CWL12 Environmental Permit Variation Application

Air Quality Impact Assessment

PREPARED FOR

VDC CWL12 Limited

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CWL11/CWL12 Environmental Permit Variation Application

Air Quality Impact Assessment

0770849



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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

Acronyms	Description
AW	Ancient Woodland
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_2 standard is modelled to be exceeded 20 times at a receptor, a breach of the NO_2 1-hour mean is therefore expected as there would be more than the 18 allowed exceedances of this standard.
CL	Critical Load
^oC	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_2 modelled environmental contribution of 220 $\mu g/m^3$ exceeds the 200 $\mu g/m^3$ 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^3/s	Cubic metres per second
mg/m^3	Milligrams per cubic metre
MWth	Megawatt thermal
NCC	Newport City Council
NH_3	Ammonia
NRW	Natural Resources Wales
NO	Nitrogen monoxide
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen (mixture of NO and NO_2)
PC	Process Contribution
PEC	Predicted Environmental Concentration
$PM_{2.5}$	Particulate Matter of diameter below or equal to 2.5 µm
PM_{10}	Particulate Matter of diameter below or equal to 10 µm

Acronyms	Description
SAC	Special Area of Conservation
SCR	Selective Catalytic Reduction
SINC	Sites of Importance for Nature Conservation
SO_2	Sulphur dioxide
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
$\mu g/m^3$	Micrograms per cubic metre
US EPA	United States Environmental Protection Agency
VDC	Vantage Data Centres

REPORT STRUCTURE

Requirement[1]	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 parameters	Appendix A
Contour plots	Appendix B

[1] Environmental Agency, 2024, 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) located at Celtic Way, Marshfield, Duffryn, Newport, NP10 8BE. The facility holds an Environmental Permit (EP), number EPR/BB3599CW/V004, issued by Natural Resources Wales (NRW) on 17th March 2025. The current EP relates to the operation of both CWL11 and CWL12 together, comprising a total of 194 emergency generators for backup power supply and the associated testing regime, with a total permitted thermal input of 520 MW_{th}.

VDC is proposing a partial transfer of the EP so that each of the two data centres operate under its own EP. CWL11 will be permitted for 141 generators and CWL12 will be permitted for 53 generators following the transfer. This document relates to the operation of the CWL12 component (referred to hereafter as the Site). VDC is supported in this environmental permit variation application by Environmental Resources Management Ltd (ERM).

An application for a variation to the CWL12 EP (following the transfer) is also being made to accommodate proposed changes to stack parameters for the 53 generators at the Site, and changes to the testing regime.

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 6th June 2023, houses 60 emergency generators with a permitted thermal input of 179 MW_{th}. 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. The model has been updated to reflect an increase in stack height and change to testing regime for all CWL12 generators. The assessment primarily focuses on Nitrogen Oxides (NO_x) emissions associated with diesel engine operations as per the previous EP application. NO_x emissions generated by the Site's engines have been assessed and compared with the statutory NO_2 Air Quality Standards (AQS) and NO Environmental Assessment Levels (EAL), the US EPA Acute Exposure Guidance Levels (AEGLs) in relation to human health impact and statutory NO_x 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_{10}. Long term PM_{10} and $PM_{2.5}$ have not been assessed as the engines are only expected to operate for a small number of hours per year. Sulphur Dioxide (SO_2) 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 CWL12, both independently and cumulatively with the 141 generators at CWL11 and the 60 generators at CWL13.

