.8	3.60x10 <sup>-05</sup>	<0.01%	12.8	43%	Insignificant
Gwent Levels - Whitson (SSSI)		9.14	2.02x10 <sup>-05</sup>	<0.01%	9.14	30%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		11.0	6.17x10 <sup>-05</sup>	<0.01%	11.0	37%	Insignificant
Henllys Bog (SSSI)		8.73	8.96x10 <sup>-06</sup>	<0.01%	8.73	29%	Insignificant
Lisvane Reservoir (SSSI)		15.2	1.21x10 <sup>-05</sup>	<0.01%	15.2	51%	Insignificant
Plas Machen Wood (SSSI)		10.1	1.39x10 <sup>-05</sup>	<0.01%	10.1	34%	Insignificant
Rhymney River Section (SSSI)		20.9	1.47x10 <sup>-05</sup>	<0.01%	20.9	70%	Insignificant
Rumney Quarry (SSSI)		18.4	0.000	<0.01%	18.4	61%	Insignificant
Ruperra Castle and Woodlands (SSSI)	9.88	1.28x10 <sup>-05</sup>	<0.01%	9.88	33%	Insignificant	

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
<b>Testing Regime – All tests of CWL11/12/13</b>							
Severn Estuary (SSSI)	30	26.1	5.81x10 <sup>-04</sup>	<0.01%	26.1	87%	Insignificant
Severn Estuary (SAC)		26.1	2.73x10 <sup>-04</sup>	<0.01%	26.1	87%	Insignificant
Severn Estuary (SPA)		26.1	5.81x10 <sup>-04</sup>	<0.01%	26.1	87%	Insignificant
Gwent Levels St Brides (SSSI)		18.4	6.05x10 <sup>-03</sup>	0.020%	18.4	61%	Insignificant
Gwent Levels Rumney (SSSI)		18.6	2.98x10 <sup>-04</sup>	<0.01%	18.6	62%	Insignificant
River Usk (SSSI)		22.0	4.28x10 <sup>-04</sup>	<0.01%	22.0	73%	Insignificant
River Usk (SAC)		22.0	0.0314	0.11%	22.0	73%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		15.2	6.67x10 <sup>-05</sup>	<0.01%	15.2	51%	Insignificant
Coed-y-Darren (SSSI)		8.81	3.93x10 <sup>-05</sup>	<0.01%	8.81	29%	Insignificant
Dan y Graig Quarry Risca (SSSI)		11.3	0.000	<0.01%	11.3	38%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		12.8	1.91x10 <sup>-04</sup>	<0.01%	12.8	43%	Insignificant
Gwent Levels - Whitson (SSSI)		9.14	1.07x10 <sup>-04</sup>	<0.01%	9.14	30%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		11.0	3.27x10 <sup>-04</sup>	<0.01%	11.0	37%	Insignificant
Henllys Bog (SSSI)		8.73	4.78x10 <sup>-05</sup>	<0.01%	8.73	29%	Insignificant
Lisvane Reservoir (SSSI)		15.2	6.44x10 <sup>-05</sup>	<0.01%	15.2	51%	Insignificant
Plas Machen Wood (SSSI)		10.1	7.44x10 <sup>-05</sup>	<0.01%	10.1	34%	Insignificant
Rhymney River Section (SSSI)		20.9	7.89x10 <sup>-05</sup>	<0.01%	20.9	70%	Insignificant
Rumney Quarry (SSSI)		18.4	0.000	<0.01%	18.4	61%	Insignificant
Ruperra Castle and Woodlands (SSSI)	9.88	6.87x10 <sup>-05</sup>	<0.01%	9.88	33%	Insignificant	

TABLE C 3: MODELLED NITROGEN DEPOSITION – TESTING REGIME (kgN/ha/yr)

Ecological Site Name	Type	Minimum CL	Background	PC	PC as % of CL	PEC	PEC as % of CL	Significance
<b>Testing Regime – All tests of CWL11</b>								
Severn Estuary (SSSI)	Grassland	10	12.8	2.84x10 <sup>-04</sup>	<0.01%	4.09x10 <sup>-05</sup>	128%	Insignificant
Severn Estuary (SAC)	Grassland	20	12.8	1.34x10 <sup>-04</sup>	<0.01%	1.93x10 <sup>-05</sup>	64%	Insignificant
Severn Estuary (SPA)	Grassland	10	12.8	2.84x10 <sup>-04</sup>	<0.01%	4.09x10 <sup>-05</sup>	128%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland	2 <sup>a</sup>	8.71	2.62x10 <sup>-03</sup>	0.0188%	3.77x10 <sup>-04</sup>	435%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland	2 <sup>a</sup>	8.32	1.58x10 <sup>-04</sup>	<0.01%	2.27x10 <sup>-05</sup>	416%	Insignificant
River Usk (SSSI)	Grassland	10	15.9	2.10x10 <sup>-04</sup>	<0.01%	3.01x10 <sup>-05</sup>	159%	Insignificant
River Usk (SAC)	Grassland	5	15.9	0.0117	0.0336%	1.68x10 <sup>-03</sup>	318%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	Grassland	2 <sup>a</sup>	11.1	3.32x10 <sup>-05</sup>	<0.01%	4.78x10 <sup>-06</sup>	555%	Insignificant
Coed-y-Darren (SSSI)	Grassland	2 <sup>a</sup>	16.5	1.98x10 <sup>-05</sup>	<0.01%	2.85x10 <sup>-06</sup>	826%	Insignificant
Dan y Graig Quarry Risca (SSSI)	Grassland	2 <sup>a</sup>	15.0	0.000	<0.01%	0.000	752%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland	2 <sup>a</sup>	8.58	9.35x10 <sup>-05</sup>	<0.01%	1.34x10 <sup>-05</sup>	429%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland	2 <sup>a</sup>	8.06	5.22x10 <sup>-05</sup>	<0.01%	7.51x10 <sup>-06</sup>	403%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland	10	8.88	1.61x10 <sup>-04</sup>	<0.01%	2.31x10 <sup>-05</sup>	89%	Insignificant
Henllys Bog (SSSI)	Woodland	2 <sup>a</sup>	13.7	2.37x10 <sup>-05</sup>	<0.01%	6.82x10 <sup>-06</sup>	685%	Insignificant
Lisvane Reservoir (SSSI)	Grassland	10	11.1	3.20x10 <sup>-05</sup>	<0.01%	4.61x10 <sup>-06</sup>	111%	Insignificant
Plas Machen Wood (SSSI)	Woodland	10	12.8	3.73x10 <sup>-05</sup>	<0.01%	1.07x10 <sup>-05</sup>	NA	Insignificant
Rhymney River Section (SSSI)	Grassland	2 <sup>a</sup>	9.72	3.92x10 <sup>-05</sup>	<0.01%	5.64x10 <sup>-06</sup>	486%	Insignificant
Rumney Quarry (SSSI)	Grassland	2 <sup>a</sup>	9.26	0.000	<0.01%	0.000	463%	Insignificant
Ruperra Castle and Woodlands (SSSI)	Woodland	2 <sup>a</sup>	13.2	3.43x10 <sup>-05</sup>	<0.01%	9.87x10 <sup>-06</sup>	658%	Insignificant

Ecological Site Name	Type	Minimum CL	Background	PC	PC as % of CL	PEC	PEC as % of CL	Significance
<b>Testing Regime – All tests of CWL12</b>								
Severn Estuary (SSSI)	Grassland	10	12.8	7.58x10 <sup>-05</sup>	<0.01%	1.09x10 <sup>-05</sup>	128%	Insignificant
Severn Estuary (SAC)	Grassland	20	12.8	3.59x10 <sup>-05</sup>	<0.01%	5.17x10 <sup>-06</sup>	64%	Insignificant
Severn Estuary (SPA)	Grassland	10	12.8	7.58x10 <sup>-05</sup>	<0.01%	1.09x10 <sup>-05</sup>	128%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland	2 <sup>a</sup>	8.71	9.16x10 <sup>-04</sup>	<0.01%	1.32x10 <sup>-04</sup>	435%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland	2 <sup>a</sup>	8.32	3.35x10 <sup>-05</sup>	<0.01%	4.82x10 <sup>-06</sup>	416%	Insignificant
River Usk (SSSI)	Grassland	10	15.9	5.62x10 <sup>-05</sup>	<0.01%	8.08x10 <sup>-06</sup>	159%	Insignificant
River Usk (SAC)	Grassland	5	15.9	5.59x10 <sup>-03</sup>	0.0161%	8.04x10 <sup>-04</sup>	318%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	Grassland	2 <sup>a</sup>	11.1	8.79x10 <sup>-06</sup>	<0.01%	1.27x10 <sup>-06</sup>	555%	Insignificant
Coed-y-Darren (SSSI)	Grassland	2 <sup>a</sup>	16.5	5.14x10 <sup>-06</sup>	<0.01%	7.39x10 <sup>-07</sup>	826%	Insignificant
Dan y Graig Quarry Risca (SSSI)	Grassland	2 <sup>a</sup>	15.0	0.000	<0.01%	0.000	752%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland	2 <sup>a</sup>	8.58	2.52x10 <sup>-05</sup>	<0.01%	3.63x10 <sup>-06</sup>	429%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland	2 <sup>a</sup>	8.06	1.42x10 <sup>-05</sup>	<0.01%	2.04x10 <sup>-06</sup>	403%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland	10	8.88	4.32x10 <sup>-05</sup>	<0.01%	6.21x10 <sup>-06</sup>	89%	Insignificant
Henllys Bog (SSSI)	Woodland	2 <sup>a</sup>	13.7	6.27x10 <sup>-06</sup>	<0.01%	1.80x10 <sup>-06</sup>	685%	Insignificant
Lisvane Reservoir (SSSI)	Grassland	10	11.1	8.48x10 <sup>-06</sup>	<0.01%	1.22x10 <sup>-06</sup>	111%	Insignificant
Plas Machen Wood (SSSI)	Woodland	10	12.8	9.75x10 <sup>-06</sup>	<0.01%	2.81x10 <sup>-06</sup>	NA	Insignificant
Rhymney River Section (SSSI)	Grassland	2 <sup>a</sup>	9.72	1.03x10 <sup>-05</sup>	<0.01%	1.48x10 <sup>-06</sup>	486%	Insignificant
Rumney Quarry (SSSI)	Grassland	2 <sup>a</sup>	9.26	0.000	<0.01%	0.000	463%	Insignificant
Ruperra Castle and Woodlands (SSSI)	Woodland	2 <sup>a</sup>	13.2	8.99x10 <sup>-06</sup>	<0.01%	2.59x10 <sup>-06</sup>	658%	Insignificant