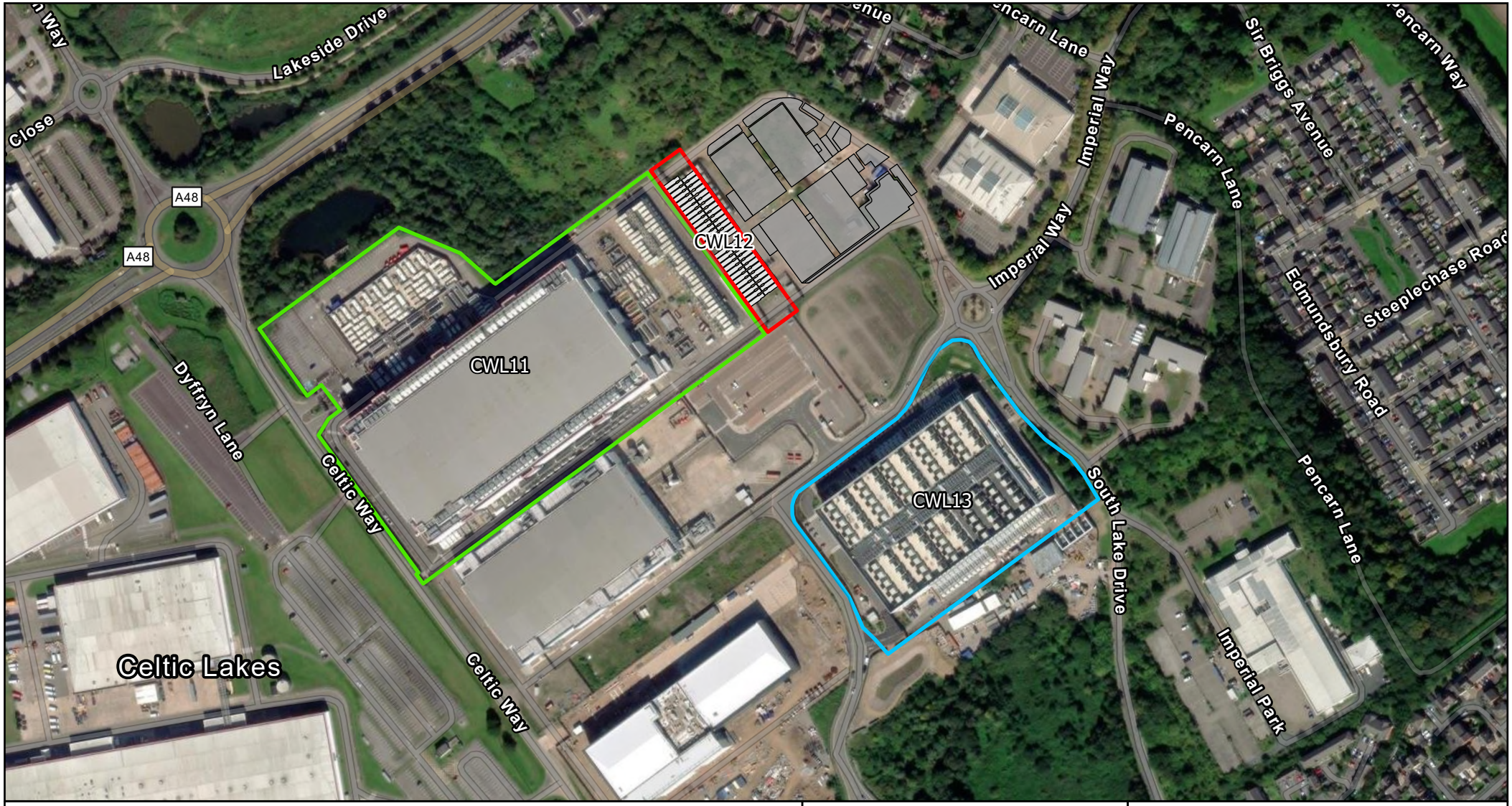
All details of current and expected future operations used in this report have been provided to ERM by VDC.

1.2 SITE LOCATION AND DESCRIPTION

The Site location and boundary is 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 CWL12 data centre comprises one data hall building split into four pods. The CWL11 data centre comprises one data hall building and 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. CWL12 is permitted for 53 diesel backup generators. CWL11 has 141 generators installed and CWL13 has 60 generators installed, bringing the total across CWL11/12/13 to 254 diesel backup generators.



Approximate Installation Boundaries:

- CWL11 Data Centre
- CWL12 Data Centre
- CWL13 Data Centre

- Proposed CWL12 Site Layout
- Proposed CWL12 Generator Layout

0 50 100 150
Metres

N

Figure 1 - CWL11, CWL12 & CWL13
Site Location Newport, Wales

SCALE: See Scale Bar	VERSION: A02
SIZE: A4	DRAWN: RW
PROJECT: 0770849	CHECKED: SC
DATE: 21/08/2025	APPROVED: KR

ERM

VANTAGE DATA CENTERS

PROJECTION: British National Grid

Maxar, Microsoft, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Path: \\UKSPRDGISFS01\Data\London\Projects\0724643 - Vantage\Map\0724643 - Vantage.aprx\0764238 - Vantage - Newport Data Centre CWL11,12, 13 Site Location - A02

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 May 2025, 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_2 impact assessment; 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[2] from EU standards[3] as well as Environmental Assessment Levels (EAL) which are part of UK permitting guidance[4]. 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_{10}.
- 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[5]) website, which was consulted 12 June 2025, however figures from 30 May 2024 were used as they were more representative of a conservative

[2] The Air Quality Standards Regulations 2010 Statutory Instrument 2008/301, https://www.legislation.gov.uk/uksi/2010/1001/contents/made
[3] European Union Air Quality Standards, http://ec.europa.eu/environment/air/quality/standards.htm
[4] 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
[5] UK Air Pollution Information System (APIS), www.apis.ac.uk

assessment, based on the site relevant critical loads tool. APIS is an online database detailing critical loads and background 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 (µg/m³)	Percentile
Sensitive Human Receptor	NO_2	1-hour mean, not to be exceeded more than 18 times per year	200	99.79th
		Annual mean	40	N/A
	PM_{10}	24-hour mean, not to be exceeded more than 35 times per year	50	90.4th
	NO	1-hour mean	4,400	N/A
		Annual mean	310	N/A
Sensitive Ecological Receptor	NO_x	24-hour mean	200 [a]	100th
		Annual mean	30	N/A

[a] The EA Permitting guidance[6] advises that a higher AQS of 200 µg/m³ should be used instead of 75 µg/m³ for detailed assessments where ozone is below the AOT40 critical level and sulphur dioxide is below the lower critical level of 10 µg/m³.

TABLE 2.2: ACUTE EXPOSURE GUIDELINE LEVELS FOR NO_2 (µg/m³)

AEGL [a]	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

[a] 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.

[6] Environment Agency, 2025, 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)	10-25	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[7] 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
Sensitive Human Receptor				
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
Sensitive Ecological Receptor				
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

[7] 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_2 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 [8] as an indicator of the risk of acute severe health effects primarily during emergency running scenarios, and subsequently also adopted by NRW.

[8] Environment Agency for England (2022) Data Centre FAQ Headline Approach DRAFT version 21.0 to TechUK for Discussion 15/11/22

3. BACKGROUND AIR QUALITY

3.1 NO_2 AND PM_{10}

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_2 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[9] (base year 2018) for 2022 provide information on the annual mean concentrations of NO_2, NO_x and PM_{10} 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[10], the majority of NO_x 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_2 and PM_{10} were 11.9 µg/m^3 and 14.4 µg/m^3 respectively, and these were multiplied by two for short-term averages, as per EA guidance[11].

TABLE 3.1: LOCAL MONITORING DATA

Site [a]	Type	NO_2 Annual Mean Concentration (µg/m^3)				
		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

[a] Annual mean concentrations for PM_{10} are not available at these monitoring sites.

TABLE 3.2: DEFRA BACKGROUND MAP CONCENTRATIONS (µg/m^3)

Grid Square (X, Y in National Grid)	Annual Mean		
	NO_2	NO_x	PM_{10}
328500, 184500	11.9	15.8	14.4

[9] DEFRA, 2018, Background Mapping data for local authorities -2018, https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018
[10] 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
[11] 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_2

The 24-hourly NO_x AQS of 200 µg/m^3 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_2 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)[12] 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_2 is not monitored in Newport or Cwmbran, and instead, the Cardiff Centre AURN [13]monitoring site was used to obtain background SO_2. 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_2 levels from the AURN sites.