Ecological Site Name	Type	Minimum CL	Background	PC	PC as % of CL	PEC	PEC as % of CL	Significance
<b>Testing Regime – All tests of CWL11/12/13</b>								
Severn Estuary (SSSI)	Grassland	10	12.8	4.07x10 <sup>-04</sup>	<0.01%	5.85x10 <sup>-05</sup>	128%	Insignificant
Severn Estuary (SAC)	Grassland	20	12.8	1.91x10 <sup>-04</sup>	<0.01%	2.75x10 <sup>-05</sup>	64%	Insignificant
Severn Estuary (SPA)	Grassland	10	12.8	4.07x10 <sup>-04</sup>	<0.01%	5.85x10 <sup>-05</sup>	128%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland	2 <sup>a</sup>	8.71	4.23x10 <sup>-03</sup>	0.0304%	6.09x10 <sup>-04</sup>	435%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland	2 <sup>a</sup>	8.32	2.09x10 <sup>-04</sup>	<0.01%	3.00x10 <sup>-05</sup>	416%	Insignificant
River Usk (SSSI)	Grassland	10	15.9	3.00x10 <sup>-04</sup>	<0.01%	4.31x10 <sup>-05</sup>	159%	Insignificant
River Usk (SAC)	Grassland	5	15.9	0.0220	0.0633%	3.17x10 <sup>-03</sup>	318%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	Grassland	2 <sup>a</sup>	11.1	4.67x10 <sup>-05</sup>	<0.01%	6.72x10 <sup>-06</sup>	555%	Insignificant
Coed-y-Darren (SSSI)	Grassland	2 <sup>a</sup>	16.5	2.75x10 <sup>-05</sup>	<0.01%	3.96x10 <sup>-06</sup>	826%	Insignificant
Dan y Graig Quarry Risca (SSSI)	Grassland	2 <sup>a</sup>	15.0	0.000	<0.01%	0.000	752%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland	2 <sup>a</sup>	8.58	1.33x10 <sup>-04</sup>	<0.01%	1.92x10 <sup>-05</sup>	429%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland	2 <sup>a</sup>	8.06	7.49x10 <sup>-05</sup>	<0.01%	1.08x10 <sup>-05</sup>	403%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland	10	8.88	2.29x10 <sup>-04</sup>	<0.01%	3.30x10 <sup>-05</sup>	89%	Insignificant
Henllys Bog (SSSI)	Woodland	2 <sup>a</sup>	13.7	3.35x10 <sup>-05</sup>	<0.01%	9.63x10 <sup>-06</sup>	685%	Insignificant
Lisvane Reservoir (SSSI)	Grassland	10	11.1	4.51x10 <sup>-05</sup>	<0.01%	6.48x10 <sup>-06</sup>	111%	Insignificant
Plas Machen Wood (SSSI)	Woodland	10	12.8	5.21x10 <sup>-05</sup>	<0.01%	1.50x10 <sup>-05</sup>	NA	Insignificant
Rhymney River Section (SSSI)	Grassland	2 <sup>a</sup>	9.72	5.53x10 <sup>-05</sup>	<0.01%	7.95x10 <sup>-06</sup>	486%	Insignificant
Rumney Quarry (SSSI)	Grassland	2 <sup>a</sup>	9.26	0.000	<0.01%	0.000	463%	Insignificant
Ruperra Castle and Woodlands (SSSI)	Woodland	2 <sup>a</sup>	13.2	4.81x10 <sup>-05</sup>	<0.01%	1.38x10 <sup>-05</sup>	658%	Insignificant

<sup>a</sup>: A minimum critical load of 2 was used for sites with no available critical loads from the APIS website as a worst case scenario.



TABLE C 4: MODELLED ACID DEPOSITION – TESTING REGIME (keq/ha/yr)

Ecological Site Name <sup>a</sup>	Type	Minimum CL	Background		PC	PC as % of CL	PEC	PEC as % of CL	Significance
			S	N					
<b>Testing Regime – All tests of CWL11</b>									
Severn Estuary (SSSI)	Grassland	Cf. <b>Table 2.3</b>	0.144	1.24	2.84x10 <sup>-04</sup>	<0.01%	2.92x10 <sup>-06</sup>	17%	Insignificant
Severn Estuary (SAC)	Grassland		0.144	1.24	1.34x10 <sup>-04</sup>	<0.01%	1.37x10 <sup>-06</sup>	17%	Insignificant
Severn Estuary (SPA)	Grassland		0.144	1.24	2.84x10 <sup>-04</sup>	<0.01%	2.92x10 <sup>-06</sup>	17%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland		0.208	0.975	2.62x10 <sup>-03</sup>	<0.01%	2.69x10 <sup>-05</sup>	197%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland		0.254	0.606	1.58x10 <sup>-04</sup>	<0.01%	1.62x10 <sup>-06</sup>	143%	Insignificant
River Usk (SSSI)	Grassland		0.301	2.58	2.10x10 <sup>-04</sup>	<0.01%	2.15x10 <sup>-06</sup>	219%	Insignificant
River Usk (SAC)	Grassland		0.301	2.58	1.17x10 <sup>-02</sup>	0.020%	1.20x10 <sup>-04</sup>	480%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland		0.155	0.942	9.35x10 <sup>-05</sup>	<0.01%	9.59x10 <sup>-07</sup>	183%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland		0.133	0.941	5.22x10 <sup>-05</sup>	<0.01%	5.36x10 <sup>-07</sup>	179%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland		0.155	0.918	1.61x10 <sup>-04</sup>	<0.01%	1.65x10 <sup>-06</sup>	3.9%	Insignificant
<b>Testing Regime – All tests of CWL12</b>									
Severn Estuary (SSSI)	Grassland	Cf. <b>Table 2.3</b>	0.144	1.24	7.58x10 <sup>-05</sup>	<0.01%	7.78x10 <sup>-07</sup>	17%	Insignificant
Severn Estuary (SAC)	Grassland		0.144	1.24	3.59x10 <sup>-05</sup>	<0.01%	3.69x10 <sup>-07</sup>	17%	Insignificant
Severn Estuary (SPA)	Grassland		0.144	1.24	7.58x10 <sup>-05</sup>	<0.01%	7.78x10 <sup>-07</sup>	17%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland		0.208	0.975	9.16x10 <sup>-04</sup>	<0.01%	9.39x10 <sup>-06</sup>	197%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland		0.254	0.606	3.35x10 <sup>-05</sup>	<0.01%	3.44x10 <sup>-07</sup>	143%	Insignificant
River Usk (SSSI)	Grassland		0.301	2.58	5.62x10 <sup>-05</sup>	<0.01%	5.77x10 <sup>-07</sup>	219%	Insignificant

Ecological Site Name <sup>a</sup>	Type	Minimum CL	Background		PC	PC as % of CL	PEC	PEC as % of CL	Significance
			S	N					
River Usk (SAC)	Grassland		0.301	2.58	5.59x10 <sup>-03</sup>	0.0095%	5.73x10 <sup>-05</sup>	480%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland		0.155	0.942	2.52x10 <sup>-05</sup>	<0.01%	2.59x10 <sup>-07</sup>	183%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland		0.133	0.941	1.42x10 <sup>-05</sup>	<0.01%	1.45x10 <sup>-07</sup>	179%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland		0.155	0.918	4.32x10 <sup>-05</sup>	<0.01%	4.43x10 <sup>-07</sup>	3.9%	Insignificant

### Testing Regime – All tests of CWL11/12/13

Severn Estuary (SSSI)	Grassland	Cf. <b>Table 2.3</b>	0.144	1.24	4.07x10 <sup>-04</sup>	<0.01%	4.17x10 <sup>-06</sup>	17%	Insignificant
Severn Estuary (SAC)	Grassland		0.144	1.24	1.91x10 <sup>-04</sup>	<0.01%	1.96x10 <sup>-06</sup>	17%	Insignificant
Severn Estuary (SPA)	Grassland		0.144	1.24	4.07x10 <sup>-04</sup>	<0.01%	4.17x10 <sup>-06</sup>	17%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland		0.208	0.975	4.23x10 <sup>-03</sup>	0.0072%	4.34x10 <sup>-05</sup>	197%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland		0.254	0.606	2.09x10 <sup>-04</sup>	<0.01%	2.14x10 <sup>-06</sup>	143%	Insignificant
River Usk (SSSI)	Grassland		0.301	2.58	3.00x10 <sup>-04</sup>	<0.01%	3.07x10 <sup>-06</sup>	219%	Insignificant
River Usk (SAC)	Grassland		0.301	2.58	2.20x10 <sup>-02</sup>	0.038%	2.26x10 <sup>-04</sup>	480%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland		0.155	0.942	1.33x10 <sup>-04</sup>	<0.01%	1.37x10 <sup>-06</sup>	183%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland		0.133	0.941	7.49x10 <sup>-05</sup>	<0.01%	7.69x10 <sup>-07</sup>	179%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland		0.155	0.918	2.29x10 <sup>-04</sup>	<0.01%	2.35x10 <sup>-06</sup>	3.9%	Insignificant

<sup>a</sup>: Acid deposition have been assessed only for the ecological sites with site-specific Critical Loads for acidity information available from the APIS website, as mentioned in Table 4.5.

TABLE C 5: MODELLED MAXIMUM 24-HOUR MEAN NO<sub>x</sub> CONCENTRATIONS – 1-HOUR EMERGENCY OUTAGE SCENARIO (µg/m<sup>3</sup>)

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
<b>1 hour Emergency Outage Scenario of CWL11</b>							
Severn Estuary (SSSI)	200	52.2	23.4	12%	75.6	38%	Potentially Significant
Severn Estuary (SAC)		52.2	15.9	8.0%	68.1	34%	Insignificant
Severn Estuary (SPA)		52.2	23.4	12%	75.6	38%	Potentially Significant
Gwent Levels St Brides (SSSI)		36.8	114	57%	151	75%	Potentially Significant
Gwent Levels Rumney (SSSI)		37.3	20.5	10%	57.8	29%	Potentially Significant
River Usk (SSSI)		43.9	13.1	6.6%	57.1	29%	Insignificant
River Usk (SAC)		43.9	272	136%	316	158%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		30.5	4.61	2.3%	35.1	18%	Insignificant
Coed-y-Darren (SSSI)		17.6	3.82	1.9%	21.4	11%	Insignificant
Dan y Graig Quarry Risca (SSSI)		22.6	0.000	<0.01%	22.6	11%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		25.7	7.12	3.6%	32.8	16%	Insignificant
Gwent Levels - Whitson (SSSI)		18.3	5.13	2.6%	23.4	12%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		22.1	13.7	6.8%	35.8	18%	Insignificant
Henllys Bog (SSSI)		17.5	3.10	1.6%	20.6	10%	Insignificant
Lisvane Reservoir (SSSI)		30.4	4.37	2.2%	34.8	17%	Insignificant
Plas Machen Wood (SSSI)		20.2	5.24	2.6%	25.4	13%	Insignificant
Rhymney River Section (SSSI)		41.9	5.75	2.9%	47.6	24%	Insignificant
Rumney Quarry (SSSI)		36.8	0.000	<0.01%	36.8	18%	Insignificant

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
Ruperra Castle and Woodlands (SSSI)		19.8	5.78	2.9%	25.5	13%	Insignificant
<b>1 hour Emergency Outage Scenario of CWL12</b>							
Severn Estuary (SSSI)	200	52.2	1.74	0.87%	53.9	27%	Insignificant
Severn Estuary (SAC)		52.2	1.25	0.62%	53.4	27%	Insignificant
Severn Estuary (SPA)		52.2	1.74	0.87%	53.9	27%	Insignificant
Gwent Levels St Brides (SSSI)		36.8	14.7	7.4%	51.5	26%	Insignificant
Gwent Levels Rumney (SSSI)		37.3	1.28	0.64%	38.5	19%	Insignificant
River Usk (SSSI)		43.9	1.26	0.63%	45.2	23%	Insignificant
River Usk (SAC)		43.9	57.0	29%	101	50%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		30.5	0.450	0.22%	30.9	15%	Insignificant
Coed-y-Darren (SSSI)		17.6	0.369	0.18%	18.0	9.0%	Insignificant
Dan y Graig Quarry Risca (SSSI)		22.6	0.000	<0.01%	22.6	11%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		25.7	0.689	0.34%	26.4	13%	Insignificant
Gwent Levels - Whitson (SSSI)		18.3	0.518	0.26%	18.8	9.4%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		22.1	1.10	0.55%	23.2	12%	Insignificant
Henllys Bog (SSSI)		17.5	0.345	0.17%	17.8	8.9%	Insignificant
Lisvane Reservoir (SSSI)		30.4	0.428	0.21%	30.8	15%	Insignificant
Plas Machen Wood (SSSI)		20.2	0.482	0.24%	20.7	10%	Insignificant
Rhymney River Section (SSSI)		41.9	0.507	0.25%	42.4	21%	Insignificant
Rumney Quarry (SSSI)		36.8	0.000	<0.01%	36.8	18%	Insignificant
Ruperra Castle and Woodlands (SSSI)	19.8	0.557	0.28%	20.3	10%	Insignificant	

**1 hour Emergency Outage Scenario of CWL11/12/13**

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
Severn Estuary (SSSI)	200	52.2	26.7	13%	78.9	39%	Potentially Significant
Severn Estuary (SAC)		52.2	17.8	8.9%	70.0	35%	Insignificant
Severn Estuary (SPA)		52.2	26.7	13%	78.9	39%	Potentially Significant
Gwent Levels St Brides (SSSI)		36.8	139	70%	176	88%	Potentially Significant
Gwent Levels Rumney (SSSI)		37.3	22.1	11%	59.4	30%	Potentially Significant
River Usk (SSSI)		43.9	15.3	7.6%	59.2	30%	
River Usk (SAC)		43.9	292	146%	336	168%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		30.5	5.34	2.7%	35.8	18%	Insignificant
Coed-y-Darren (SSSI)		17.6	4.49	2.2%	22.1	11%	Insignificant
Dan y Graig Quarry Risca (SSSI)		22.6	0.000	<0.01%	22.6	11%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		25.7	8.30	4.2%	34.0	17%	Insignificant
Gwent Levels - Whitson (SSSI)		18.3	5.85	2.9%	24.1	12%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		22.1	15.5	7.8%	37.6	19%	Insignificant
Henllys Bog (SSSI)		17.5	3.77	1.9%	21.2	11%	Insignificant
Lisvane Reservoir (SSSI)		30.4	5.05	2.5%	35.5	18%	Insignificant
Plas Machen Wood (SSSI)		20.2	5.86	2.9%	26.1	13%	Insignificant
Rhymney River Section (SSSI)		41.9	6.52	3.3%	48.4	24%	Insignificant
Rumney Quarry (SSSI)		36.8	0.000	<0.01%	36.8	18%	Insignificant
Ruperra Castle and Woodlands (SSSI)		19.8	6.80	3.4%	26.6	13%	Insignificant

TABLE C 6: MODELLED MAXIMUM 24-HOUR MEAN NO<sub>x</sub> CONCENTRATIONS – 72-HOUR EMERGENCY OUTAGE SCENARIO (µg/m<sup>3</sup>)

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
<b>72 hour Emergency Outage Scenario of CWL11</b>							
Severn Estuary (SSSI)	200	52.2	562	281%	615	307%	Potentially Significant
Severn Estuary (SAC)		52.2	382	191%	434	217%	Potentially Significant
Severn Estuary (SPA)		52.2	562	281%	615	307%	Potentially Significant
Gwent Levels St Brides (SSSI)		36.8	2741	1370%	2778	1389%	Potentially Significant
Gwent Levels Rumney (SSSI)		37.3	492	246%	529	265%	Potentially Significant
River Usk (SSSI)		43.9	315	158%	359	180%	Potentially Significant
River Usk (SAC)		43.9	6538	3269%	6582	3291%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		30.5	111	55%	141	71%	Potentially Significant
Coed-y-Darren (SSSI)		17.6	92	46%	109	55%	Potentially Significant
Dan y Graig Quarry Risca (SSSI)		22.6	0.000	<0.01%	22.6	11%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		25.7	171	85%	197	98%	Potentially Significant
Gwent Levels - Whitson (SSSI)		18.3	123	62%	141	71%	Potentially Significant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		22.1	329	164%	351	175%	Potentially Significant
Henllys Bog (SSSI)		17.5	75	37%	92.0	46%	Potentially Significant

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
Lisvane Reservoir (SSSI)		30.4	105	52%	135	68%	Potentially Significant
Plas Machen Wood (SSSI)		20.2	126	63%	146	73%	Potentially Significant
Rhymney River Section (SSSI)		41.9	138	69%	180	90%	Potentially Significant
Rumney Quarry (SSSI)		36.8	0.000	<0.01%	36.8	18%	Insignificant
Ruperra Castle and Woodlands (SSSI)		19.8	139	69%	158	79%	Potentially Significant

### 72 hour Emergency Outage Scenario of CWL12

Severn Estuary (SSSI)	200	52.2	41.9	21%	94.0	47%	Potentially Significant
Severn Estuary (SAC)		52.2	30.0	15%	82.1	41%	Potentially Significant
Severn Estuary (SPA)		52.2	41.9	21%	94.0	47%	Potentially Significant
Gwent Levels St Brides (SSSI)		36.8	354	177%	390	195%	Potentially Significant
Gwent Levels Rumney (SSSI)		37.3	30.6	15%	67.9	34%	Potentially Significant
River Usk (SSSI)		43.9	30.3	15%	74.2	37%	Potentially Significant
River Usk (SAC)		43.9	1369	684%	1413	706%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		30.5	10.8	5.4%	41.3	21%	Insignificant
Coed-y-Darren (SSSI)		17.6	8.87	4.4%	26.5	13%	Insignificant
Dan y Graig Quarry Risca (SSSI)		22.6	0.000	<0.01%	22.6	11%	Insignificant

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
Gwent Levels - Nash and Goldcliff (SSSI)		25.7	16.5	8.3%	42.2	21%	Insignificant
Gwent Levels - Whitson (SSSI)		18.3	12.4	6.2%	30.7	15%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		22.1	26.3	13%	48.4	24%	Potentially Significant
Henllys Bog (SSSI)		17.5	8.29	4.1%	25.7	13%	Insignificant
Lisvane Reservoir (SSSI)		30.4	10.3	5.1%	40.7	20%	Insignificant
Plas Machen Wood (SSSI)		20.2	11.6	5.8%	31.8	16%	Insignificant
Rhymney River Section (SSSI)		41.9	12.2	6.1%	54.0	27%	Insignificant
Rumney Quarry (SSSI)		36.8	0.000	<0.01%	36.8	18%	Insignificant
Ruperra Castle and Woodlands (SSSI)		19.8	13.4	6.7%	33.1	17%	Insignificant
<b>72 hour Emergency Outage Scenario of CWL11/12/13</b>							
Severn Estuary (SSSI)	200	52.2	641	320%	693	346%	Potentially Significant
Severn Estuary (SAC)		52.2	428	214%	480	240%	Potentially Significant
Severn Estuary (SPA)		52.2	641	320%	693	346%	Potentially Significant
Gwent Levels St Brides (SSSI)		36.8	3343	1672%	3380	1690%	Potentially Significant
Gwent Levels Rumney (SSSI)		37.3	531	266%	568	284%	Potentially Significant
River Usk (SSSI)		43.9	367	183%	410	205%	Potentially Significant
River Usk (SAC)		43.9	7015	3508%	7059	3530%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		30.5	128	64%	159	79%	Potentially Significant

<b>Ecological Site Name</b>	<b>AQS</b>	<b>Baseline</b>	<b>PC</b>	<b>PC as % of AQS</b>	<b>PEC</b>	<b>PEC as % of AQS</b>	<b>Significance</b>
Coed-y-Darren (SSSI)		17.6	108	54%	125	63%	Potentially Significant
Dan y Graig Quarry Risca (SSSI)		22.6	0.000	<0.01%	22.6	11%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		25.7	199	100%	225	112%	Potentially Significant
Gwent Levels - Whitson (SSSI)		18.3	140	70%	159	79%	Potentially Significant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		22.1	373	186%	395	197%	Potentially Significant
Henllys Bog (SSSI)		17.5	90.4	45%	108	54%	Potentially Significant
Lisvane Reservoir (SSSI)		30.4	121	61%	151	76%	Potentially Significant
Plas Machen Wood (SSSI)		20.2	141	70%	161	80%	Potentially Significant
Rhymney River Section (SSSI)		41.9	157	78%	198	99%	Potentially Significant
Rumney Quarry (SSSI)		36.8	0.000	<0.01%	36.8	18%	Insignificant
Ruperra Castle and Woodlands (SSSI)		19.8	163	82%	183	92%	Potentially Significant

TABLE C 7: MODELLED ANNUAL MEAN NO<sub>x</sub> CONCENTRATIONS – 1-HOUR EMERGENCY OUTAGE SCENARIO (µg/m<sup>3</sup>)

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
<b>1 hour Emergency Outage Scenario of CWL11</b>							
Severn Estuary (SSSI)	30	26.1	5.58x10 <sup>-03</sup>	0.019%	26.1	87%	Insignificant
Severn Estuary (SAC)		26.1	2.54x10 <sup>-03</sup>	<0.01%	26.1	87%	Insignificant
Severn Estuary (SPA)		26.1	5.58x10 <sup>-03</sup>	0.019%	26.1	87%	Insignificant
Gwent Levels St Brides (SSSI)		18.4	0.0530	0.18%	18.4	61%	Insignificant
Gwent Levels Rumney (SSSI)		18.6	3.16x10 <sup>-03</sup>	0.0105%	18.6	62%	Insignificant
River Usk (SSSI)		22.0	4.04x10 <sup>-03</sup>	0.0135%	22.0	73%	Insignificant
River Usk (SAC)		22.0	0.185	0.62%	22.1	74%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		15.2	6.32x10 <sup>-04</sup>	<0.01%	15.2	51%	Insignificant
Coed-y-Darren (SSSI)		8.81	3.83x10 <sup>-04</sup>	<0.01%	8.8	29%	Insignificant
Dan y Graig Quarry Risca (SSSI)		11.3	0.000	<0.01%	11.3	38%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		12.8	1.77x10 <sup>-03</sup>	<0.01%	12.8	43%	Insignificant
Gwent Levels - Whitson (SSSI)		9.14	9.80x10 <sup>-04</sup>	<0.01%	9.1	30%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		11.0	3.06x10 <sup>-03</sup>	0.0102%	11.0	37%	Insignificant
Henllys Bog (SSSI)		8.73	4.54x10 <sup>-04</sup>	<0.01%	8.7	29%	Insignificant
Lisvane Reservoir (SSSI)		15.2	6.10x10 <sup>-04</sup>	<0.01%	15.2	51%	Insignificant
Plas Machen Wood (SSSI)		10.1	7.20x10 <sup>-04</sup>	<0.01%	10.1	34%	Insignificant
Rhymney River Section (SSSI)		20.9	7.52x10 <sup>-04</sup>	<0.01%	20.9	70%	Insignificant
Rumney Quarry (SSSI)		18.4	0.000	<0.01%	18.4	61%	Insignificant
Ruperra Castle and Woodlands (SSSI)	9.88	6.58x10 <sup>-04</sup>	<0.01%	9.9	33%	Insignificant	
<b>1 hour Emergency Outage Scenario of CWL12</b>							

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
Severn Estuary (SSSI)	30	26.1	5.48x10 <sup>-04</sup>	<0.01%	26.1	87%	Insignificant
Severn Estuary (SAC)		26.1	2.60x10 <sup>-04</sup>	<0.01%	26.1	87%	Insignificant
Severn Estuary (SPA)		26.1	5.48x10 <sup>-04</sup>	<0.01%	26.1	87%	Insignificant
Gwent Levels St Brides (SSSI)		18.4	6.25x10 <sup>-03</sup>	0.0208%	18.4	61%	Insignificant
Gwent Levels Rumney (SSSI)		18.6	2.42x10 <sup>-04</sup>	<0.01%	18.6	62%	Insignificant
River Usk (SSSI)		22.0	4.06x10 <sup>-04</sup>	<0.01%	22.0	73%	Insignificant
River Usk (SAC)		22.0	0.0368	0.12%	22.0	73%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		15.2	6.32x10 <sup>-05</sup>	<0.01%	15.2	51%	Insignificant
Coed-y-Darren (SSSI)		8.81	3.70x10 <sup>-05</sup>	<0.01%	8.81	29%	Insignificant
Dan y Graig Quarry Risca (SSSI)		11.3	0.000	<0.01%	11.3	38%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		12.8	1.82x10 <sup>-04</sup>	<0.01%	12.8	43%	Insignificant
Gwent Levels - Whitson (SSSI)		9.14	1.02x10 <sup>-04</sup>	<0.01%	9.14	30%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		11.0	3.12x10 <sup>-04</sup>	<0.01%	11.0	37%	Insignificant
Henllys Bog (SSSI)		8.73	4.52x10 <sup>-05</sup>	<0.01%	8.73	29%	Insignificant
Lisvane Reservoir (SSSI)		15.2	6.10x10 <sup>-05</sup>	<0.01%	15.2	51%	Insignificant
Plas Machen Wood (SSSI)		10.1	7.01x10 <sup>-05</sup>	<0.01%	10.1	34%	Insignificant
Rhymney River Section (SSSI)		20.9	7.43x10 <sup>-05</sup>	<0.01%	20.9	70%	Insignificant
Rumney Quarry (SSSI)		18.4	0.000	<0.01%	18.4	61%	Insignificant
Ruperra Castle and Woodlands (SSSI)		9.88	6.47x10 <sup>-05</sup>	<0.01%	9.88	33%	Insignificant

**1 hour Emergency Outage Scenario of CWL11/12/13**

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
Severn Estuary (SSSI)	30	26.1	6.66x10 <sup>-03</sup>	0.022%	26.1	87%	Insignificant
Severn Estuary (SAC)		26.1	3.04x10 <sup>-03</sup>	0.010%	26.1	87%	Insignificant
Severn Estuary (SPA)		26.1	6.66x10 <sup>-03</sup>	0.022%	26.1	87%	Insignificant
Gwent Levels St Brides (SSSI)		18.4	0.0670	0.22%	18.4	61%	Insignificant
Gwent Levels Rumney (SSSI)		18.6	3.57x10 <sup>-03</sup>	0.012%	18.6	62%	Insignificant
River Usk (SSSI)		22.0	4.83x10 <sup>-03</sup>	0.016%	22.0	73%	Insignificant
River Usk (SAC)		22.0	0.2294	0.77%	22.2	74%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		15.2	7.49x10 <sup>-04</sup>	<0.01%	15.2	51%	Insignificant
Coed-y-Darren (SSSI)		8.81	4.49x10 <sup>-04</sup>	<0.01%	8.81	29%	Insignificant
Dan y Graig Quarry Risca (SSSI)		11.3	0.000	0.01%	11.3	38%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		12.8	2.12x10 <sup>-03</sup>	<0.01%	12.8	43%	Insignificant
Gwent Levels - Whitson (SSSI)		9.14	1.18x10 <sup>-03</sup>	<0.01%	9.14	30%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		11.0	3.66x10 <sup>-03</sup>	<0.01%	11.0	37%	Insignificant
Henllys Bog (SSSI)		8.73	5.39x10 <sup>-04</sup>	<0.01%	8.73	29%	Insignificant
Lisvane Reservoir (SSSI)		15.2	7.23x10 <sup>-04</sup>	<0.01%	15.2	51%	Insignificant
Plas Machen Wood (SSSI)		10.1	8.48x10 <sup>-04</sup>	<0.01%	10.1	34%	Insignificant
Rhymney River Section (SSSI)		20.9	8.92x10 <sup>-04</sup>	<0.01%	20.9	70%	Insignificant
Rumney Quarry (SSSI)		18.4	0.000	0.01%	18.4	61%	Insignificant
Ruperra Castle and Woodlands (SSSI)		9.88	7.78x10 <sup>-04</sup>	<0.01%	9.88	33%	Insignificant

TABLE C 8: MODELLED ANNUAL MEAN NO<sub>x</sub> CONCENTRATIONS – 72-HOUR EMERGENCY OUTAGE SCENARIO (µg/m<sup>3</sup>)

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
<b>72 hour Emergency Outage Scenario of CWL11</b>							
Severn Estuary (SSSI)	30	26.1	0.402	1.3%	26.5	88%	Potentially Significant
Severn Estuary (SAC)		26.1	0.183	0.61%	26.3	88%	Insignificant
Severn Estuary (SPA)		26.1	0.402	1.3%	26.5	88%	Potentially Significant
Gwent Levels St Brides (SSSI)		18.4	3.82	13%	22.2	74%	Potentially Significant
Gwent Levels Rumney (SSSI)		18.6	0.228	0.76%	18.9	63%	Insignificant
River Usk (SSSI)		22.0	0.291	0.97%	22.3	74%	Insignificant
River Usk (SAC)		22.0	13.3	44%	35.3	118%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		15.2	0.0455	0.15%	15.3	51%	Insignificant
Coed-y-Darren (SSSI)		8.81	0.0276	0.092%	8.84	29%	Insignificant
Dan y Graig Quarry Risca (SSSI)		11.3	0.000	<0.01%	11.3	38%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		12.8	0.127	0.42%	13.0	43%	Insignificant
Gwent Levels - Whitson (SSSI)		9.14	0.0706	0.24%	9.21	31%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		11.0	0.2201	0.73%	11.2	37%	Insignificant
Henllys Bog (SSSI)		8.73	0.0327	0.11%	8.76	29%	Insignificant
Lisvane Reservoir (SSSI)		15.2	0.0439	0.15%	15.2	51%	Insignificant
Plas Machen Wood (SSSI)		10.1	0.0519	0.17%	10.1	34%	Insignificant
Rhymney River Section (SSSI)		20.9	0.0542	0.18%	21.0	70%	Insignificant
Rumney Quarry (SSSI)		18.4	0.000	<0.01%	18.4	61%	Insignificant

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
Ruperra Castle and Woodlands (SSSI)		9.88	0.0474	0.16%	9.92	33%	Insignificant
<b>72 hour Emergency Outage Scenario of CWL12</b>							
Severn Estuary (SSSI)	30	26.1	0.0394	0.13%	26.1	87%	Insignificant
Severn Estuary (SAC)		26.1	0.0187	0.062%	26.1	87%	Insignificant
Severn Estuary (SPA)		26.1	0.0394	0.13%	26.1	87%	Insignificant
Gwent Levels St Brides (SSSI)		18.4	0.450	1.5%	18.8	63%	Insignificant
Gwent Levels Rumney (SSSI)		18.6	0.0174	0.058%	18.7	62%	Insignificant
River Usk (SSSI)		22.0	0.0292	0.10%	22.0	73%	Insignificant
River Usk (SAC)		22.0	2.65	8.8%	24.6	82%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		15.2	4.55x10 <sup>-03</sup>	0.015%	15.3	51%	Insignificant
Coed-y-Darren (SSSI)		8.81	2.66x10 <sup>-03</sup>	0.009%	8.8	29%	Insignificant
Dan y Graig Quarry Risca (SSSI)		11.3	0.000	<0.01%	11.3	38%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		12.8	0.0131	0.044%	12.9	43%	Insignificant
Gwent Levels - Whitson (SSSI)		9.14	0.00736	0.025%	9.1	30%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		11.0	0.0224	0.075%	11.0	37%	Insignificant
Henllys Bog (SSSI)		8.73	3.25x10 <sup>-03</sup>	0.011%	8.7	29%	Insignificant
Lisvane Reservoir (SSSI)		15.2	4.39x10 <sup>-03</sup>	0.015%	15.2	51%	Insignificant
Plas Machen Wood (SSSI)		10.1	5.05x10 <sup>-03</sup>	0.017%	10.1	34%	Insignificant
Rhymney River Section (SSSI)		20.9	5.35x10 <sup>-03</sup>	0.018%	20.9	70%	Insignificant
Rumney Quarry (SSSI)		18.4	0.0000	<0.01%	18.4	61%	Insignificant
Ruperra Castle and Woodlands (SSSI)		9.88	4.66x10 <sup>-03</sup>	0.016%	9.9	33%	Insignificant

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
<b>72 hour Emergency Outage Scenario of CWL11/12/13</b>							
Severn Estuary (SSSI)	30	26.1	0.479	1.60%	26.6	89%	Potentially Significant
Severn Estuary (SAC)		26.1	0.219	0.73%	26.3	88%	Insignificant
Severn Estuary (SPA)		26.1	0.479	1.60%	26.6	89%	Potentially Significant
Gwent Levels St Brides (SSSI)		18.4	4.823	16%	23.2	77%	Potentially Significant
Gwent Levels Rumney (SSSI)		18.6	0.257	0.86%	18.9	63%	Insignificant
River Usk (SSSI)		22.0	0.348	1.2%	22.3	74%	Potentially Significant
River Usk (SAC)		22.0	16.5	55%	38.5	128%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		15.2	0.0539	0.18%	15.3	51%	Insignificant
Coed-y-Darren (SSSI)		8.81	0.0323	0.11%	8.84	29%	Insignificant
Dan y Graig Quarry Risca (SSSI)		11.3	0.000	<0.01%	11.3	38%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		12.8	0.152	0.51%	13.0	43%	Insignificant
Gwent Levels - Whitson (SSSI)		9.14	0.0848	0.28%	9.23	31%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		11.0	0.263	0.88%	11.3	38%	Insignificant
Henllys Bog (SSSI)		8.73	0.0388	0.13%	8.77	29%	Insignificant
Lisvane Reservoir (SSSI)		15.2	0.0520	0.17%	15.3	51%	Insignificant
Plas Machen Wood (SSSI)		10.1	0.0610	0.20%	10.2	34%	Insignificant
Rhymney River Section (SSSI)		20.9	0.0642	0.21%	21.0	70%	Insignificant
Rumney Quarry (SSSI)		18.4	0.000	<0.01%	18.4	61%	Insignificant

<b>Ecological Site Name</b>	<b>AQS</b>	<b>Baseline</b>	<b>PC</b>	<b>PC as % of AQS</b>	<b>PEC</b>	<b>PEC as % of AQS</b>	<b>Significance</b>
Ruperra Castle and Woodlands (SSSI)		9.88	0.0560	0.19%	9.93	33%	Insignificant

TABLE C 9: MODELLED NITROGEN DEPOSITION – 1-HOUR EMERGENCY SCENARIO (kgN/ha/yr)

Ecological Site Name	Type	Minimum CL	Background	PC	PC as % of CL	PEC	PEC as % of CL	Significance
<b>1 hour Emergency Outage Scenario of CWL11</b>								
Severn Estuary (SSSI)	Grassland	10	12.8	3.90x10 <sup>-03</sup>	5.62x10 <sup>-04</sup>	128%	<0.01%	Insignificant
Severn Estuary (SAC)	Grassland	20	12.8	1.78x10 <sup>-03</sup>	2.56x10 <sup>-04</sup>	64%	<0.01%	Insignificant
Severn Estuary (SPA)	Grassland	10	12.8	3.90x10 <sup>-03</sup>	5.62x10 <sup>-04</sup>	128%	<0.01%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland	2 <sup>a</sup>	8.71	3.71x10 <sup>-02</sup>	5.34x10 <sup>-03</sup>	436%	0.27%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland	2 <sup>a</sup>	8.32	2.21x10 <sup>-03</sup>	3.19x10 <sup>-04</sup>	416%	0.010%	Insignificant
River Usk (SSSI)	Grassland	10	15.9	2.83x10 <sup>-03</sup>	4.07x10 <sup>-04</sup>	159%	<0.01%	Insignificant
River Usk (SAC)	Grassland	5	15.9	0.130	1.86x10 <sup>-02</sup>	318%	0.38%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	Grassland	2 <sup>a</sup>	11.1	4.42x10 <sup>-04</sup>	6.36x10 <sup>-05</sup>	555%	<0.01%	Insignificant
Coed-y-Darren (SSSI)	Grassland	2 <sup>a</sup>	16.5	2.68x10 <sup>-04</sup>	3.86x10 <sup>-05</sup>	826%	<0.01%	Insignificant
Dan y Graig Quarry Risca (SSSI)	Grassland	2 <sup>a</sup>	15.0	0.000	0.000	752%	<0.01%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland	2 <sup>a</sup>	8.58	1.24x10 <sup>-03</sup>	1.78x10 <sup>-04</sup>	429%	<0.01%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland	2 <sup>a</sup>	8.06	6.86x10 <sup>-04</sup>	9.87x10 <sup>-05</sup>	403%	<0.01%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland	10	8.88	2.14x10 <sup>-03</sup>	3.08x10 <sup>-04</sup>	89%	<0.01%	Insignificant
Henllys Bog (SSSI)	Woodland	2 <sup>a</sup>	13.7	3.18x10 <sup>-04</sup>	9.14x10 <sup>-05</sup>	685%	<0.01%	Insignificant
Lisvane Reservoir (SSSI)	Grassland	10	11.1	4.27x10 <sup>-04</sup>	6.14x10 <sup>-05</sup>	111%	<0.01%	Insignificant
Plas Machen Wood (SSSI)	Woodland	10	12.81	5.04x10 <sup>-04</sup>	1.45x10 <sup>-04</sup>	NA	<0.01%	Insignificant
Rhymney River Section (SSSI)	Grassland	2 <sup>a</sup>	9.72	5.26x10 <sup>-04</sup>	7.57x10 <sup>-05</sup>	486%	<0.01%	Insignificant
Rumney Quarry (SSSI)	Grassland	2 <sup>a</sup>	9.26	0.000	0.000	463%	<0.01%	Insignificant
Ruperra Castle and Woodlands (SSSI)	Woodland	2 <sup>a</sup>	13.2	4.61x10 <sup>-04</sup>	1.33x10 <sup>-04</sup>	658%	<0.01%	Insignificant

Ecological Site Name	Type	Minimum CL	Background	PC	PC as % of CL	PEC	PEC as % of CL	Significance
<b>1 hour Emergency Outage Scenario of CWL12</b>								
Severn Estuary (SSSI)	Grassland	10	12.8	3.83x10 <sup>-04</sup>	5.51x10 <sup>-05</sup>	128%	<0.01%	Insignificant
Severn Estuary (SAC)	Grassland	20	12.8	1.82x10 <sup>-04</sup>	2.62x10 <sup>-05</sup>	64%	<0.01%	Insignificant
Severn Estuary (SPA)	Grassland	10	12.8	3.83x10 <sup>-04</sup>	5.51x10 <sup>-05</sup>	128%	<0.01%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland	2 <sup>a</sup>	8.71	4.37x10 <sup>-03</sup>	6.29x10 <sup>-04</sup>	435%	0.031%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland	2 <sup>a</sup>	8.32	1.69x10 <sup>-04</sup>	2.43x10 <sup>-05</sup>	416%	<0.01%	Insignificant
River Usk (SSSI)	Grassland	10	15.9	2.84x10 <sup>-04</sup>	4.09x10 <sup>-05</sup>	159%	<0.01%	Insignificant
River Usk (SAC)	Grassland	5	15.9	2.58x10 <sup>-02</sup>	3.71x10 <sup>-03</sup>	318%	0.074%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	Grassland	2 <sup>a</sup>	11.1	4.43x10 <sup>-05</sup>	6.37x10 <sup>-06</sup>	555%	<0.01%	Insignificant
Coed-y-Darren (SSSI)	Grassland	2 <sup>a</sup>	16.5	2.59x10 <sup>-05</sup>	3.72x10 <sup>-06</sup>	826%	<0.01%	Insignificant
Dan y Graig Quarry Risca (SSSI)	Grassland	2 <sup>a</sup>	15.0	0.000	0.000	752%	<0.01%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland	2 <sup>a</sup>	8.58	1.27x10 <sup>-04</sup>	1.83x10 <sup>-05</sup>	429%	<0.01%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland	2 <sup>a</sup>	8.06	7.16x10 <sup>-05</sup>	1.03x10 <sup>-05</sup>	403%	<0.01%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland	10	8.88	2.18x10 <sup>-04</sup>	3.14x10 <sup>-05</sup>	89%	<0.01%	Insignificant
Henllys Bog (SSSI)	Woodland	2 <sup>a</sup>	13.7	3.16x10 <sup>-05</sup>	9.09x10 <sup>-06</sup>	685%	<0.01%	Insignificant
Lisvane Reservoir (SSSI)	Grassland	10	11.1	4.27x10 <sup>-05</sup>	6.14x10 <sup>-06</sup>	111%	<0.01%	Insignificant
Plas Machen Wood (SSSI)	Woodland	10	12.81	4.91x10 <sup>-05</sup>	1.41x10 <sup>-05</sup>	NA	<0.01%	Insignificant
Rhymney River Section (SSSI)	Grassland	2 <sup>a</sup>	9.72	5.20x10 <sup>-05</sup>	7.48x10 <sup>-06</sup>	486%	<0.01%	Insignificant
Rumney Quarry (SSSI)	Grassland	2 <sup>a</sup>	9.26	0.000	0.000	463%	<0.01%	Insignificant
Ruperra Castle and Woodlands (SSSI)	Woodland	2 <sup>a</sup>	13.2	4.53x10 <sup>-05</sup>	1.30x10 <sup>-05</sup>	658%	<0.01%	Insignificant

Ecological Site Name	Type	Minimum CL	Background	PC	PC as % of CL	PEC	PEC as % of CL	Significance
<b>1 hour Emergency Outage Scenario of CWL11/12/13</b>								
Severn Estuary (SSSI)	Grassland	10	12.8	4.66x10 <sup>-03</sup>	6.70x10 <sup>-04</sup>	128%	<0.01%	Insignificant
Severn Estuary (SAC)	Grassland	20	12.8	2.13x10 <sup>-03</sup>	3.06x10 <sup>-04</sup>	64%	<0.01%	Insignificant
Severn Estuary (SPA)	Grassland	10	12.8	4.66x10 <sup>-03</sup>	6.70x10 <sup>-04</sup>	128%	<0.01%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland	2 <sup>a</sup>	8.71	4.69x10 <sup>-02</sup>	6.75x10 <sup>-03</sup>	436%	0.34%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland	2 <sup>a</sup>	8.32	2.50x10 <sup>-03</sup>	3.59x10 <sup>-04</sup>	416%	0.018%	Insignificant
River Usk (SSSI)	Grassland	10	15.9	3.38x10 <sup>-03</sup>	4.87x10 <sup>-04</sup>	159%	<0.01%	Insignificant
River Usk (SAC)	Grassland	5	15.9	0.161	2.31x10 <sup>-02</sup>	318%	0.46%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	Grassland	2 <sup>a</sup>	11.1	5.24x10 <sup>-04</sup>	7.54x10 <sup>-05</sup>	555%	<0.01%	Insignificant
Coed-y-Darren (SSSI)	Grassland	2 <sup>a</sup>	16.5	3.14x10 <sup>-04</sup>	4.52x10 <sup>-05</sup>	826%	<0.01%	Insignificant
Dan y Graig Quarry Risca (SSSI)	Grassland	2 <sup>a</sup>	15.0	0.000	0.000	752%	<0.01%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland	2 <sup>a</sup>	8.58	1.48x10 <sup>-03</sup>	2.13x10 <sup>-04</sup>	429%	<0.01%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland	2 <sup>a</sup>	8.06	8.25x10 <sup>-04</sup>	1.19x10 <sup>-04</sup>	403%	<0.01%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland	10	8.88	2.56x10 <sup>-03</sup>	3.68x10 <sup>-04</sup>	89%	<0.01%	Insignificant
Henllys Bog (SSSI)	Woodland	2 <sup>a</sup>	13.7	3.77x10 <sup>-04</sup>	1.09x10 <sup>-04</sup>	685%	<0.01%	Insignificant
Lisvane Reservoir (SSSI)	Grassland	10	11.1	5.06x10 <sup>-04</sup>	7.28x10 <sup>-05</sup>	111%	<0.01%	Insignificant
Plas Machen Wood (SSSI)	Woodland	10	12.81	5.93x10 <sup>-04</sup>	1.71x10 <sup>-04</sup>	NA	<0.01%	Insignificant
Rhymney River Section (SSSI)	Grassland	2 <sup>a</sup>	9.72	6.24x10 <sup>-04</sup>	8.98x10 <sup>-05</sup>	486%	<0.01%	Insignificant
Rumney Quarry (SSSI)	Grassland	2 <sup>a</sup>	9.26	0.000	0.000	463%	<0.01%	Insignificant
Ruperra Castle and Woodlands (SSSI)	Woodland	2 <sup>a</sup>	13.2	5.44x10 <sup>-04</sup>	1.57x10 <sup>-04</sup>	658%	<0.01%	Insignificant

<sup>a</sup>: A minimum critical loads of 2 was used for sites with no available critical loads from the APIS website as a worst case scenario.



TABLE C 10: MODELLED NITROGEN DEPOSITION – 72-HOUR EMERGENCY SCENARIO (kgN/ha/yr)

Ecological Site Name	Type	Minimum CL	Background	PC	PC as % of CL	PEC	PEC as % of CL	Significance
<b>72 hour Emergency Outage Scenario of CWL11</b>								
Severn Estuary (SSSI)	Grassland	10	12.8	0.281	0.0404	129%	0.40%	Insignificant
Severn Estuary (SAC)	Grassland	20	12.8	0.128	0.0184	64%	0.092%	Insignificant
Severn Estuary (SPA)	Grassland	10	12.8	0.281	0.0404	129%	0.40%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland	2 <sup>a</sup>	8.71	2.67	0.385	454%	19%	Potentially Significant
Gwent Levels Rumney (SSSI)	Grassland	2 <sup>a</sup>	8.32	0.159	0.0229	417%	1.2%	Potentially Significant
River Usk (SSSI)	Grassland	10	15.9	0.204	0.0293	159%	0.29%	Insignificant
River Usk (SAC)	Grassland	5	15.9	9.33	1.34	345%	27%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	Grassland	2 <sup>a</sup>	11.1	0.0318	4.58x10 <sup>-03</sup>	555%	0.23%	Insignificant
Coed-y-Darren (SSSI)	Grassland	2 <sup>a</sup>	16.5	0.0193	2.78x10 <sup>-03</sup>	826%	0.14%	Insignificant
Dan y Graig Quarry Risca (SSSI)	Grassland	2 <sup>a</sup>	15.0	0.000	0.000	752%	<0.01%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland	2 <sup>a</sup>	8.58	0.0891	0.0128	430%	0.64%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland	2 <sup>a</sup>	8.06	0.0494	7.10x10 <sup>-03</sup>	403%	0.36%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland	10	8.88	0.154	0.0222	89%	0.22%	Insignificant
Henllys Bog (SSSI)	Woodland	2 <sup>a</sup>	13.7	0.0229	6.58x10 <sup>-03</sup>	686%	0.33%	Insignificant
Lisvane Reservoir (SSSI)	Grassland	10	11.1	0.0307	4.42x10 <sup>-03</sup>	111%	0.044%	Insignificant
Plas Machen Wood (SSSI)	Woodland	10	12.81	0.0363	0.0104	NA	0.10%	Insignificant
Rhymney River Section (SSSI)	Grassland	2 <sup>a</sup>	9.72	0.0379	5.45x10 <sup>-03</sup>	486%	0.27%	Insignificant

Ecological Site Name	Type	Minimum CL	Background	PC	PC as % of CL	PEC	PEC as % of CL	Significance
Rumney Quarry (SSSI)	Grassland	2 <sup>a</sup>	9.26	0.000	0.000	463%	<0.01%	Insignificant
Ruperra Castle and Woodlands (SSSI)	Woodland	2 <sup>a</sup>	13.2	0.0332	9.55x10 <sup>-03</sup>	659%	0.48%	Insignificant
<b>72 hour Emergency Outage Scenario of CWL12</b>								
Severn Estuary (SSSI)	Grassland	10	12.8	0.0276	3.97x10 <sup>-03</sup>	128%	0.040%	Insignificant
Severn Estuary (SAC)	Grassland	20	12.8	0.0131	1.88x10 <sup>-03</sup>	64%	0.0094%	Insignificant
Severn Estuary (SPA)	Grassland	10	12.8	0.0276	3.97x10 <sup>-03</sup>	128%	0.040%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland	2 <sup>a</sup>	8.71	0.315	0.0453	438%	2.3%	Potentially Significant
Gwent Levels Rumney (SSSI)	Grassland	2 <sup>a</sup>	8.32	0.0122	1.75x10 <sup>-03</sup>	416%	0.088%	Insignificant
River Usk (SSSI)	Grassland	10	15.9	0.0205	2.94x10 <sup>-03</sup>	159%	0.029%	Insignificant
River Usk (SAC)	Grassland	5	15.9	1.86E+00	0.27	323%	5.3%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	Grassland	2 <sup>a</sup>	11.1	3.19x10 <sup>-03</sup>	4.59x10 <sup>-04</sup>	555%	0.023%	Insignificant
Coed-y-Darren (SSSI)	Grassland	2 <sup>a</sup>	16.5	1.86x10 <sup>-03</sup>	2.68x10 <sup>-04</sup>	826%	0.013%	Insignificant
Dan y Graig Quarry Risca (SSSI)	Grassland	2 <sup>a</sup>	15.0	0.000	0.000	752%	<0.01%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland	2 <sup>a</sup>	8.58	9.18x10 <sup>-03</sup>	1.32x10 <sup>-03</sup>	429%	0.066%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland	2 <sup>a</sup>	8.06	5.16x10 <sup>-03</sup>	7.42x10 <sup>-04</sup>	403%	0.037%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland	10	8.88	0.0157	2.26x10 <sup>-03</sup>	89%	0.023%	Insignificant
Henllys Bog (SSSI)	Woodland	2 <sup>a</sup>	13.7	2.28x10 <sup>-03</sup>	6.55x10 <sup>-04</sup>	685%	0.033%	Insignificant

Ecological Site Name	Type	Minimum CL	Background	PC	PC as % of CL	PEC	PEC as % of CL	Significance
Lisvane Reservoir (SSSI)	Grassland	10	11.1	3.07x10 <sup>-03</sup>	4.42x10 <sup>-04</sup>	111%	<0.01%	Insignificant
Plas Machen Wood (SSSI)	Woodland	10	12.81	3.53x10 <sup>-03</sup>	1.02x10 <sup>-03</sup>	NA	0.010%	Insignificant
Rhymney River Section (SSSI)	Grassland	2 <sup>a</sup>	9.72	3.74x10 <sup>-03</sup>	5.38x10 <sup>-04</sup>	486%	0.027%	Insignificant
Rumney Quarry (SSSI)	Grassland	2 <sup>a</sup>	9.26	0.000	0.000	463%	<0.01%	Insignificant
Ruperra Castle and Woodlands (SSSI)	Woodland	2 <sup>a</sup>	13.2	3.26x10 <sup>-03</sup>	9.38x10 <sup>-04</sup>	658%	0.047%	Insignificant

### 72 hour Emergency Outage Scenario of CWL11/12/13

Severn Estuary (SSSI)	Grassland	10	12.8	0.336	0.0483	129%	0.48%	Insignificant
Severn Estuary (SAC)	Grassland	20	12.8	0.153	0.0221	64%	0.11%	Insignificant
Severn Estuary (SPA)	Grassland	10	12.8	0.336	0.0483	129%	0.48%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland	2 <sup>a</sup>	8.71	3.38	0.486	460%	24%	Potentially Significant
Gwent Levels Rumney (SSSI)	Grassland	2 <sup>a</sup>	8.32	0.180	0.0258	417%	1.3%	Potentially Significant
River Usk (SSSI)	Grassland	10	15.9	0.244	0.0351	159%	0.35%	Insignificant
River Usk (SAC)	Grassland	5	15.9	11.6	1.66	351%	33%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	Grassland	2 <sup>a</sup>	11.1	0.0377	5.43x10 <sup>-03</sup>	555%	0.27%	Insignificant
Coed-y-Darren (SSSI)	Grassland	2 <sup>a</sup>	16.5	0.0226	3.26x10 <sup>-03</sup>	826%	0.16%	Insignificant
Dan y Graig Quarry Risca (SSSI)	Grassland	2 <sup>a</sup>	15.0	0.000	0.000	752%	<0.01%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland	2 <sup>a</sup>	8.58	0.107	0.0153	430%	0.77%	Insignificant

Ecological Site Name	Type	Minimum CL	Background	PC	PC as % of CL	PEC	PEC as % of CL	Significance
Gwent Levels - Whitson (SSSI)	Grassland	2 <sup>a</sup>	8.06	0.0594	8.54x10 <sup>-03</sup>	403%	0.43%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland	10	8.88	0.184	0.0265	89%	0.27%	Insignificant
Henllys Bog (SSSI)	Woodland	2 <sup>a</sup>	13.7	0.0272	7.82x10 <sup>-03</sup>	686%	0.39%	Insignificant
Lisvane Reservoir (SSSI)	Grassland	10	11.1	0.0364	5.24x10 <sup>-03</sup>	111%	0.052%	Insignificant
Plas Machen Wood (SSSI)	Woodland	10	12.81	0.0427	0.0123	NA	0.12%	Insignificant
Rhymney River Section (SSSI)	Grassland	2 <sup>a</sup>	9.72	0.0450	6.47x10 <sup>-03</sup>	486%	0.32%	Insignificant
Rumney Quarry (SSSI)	Grassland	2 <sup>a</sup>	9.26	0.000	0.000	463%	<0.01%	Insignificant
Ruperra Castle and Woodlands (SSSI)	Woodland	2 <sup>a</sup>	13.2	0.0392	0.0113	659%	0.56%	Insignificant

<sup>a</sup>: A minimum critical loads of 2 was used for sites with no available critical loads from the APIS website as a worst case scenario.

TABLE C 11: MODELLED ACID DEPOSITION – 1-HOUR EMERGENCY SCENARIO (keq/ha/yr)

Ecological Site Name <sup>a</sup>	Type	Minimum CL	Background		PC	PC as % of CL	PEC	PEC as % of CL	Significance
			S	N					
<b>1 hour Emergency Outage Scenario of CWL11</b>									
Severn Estuary (SSSI)	Grassland	Cf. <b>Table 2.3</b>	0.144	1.24	3.90x10 <sup>-03</sup>	4.01x10 <sup>-05</sup>	<0.01%	17%	Insignificant
Severn Estuary (SAC)	Grassland		0.144	1.24	1.78x10 <sup>-03</sup>	1.83x10 <sup>-05</sup>	<0.01%	17%	Insignificant
Severn Estuary (SPA)	Grassland		0.144	1.24	3.90x10 <sup>-03</sup>	4.01x10 <sup>-05</sup>	<0.01%	17%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland		0.208	0.975	3.71x10 <sup>-02</sup>	3.81x10 <sup>-04</sup>	0.063%	197%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland		0.254	0.606	2.21x10 <sup>-03</sup>	2.27x10 <sup>-05</sup>	<0.01%	143%	Insignificant
River Usk (SSSI)	Grassland		0.301	2.58	2.83x10 <sup>-03</sup>	2.90x10 <sup>-05</sup>	<0.01%	219%	Insignificant
River Usk (SAC)	Grassland		0.301	2.58	0.130	1.33x10 <sup>-03</sup>	0.22%	480%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland		0.155	0.942	1.24x10 <sup>-03</sup>	1.27x10 <sup>-05</sup>	<0.01%	183%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland		0.133	0.941	6.86x10 <sup>-04</sup>	7.04x10 <sup>-06</sup>	<0.01%	179%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland		0.155	0.918	2.14x10 <sup>-03</sup>	2.20x10 <sup>-05</sup>	<0.01%	3.9%	Insignificant
<b>1 hour Emergency Outage Scenario of CWL12</b>									
Severn Estuary (SSSI)	Grassland	Cf. <b>Table 2.3</b>	0.144	1.24	3.83x10 <sup>-04</sup>	3.93x10 <sup>-06</sup>	<0.01%	17%	Insignificant
Severn Estuary (SAC)	Grassland		0.144	1.24	1.82x10 <sup>-04</sup>	1.87x10 <sup>-06</sup>	<0.01%	17%	Insignificant

Ecological Site Name <sup>a</sup>	Type	Minimum CL	Background		PC	PC as % of CL	PEC	PEC as % of CL	Significance
			S	N					
Severn Estuary (SPA)	Grassland		0.144	1.24	3.83x10 <sup>-04</sup>	3.93x10 <sup>-06</sup>	<0.01%	17%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland		0.208	0.975	4.37x10 <sup>-03</sup>	4.49x10 <sup>-05</sup>	<0.01%	197%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland		0.254	0.606	1.69x10 <sup>-04</sup>	1.74x10 <sup>-06</sup>	<0.01%	143%	Insignificant
River Usk (SSSI)	Grassland		0.301	2.58	2.84x10 <sup>-04</sup>	2.92x10 <sup>-06</sup>	<0.01%	219%	Insignificant
River Usk (SAC)	Grassland		0.301	2.58	2.58x10 <sup>-02</sup>	2.65x10 <sup>-04</sup>	0.044%	480%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland		0.155	0.942	1.27x10 <sup>-04</sup>	1.31x10 <sup>-06</sup>	<0.01%	183%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland		0.133	0.941	7.16x10 <sup>-05</sup>	7.35x10 <sup>-07</sup>	<0.01%	179%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland		0.155	0.918	2.18x10 <sup>-04</sup>	2.24x10 <sup>-06</sup>	<0.01%	3.9%	Insignificant

**1 hour Emergency Outage Scenario of CWL11/12/13**

Severn Estuary (SSSI)	Grassland	<b>Cf. Table 2.3</b>	0.144	1.24	4.66x10 <sup>-03</sup>	4.78x10 <sup>-05</sup>	<0.01%	17%	Insignificant
Severn Estuary (SAC)	Grassland		0.144	1.24	2.13x10 <sup>-03</sup>	2.18x10 <sup>-05</sup>	<0.01%	17%	Insignificant
Severn Estuary (SPA)	Grassland		0.144	1.24	4.66x10 <sup>-03</sup>	4.78x10 <sup>-05</sup>	<0.01%	17%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland		0.208	0.975	0.0469	4.81x10 <sup>-04</sup>	0.080%	197%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland		0.254	0.606	2.50x10 <sup>-03</sup>	2.56x10 <sup>-05</sup>	<0.01%	143%	Insignificant

Ecological Site Name <sup>a</sup>	Type	Minimum CL	Background		PC	PC as % of CL	PEC	PEC as % of CL	Significance
			S	N					
River Usk (SSSI)	Grassland		0.301	2.58	$3.38 \times 10^{-03}$	$3.47 \times 10^{-05}$	<0.01%	219%	Insignificant
River Usk (SAC)	Grassland		0.301	2.58	0.161	$1.65 \times 10^{-03}$	0.27%	480%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland		0.155	0.942	$1.48 \times 10^{-03}$	$1.52 \times 10^{-05}$	<0.01%	183%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland		0.133	0.941	$8.25 \times 10^{-04}$	$8.46 \times 10^{-06}$	<0.01%	179%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland		0.155	0.918	$2.56 \times 10^{-03}$	$2.63 \times 10^{-05}$	<0.01%	3.9%	Insignificant

<sup>a</sup>: Acid deposition have been assessed only for the ecological sites with site-specific Critical Loads for acidity information available from the APIS website, as mentioned in Table 4.5.

TABLE C 12: MODELLED ACID DEPOSITION – 72-HOUR EMERGENCY SCENARIO (keq/ha/yr)

Ecological Site Name <sup>a</sup>	Type	Minimum CL	Background		PC	PC as % of CL	PEC	PEC as % of CL	Significance
			S	N					
<b>72 hour Emergency Outage Scenario of CWL11</b>									
Severn Estuary (SSSI)	Grassland	<b>Cf. Table 2.3</b>	0.144	1.24	0.281	2.88x10 <sup>-03</sup>	<0.01%	17%	Insignificant
Severn Estuary (SAC)	Grassland		0.144	1.24	0.128	1.31x10 <sup>-03</sup>	<0.01%	17%	Insignificant
Severn Estuary (SPA)	Grassland		0.144	1.24	0.281	2.88x10 <sup>-03</sup>	<0.01%	17%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland		0.208	0.975	2.67	0.0274	4.6%	201%	Potentially Significant
Gwent Levels Rumney (SSSI)	Grassland		0.254	0.606	0.159	1.64x10 <sup>-03</sup>	0.27%	143%	Insignificant
River Usk (SSSI)	Grassland		0.301	2.58	0.204	2.09x10 <sup>-03</sup>	0.16%	220%	Insignificant
River Usk (SAC)	Grassland		0.301	2.58	9.33	0.0957	16%	495%	Potentially Significant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland		0.155	0.942	0.0891	9.14x10 <sup>-04</sup>	0.15%	183%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland		0.133	0.941	0.0494	5.07x10 <sup>-04</sup>	0.084%	179%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland		0.155	0.918	0.154	1.58x10 <sup>-03</sup>	<0.01%	3.9%	Insignificant
<b>72 hour Emergency Outage Scenario of CWL12</b>									
Severn Estuary (SSSI)	Grassland	<b>Cf. Table 2.3</b>	0.144	1.24	0.0276	2.83x10 <sup>-04</sup>	<0.01%	17%	Insignificant
Severn Estuary (SAC)	Grassland		0.144	1.24	0.0131	1.34x10 <sup>-04</sup>	<0.01%	17%	Insignificant
Severn Estuary (SPA)	Grassland		0.144	1.24	0.0276	2.83x10 <sup>-04</sup>	<0.01%	17%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland		0.208	0.975	0.315	3.23x10 <sup>-03</sup>	0.54%	197%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland		0.254	0.606	0.0122	1.25x10 <sup>-04</sup>	0.021%	143%	Insignificant

Ecological Site Name <sup>a</sup>	Type	Minimum CL	Background		PC	PC as % of CL	PEC	PEC as % of CL	Significance
			S	N					
River Usk (SSSI)	Grassland		0.301	2.58	0.0205	2.10x10 <sup>-04</sup>	0.016%	220%	Insignificant
River Usk (SAC)	Grassland		0.301	2.58	1.86	0.0191	3.2%	483%	Potentially Significant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland		0.155	0.942	9.18x10 <sup>-03</sup>	9.41x10 <sup>-05</sup>	0.016%	183%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland		0.133	0.941	5.16x10 <sup>-03</sup>	5.29x10 <sup>-05</sup>	<0.01%	179%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland		0.155	0.918	0.0157	1.61x10 <sup>-04</sup>	<0.01%	3.9%	Insignificant

### 72 hour Emergency Outage Scenario of CWL11/12/13

Severn Estuary (SSSI)	Grassland	Cf. <b>Table 2.3</b>	0.144	1.24	0.336	3.44x10 <sup>-03</sup>	<0.01%	17%	Insignificant
Severn Estuary (SAC)	Grassland		0.144	1.24	0.153	1.57x10 <sup>-03</sup>	<0.01%	17%	Insignificant
Severn Estuary (SPA)	Grassland		0.144	1.24	0.336	3.44x10 <sup>-03</sup>	<0.01%	17%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland		0.208	0.975	3.38	3.46x10 <sup>-02</sup>	5.8%	203%	Potentially Significant
Gwent Levels Rumney (SSSI)	Grassland		0.254	0.606	0.180	1.84x10 <sup>-03</sup>	0.31%	143%	Insignificant
River Usk (SSSI)	Grassland		0.301	2.58	0.244	2.50x10 <sup>-03</sup>	0.19%	220%	Insignificant
River Usk (SAC)	Grassland		0.301	2.58	11.56	0.119	20%	499%	Potentially Significant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland		0.155	0.942	0.107	1.09x10 <sup>-03</sup>	0.18%	183%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland		0.133	0.941	0.0594	6.09x10 <sup>-04</sup>	0.10%	179%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland		0.155	0.918	0.184	1.89x10 <sup>-03</sup>	<0.01%	3.9%	Insignificant

<sup>a</sup>: Acid deposition have been assessed only for the ecological sites with site-specific Critical Loads for acidity information available from the APIS website, as mentioned in Table 4.5.

# APPENDIX D MODELLED RESULTS OF THE POTENTIAL IMPACT ON NON-STATUTORY ECOLOGICAL SITES

TABLE D 1 MODELLED MAXIMUM 24-HOUR MEAN NO<sub>x</sub> CONCENTRATIONS – TESTING REGIME (µg/m<sup>3</sup>)

Non Statutory Ecological Sites	AQS	Quarterly test of CWL11		Quarterly test of CWL12		Black Building Test of CWL11		Black Building Test of CWL12	
		PC	PC as % of AQS	PC	PC as % of AQS	PC	PC as % of AQS	PC	PC as % of AQS
Ancient woodland C	200	0.978	0.49%	0.246	0.12%	1.57	0.78%	0.246	0.12%
Ancient woodland D		0.832	0.42%	0.229	0.11%	1.64	0.82%	0.229	0.11%
Ancient woodland E		0.479	0.24%	0.0768	0.038%	0.399	0.20%	0.0768	0.038%
Ancient woodland F		1.17	0.59%	0.421	0.21%	2.13	1.1%	0.421	0.21%
Ancient woodland G		0.717	0.36%	0.251	0.13%	1.33	0.66%	0.251	0.13%
Ancient woodland H		0.638	0.32%	0.184	0.092%	0.961	0.48%	0.184	0.092%
Celtic Springs SINC		1.61	0.81%	0.457	0.23%	2.72	1.4%	0.457	0.23%
LG Duffryn Site 1/2 SINC		1.60	0.80%	0.452	0.23%	2.16	1.1%	0.452	0.23%
Duffryn Pond SINC		0.816	0.41%	0.249	0.12%	1.30	0.65%	0.249	0.12%
Coed Ffynon-Oer SINC		0.254	0.13%	0.0319	0.016%	0.181	0.09%	0.0319	0.016%
Court Wood SINC		0.282	0.14%	0.0476	0.024%	0.265	0.13%	0.0476	0.024%
Afon Ebbw River SINC		0.482	0.24%	0.164	0.082%	0.847	0.42%	0.164	0.082%
Gaer Fort SINC		0.427	0.21%	0.137	0.068%	0.683	0.34%	0.137	0.068%
Cwm Pensidan SINC		0.259	0.13%	0.0628	0.031%	0.323	0.16%	0.0628	0.031%

TABLE D 2 MODELLED ANNUAL MEAN NO<sub>x</sub> CONCENTRATIONS – TESTING REGIME (µg/m<sup>3</sup>)

Non Statutory Ecological Sites	AQS	All tests of CWL11/12	
		PC	PC as % of AQS
Ancient woodland C	30	1.50E-03	0.0050%
Ancient woodland D		1.05E-03	0.0035%
Ancient woodland E		5.41E-04	0.0018%
Ancient woodland F		2.62E-03	0.0087%
Ancient woodland G		1.33E-03	0.0044%
Ancient woodland H		2.30E-03	0.0077%
Celtic Springs SINC		3.32E-03	0.011%
LG Duffryn Site 1/2 SINC		3.31E-03	0.011%
Duffryn Pond SINC		3.10E-03	0.010%
Coed Ffynon-Oer SINC		2.18E-04	0.00073%
Court Wood SINC		2.75E-04	0.00092%
Afon Ebbw River SINC		6.83E-04	0.0023%
Gaer Fort SINC		5.93E-04	0.0020%
Cwm Pensidan SINC		3.29E-04	0.0011%

TABLE D 3 MODELLED MAXIMUM 24-HOUR MEAN NO<sub>x</sub> CONCENTRATIONS – 1-HOUR EMERGENCY OUTAGE SCENARIO (µg/m<sup>3</sup>)

Non Statutory Ecological Sites	AQS	CWL11		CWL12	
		PC	PC as % of AQS	PC	PC as % of AQS
Ancient woodland C	200	68.9	34%	6.51	3.3%
Ancient woodland D		58.6	29%	6.08	3.0%
Ancient woodland E		33.7	17%	2.04	1.0%
Ancient woodland F		82.7	41%	11.2	5.6%
Ancient woodland G		50.5	25%	6.66	3.3%
Ancient woodland H		45.0	22%	4.88	2.4%
Celtic Springs SINC		114	57%	12.1	6.1%
LG Duffryn Site 1/2 SINC		113	56%	12.0	6.0%
Duffryn Pond SINC		57.5	29%	6.59	3.3%
Coed Ffynon-Oer SINC		17.9	8.9%	0.846	0.42%
Court Wood SINC		19.9	9.9%	1.26	0.63%
Afon Ebbw River SINC		33.9	17%	4.36	2.2%
Gaer Fort SINC		30.1	15%	3.62	1.8%
Cwm Pensidan SINC		18.3	9.1%	1.66	0.83%

TABLE D 4 MODELLED ANNUALMEAN NO<sub>x</sub> CONCENTRATIONS – 1-HOUR EMERGENCY OUTAGE SCENARIO (µg/m<sup>3</sup>)

Non Statutory Ecological Sites	AQS	CWL11		CWL12	
		PC	PC as % of AQS	PC	PC as % of AQS
Ancient woodland C	30	0.0155	0.052%	1.38E-03	0.0046%
Ancient woodland D		0.0120	0.040%	9.64E-04	0.0032%
Ancient woodland E		7.05E-03	0.023%	4.79E-04	0.0016%
Ancient woodland F		0.0243	0.081%	2.95E-03	0.010%
Ancient woodland G		0.0117	0.039%	1.43E-03	0.005%
Ancient woodland H		0.0221	0.074%	2.39E-03	0.0080%
Celtic Springs SINC		0.0392	0.13%	3.13E-03	0.010%
LG Duffryn Site 1/2 SINC		0.0569	0.19%	2.63E-03	0.0088%
Duffryn Pond SINC		0.0293	0.098%	3.27E-03	0.011%
Coed Ffynon-Oer SINC		2.65E-03	0.0088%	1.97E-04	0.00066%
Court Wood SINC		3.12E-03	0.010%	2.59E-04	0.00086%
Afon Ebbw River SINC		6.74E-03	0.022%	7.05E-04	0.0024%
Gaer Fort SINC		5.80E-03	0.019%	6.19E-04	0.0021%
Cwm Pensidan SINC		3.65E-03	0.012%	3.16E-04	0.0011%

TABLE D 5 MODELLED MAXIMUM 24-HOUR MEAN NO<sub>x</sub> CONCENTRATIONS – 72-HOUR EMERGENCY OUTAGE SCENARIO (µg/m<sup>3</sup>)

Non Statutory Ecological Sites	AQS	CWL11		CWL12	
		PC	PC as % of AQS	PC	PC as % of AQS
Ancient woodland C	200	1654	827%	156	78%
Ancient woodland D		1407	704%	146	73%
Ancient woodland E		810	405%	48.9	24%
Ancient woodland F		1984	992%	268	134%
Ancient woodland G		1213	606%	160	80%
Ancient woodland H		1080	540%	117	59%
Celtic Springs SINC		2726	1363%	291	145%
LG Duffryn Site 1/2 SINC		2708	1354%	287	144%
Duffryn Pond SINC		1380	690%	158	79%
Coed Ffynon-Oer SINC		429	215%	20.3	10%
Court Wood SINC		477	238%	30.3	15%
Afon Ebbw River SINC		815	407%	105	52%
Gaer Fort SINC		722	361%	86.9	43%
Cwm Pensidan SINC		439	219%	40.0	20%

TABLE D 6 MODELLED ANNUALMEAN NO<sub>x</sub> CONCENTRATIONS – 72-HOUR EMERGENCY OUTAGE SCENARIO (µg/m<sup>3</sup>)

Non Statutory Ecological Sites	AQS	CWL11		CWL12	
		PC	PC as % of AQS	PC	PC as % of AQS
Ancient woodland C	30	1.12	3.7%	0.0996	0.33%
Ancient woodland D		0.864	2.9%	0.0694	0.23%
Ancient woodland E		0.508	1.7%	0.0345	0.11%
Ancient woodland F		1.75	5.8%	0.212	0.71%
Ancient woodland G		0.840	2.8%	0.103	0.34%
Ancient woodland H		1.59	5.3%	0.172	0.57%
Celtic Springs SINC		2.82	9.4%	0.226	0.75%
LG Duffryn Site 1/2 SINC		4.09	13.6%	0.189	0.63%
Duffryn Pond SINC		2.11	7.0%	0.235	0.78%
Coed Ffynon-Oer SINC		0.191	0.64%	0.0142	0.047%
Court Wood SINC		0.225	0.75%	0.0187	0.062%
Afon Ebbw River SINC		0.485	1.6%	0.0508	0.17%
Gaer Fort SINC		0.418	1.4%	0.0445	0.15%
Cwm Pensidan SINC		0.263	0.88%	0.0228	0.076%

## APPENDIX E IN-COMBINATION IMPACT

TABLE E 1 IN-COMBINATION IMPACT OF TESTING OPERATIONS ON ANNUAL MEAN NO<sub>x</sub> (µg/m<sup>3</sup>)

Statutory Sites where pollution overlap is anticipated	AQS	Baseline	CWL11/12/13	MSFT	IQE	ERF	PC as % of AQS	PEC	PEC as % of AQS	Significance
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	30	15.2	6.67E-05	1.48E-04	NA	NA	0.0007%	15.2	51%	Insignificant
Coed-y-Darren (SSSI)		8.81	3.93E-05	7.35E-05	NA	NA	0.0004%	8.8	29%	Insignificant
Dan y Graig Quarry Risca (SSSI)		11.3	0.00E+00	NA	NA	NA	0.0000%	11.3	38%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		12.8	1.91E-04	3.99E-04	NA	NA	0.0020%	12.8	43%	Insignificant
Gwent Levels - Whitson (SSSI)		9.14	1.07E-04	2.34E-04	NA	NA	0.0011%	9.1	30%	Insignificant
Gwent Levels Rumney (SSSI)		18.6	2.98E-04	5.42E-04	NA	NA	0.0028%	18.6	62%	Insignificant
Gwent Levels St Brides (SSSI)		18.4	6.05E-03	1.00E-02	0.06	0.64	2.4%	19.1	64%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		11.0	3.27E-04	6.30E-04	NA	0.34	1.1%	11.4	38%	Insignificant
Henllys Bog (SSSI)		8.73	4.78E-05	9.44E-05	NA	NA	0.0005%	8.7	29%	Insignificant
Lisvane Reservoir (SSSI)		15.2	6.44E-05	1.51E-04	NA	NA	0.0007%	15.2	51%	Insignificant
Plas Machen Wood (SSSI)		10.1	7.44E-05	1.91E-04	NA	NA	0.0009%	10.1	34%	Insignificant
Rhymney River Section (SSSI)		20.9	7.89E-05	1.67E-04	NA	NA	0.0008%	20.9	70%	Insignificant
River Usk (SAC, SSSI)		22.0	3.14E-02	8.07E-04	0.00	1.2	4.1%	23.2	77%	Potentially Significant
Rumney Quarry (SSSI)		18.4	0.00E+00	1.44E-04	NA	NA	0.0005%	18.4	61%	Insignificant
Ruperra Castle and Woodlands (SSSI)		9.88	6.87E-05	1.88E-04	NA	NA	0.0009%	9.9	33%	Insignificant
Severn Estuary (SAC, SPA, SSSI)		26.1	5.8E-04	1.02E-03	0.00	0.47	1.6%	26.6	89%	Potentially Significant

Note:  
The maximum annual mean PCs do not necessarily occur at the same locations, as dispersion is spread across the habitat areas.  
NA - Results have not been reported in the publicly available report.

TABLE E 2 IN-COMBINATION IMPACT OF TESTING OPERATIONS ON 24-HOUR MEAN NO<sub>x</sub> (µg/m<sup>3</sup>)

Statutory Sites where pollution overlap is anticipated	AQS	Baseline	CWL11/12/13	MSFT	IQE	ERF	PC as % of AQS	PEC	PEC as % of AQS	Significance
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	200	30.5	0.224	4.47	NA	NA	2%	35.2	18%	Insignificant
Coed-y-Darren (SSSI)		17.6	0.187	2.63	NA	NA	1%	20.4	10%	Insignificant
Dan y Graig Quarry Risca (SSSI)		22.6	0.000	NA	NA	NA	0%	22.6	11%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		25.7	0.343	5.94	NA	NA	3%	32.0	16%	Insignificant
Gwent Levels - Whitson (SSSI)		18.3	0.254	4.69	NA	NA	2%	23.2	12%	Insignificant
Gwent Levels Rumney (SSSI)		37.3	0.858	14	NA	NA	7%	52.1	26%	Insignificant
Gwent Levels St Brides (SSSI)		36.8	6.35	124	0.52	10.3	71%	177.9	89%	Potentially Significant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		22.1	0.584	6.57	NA	2.7	5%	31.9	16%	Insignificant
Henllys Bog (SSSI)		17.5	0.166	3.17	NA	NA	2%	20.8	10%	Insignificant
Lisvane Reservoir (SSSI)		30.4	0.211	4.49	NA	NA	2%	35.1	18%	Insignificant
Plas Machen Wood (SSSI)		20.2	0.247	12.3	NA	NA	6%	32.7	16%	Insignificant
Rhymney River Section (SSSI)		41.9	0.259	4.85	NA	NA	3%	47.0	23%	Insignificant
River Usk (SAC, SSSI)		43.9	21.9	14.0	0.05	8.9	22%	88.7	44%	Potentially Significant
Rumney Quarry (SSSI)		36.8	0.000	14.0	NA	NA	7%	50.8	25%	Insignificant
Ruperra Castle and Woodlands (SSSI)		19.8	0.284	9.11	NA	NA	5%	29.1	15%	Insignificant
Severn Estuary (SAC, SPA, SSSI)		52.2	0.981	9.04	0.06	9.6	10%	71.9	36%	Insignificant

Note:  
 The maximum 24-hour mean PCs do not necessarily occur at the same locations or during the same hour, as the testing operations of each facility occur at different times, and dispersion is spread across the habitat areas.  
 NA - Results have not been reported in the publicly available report.

TABLE E 3 IN-COMBINATION IMPACT OF TESTING OPERATIONS ON NUTRIENT NITROGEN DEPOSITION (kgN/ha/yr)

Statutory Sites where pollution overlap is anticipated	Minimum Critical Load <sup>a</sup>	Baseline	CWL11/12/13	MSFT	IQE <sup>b</sup>	ERF	PC as % of CL	PEC	PEC as % of CL	Significance
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	2	15.2	4.67E-05	3.95E-05	NA	NA	0.001%	1.24E-05	762%	Insignificant
Coed-y-Darren (SSSI)	2	8.8	2.75E-05	1.96E-05	NA	NA	0.000%	6.78E-06	441%	Insignificant
Dan y Graig Quarry Risca (SSSI)	2	11.3	0.00E+00	NA	NA	NA	0.000%	0.00E+00	564%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	2	12.8	1.33E-04	5.76E-05	NA	NA	0.001%	2.75E-05	642%	Insignificant
Gwent Levels - Whitson (SSSI)	2	9.1	7.49E-05	3.38E-05	NA	NA	0.001%	1.56E-05	457%	Insignificant
Gwent Levels Rumney (SSSI)	2	18.6	2.09E-04	1.44E-04	NA	NA	0.003%	5.08E-05	932%	Insignificant
Gwent Levels St Brides (SSSI)	2	18.4	4.23E-03	1.44E-03	NA	0.37	2.7%	5.40E-02	922%	Potentially Significant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	10	11.0	2.29E-04	9.08E-05	NA	0.2	0.29%	2.88E-02	111%	Insignificant
Henllys Bog (SSSI)	2	8.7	3.35E-05	2.50E-05	NA	NA	0.001%	1.68E-05	436%	Insignificant
Lisvane Reservoir (SSSI)	10	15.2	4.51E-05	4.04E-05	NA	NA	0.000%	1.23E-05	152%	Insignificant
Plas Machen Wood (SSSI)	10	10.1	5.21E-05	5.09E-05	NA	NA	0.000%	2.96E-05	101%	Insignificant
Rhymney River Section (SSSI)	2	20.9	5.53E-05	4.45E-05	NA	NA	0.001%	1.43E-05	1047%	Insignificant
River Usk (SAC, SSSI)	5	22.0	2.20E-02	2.15E-04	NA	0.68	2.0%	1.01E-01	441%	Potentially Significant
Rumney Quarry (SSSI)	2	18.4	0.00E+00	3.85E-05	NA	NA	0.000%	5.54E-06	919%	Insignificant
Ruperra Castle and Woodlands (SSSI)	2	9.9	4.81E-05	5.01E-05	NA	NA	0.001%	2.82E-05	494%	Insignificant
Severn Estuary (SAC, SPA, SSSI)	10	26.1	4.07E-04	2.72E-04	NA	0.27	0.39%	3.89E-02	261%	Insignificant

Note:  
 The nutrient nitrogen deposition impact does not necessarily arise at the same locations.  
<sup>a</sup> A minimum critical loads of 2 was used for sites with no available critical loads from the APIS website as a worst case scenario.  
<sup>b</sup> Nutrient nitrogen deposition has been screened out as outlined in the IQE permit variation application report (December 2023).  
 NA - Results have not been reported in the publicly available report.

TABLE E 4 IN-COMBINATION IMPACT OF TESTING OPERATIONS ON ACID DEPOSITION (keq/ha/yr)

Statutory Sites where pollution overlap is anticipated	CWL11/12/13 <sup>a</sup>	MSFT	IQE <sup>b</sup>	ERF
	PC as % of CL			
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	NA	NA	NA	NA
Coed-y-Darren (SSSI)	NA	NA	NA	NA
Dan y Graig Quarry Risca (SSSI)	NA	NA	NA	NA
Gwent Levels - Nash and Goldcliff (SSSI)	0.00023%	<1%	NA	NA
Gwent Levels - Whitson (SSSI)	0.00013%	<1%	NA	NA
Gwent Levels Rumney (SSSI)	0.00036%		NA	NA
Gwent Levels St Brides (SSSI)	0.01%	<1%	NA	NA
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	0.00000%	<1%	NA	0.50%
Henllys Bog (SSSI)	NA	NA	NA	NA
Lisvane Reservoir (SSSI)	NA	NA	NA	NA
Plas Machen Wood (SSSI)	NA	NA	NA	NA
Rhymney River Section (SSSI)	NA	NA	NA	NA
River Usk (SAC, SSSI)	0.04%	<1%	NA	NA
Rumney Quarry (SSSI)	NA	NA	NA	NA
Ruperra Castle and Woodlands (SSSI)	NA	NA	NA	NA
Severn Estuary (SAC, SPA, SSSI)	0.0000%	<1%	NA	3.20%

Note:  
 Acid deposition is presented as PC and PC % of Critical Loads, with sulphur and nitrogen being the two major contributors. The impact does not necessarily occur at the same locations.  
<sup>a</sup> Acid deposition have been assessed only for the ecological sites with site-specific Critical Loads for acidity information available from the APIS website.  
<sup>b</sup> Acid deposition has been screened out as outlined in the IQE permit variation application report (December 2023).  
 NA - Results have not been reported in the publicly available report.

APPENDIX F STATEMENT FROM SCR SUPPLIER



## IMS Eco SCR systems Ammonia Statement

### SCR Operation

The SCR system monitors the temperature, pressure and NOX being produced by the engine plus the engine load. It also monitors the temperature and NOX level downstream of the SCR system.

During commissioning the AdBlue injection level is set by the commissioning engineer, with the engine operating at the required engine load (typically full load) to enable the system to meet the required downstream NOX level (typically below 190 Nm<sup>3</sup>/mg).

Once the AdBlue injection rate is set it can only be changed by a service engineer. The SCR system will automatically adjust the AdBlue injection rate for lower engine loads.

The last section of the SCR system contains an Ammonia anti slip catalyst which will capture any unused Ammonia if there were to be any.

Any Ammonia which is not employed within the SCR system would show as additional NOX downstream of the SCR system. This does not happen with the IMS Eco SCR system and can be demonstrated. If the AdBlue injection rate is increased to above that necessary to meet the specification then the NOX level downstream will fall, not rise as would be the case if there was excess Ammonia downstream. As the AdBlue injection rate is increased the NOX level downstream reduces.

The SCR system does not monitor the Ammonia level in the exhaust system.

### SCR Operational Problems

If there is a failure of the IMS Eco system then the NOX downstream of the SCR will increase and there will be little or no reduction in the NOX levels. This will automatically trigger a warning and then an alarm from the SCR control panel and the injection of AdBlue will be stopped by the SCR control panel. This will not change until the cause of the failure is corrected and the system manually reset by an IMS service engineer.

Tom Doyle  
General Manager  
Industrial and Marine Silencers Ltd  
14<sup>th</sup> October 2024



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