TABLE 3.3: BACKGROUND OZONE AND SO_2

AURN Site	Threshold (µg/m^3)	Pollutants Monitored	Baseline (µg/m^3)	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_2	0.745	Annual mean from 2024

[12] DEFRA, Site Information for Cwmbran Crownbridge, https://uk-air.defra.gov.uk/networks/site-info?site_id=CWMC&view=View
[13] DEFRA, Site Information for Cardiff Centre, https://uk-air.defra.gov.uk/networks/site-info?site_id=CARD&view=View

4. ASSESSMENT METHODOLOGY FOR OPERATIONAL PHASE

4.1 ENGINE OPERATION

CWL12 is permitted for 53 emergency generators. In addition to CWL12, this assessment also considers the potential cumulative impact of emissions from CWL11, where 141 generators are installed (currently covered under the same EP as CWL12 (EPR/BB3599CW/V004)), and 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 power 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.

VDC are proposing to change the testing regime for the engines at CWL11, CWL12 and CWL13 from that assessed in the previous EP applications. 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. Changes relevant to this EP variation application are indicated in **bold** text

TABLE 4.1: ANTICIPATED ENGINE OPERATIONS

Regime	Frequency	Duration	Scheduling	Number of Engines	Load [c]
Testing Regime – All tests					
Quarterly test	Quarterly [a]	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	**Once** per year	**30** minutes per generator group	Monday to Friday; 0900 to 1700	Groups of engines are tested, one group after the other [b]	100%
Emergency Outage Scenarios					
Emergency outage	Unpredictable, infrequent	1 hour all generators	Any time	All engines together	100%
		72 hours all generators	Any time	All engines together	100%

[a] The quarterly test is undertaken 4 times a year.
[b] No more than one black building test per day.
[c] 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
Number of sources	CWL11: 141; CWL12: 53; CWL13: 60; Total 254	See *Figure 4.1* for sources locations.
Model domain	20 km x 20 km	Radius from the Site of 10 km to cover protected conservation areas. Map in Appendix A.
Receptor grid resolution	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	The modelled stack heights ranged from 3.18 m to 21.2 m, as detailed in Table 4.3.
Discrete sensitive receptors	45	See details in Section 4.4.1.
Buildings	**5 buildings on and around the Site:** CWL11, CWL12, CWL13, IQE facility building, **KLA Building**	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.
Terrain	Not required	There are not sustained gradients of >1:10 in the vicinity of the Site, and therefore terrain was not required.
Surface characteristics	Albedo: 0.37-1.00 Bowen Ratio: 0.9 Surface Roughness: 0.2	As provided with meteorological data.
Meteorological data	Cardiff Airport, 5 years (2017-2021)	Hour-sequential data. Wind roses are presented in Appendix A.
NO_x to NO_2 conversion ratio	Short-term concentrations: <500 m from source 15% >500 m from source 35% Long-term concentrations: 70%	The Environment Agency [a] 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 [b].
Averaging period conversion rates	1-hour NO_x concentration to 10-minute NO_x concentration factor: 1.431 1-hour NO_x concentration to 30-minute NO_x concentration factor: 1.149	AERMOD does not allow for modelling shorter averaging periods than 1 hour. To estimate NO_2 concentrations for comparison against the 10-minute and 30-minute AEGLs, the power law was used to calculate a factor. These factors were applied to the modelled 1-hour NO_2 concentration to determine a modelled 10-minute and 30-minute NO_2 concentration.

[a] Environmental Agency AQMAU, 2016, Diesel generator short term NO2 impact assessment, https://consult.defra.gov.uk/airquality/medium-combustion-plant-and-controls-on-generators/supporting_documents/Generator%20EA%20air%20dispersion%20modelling%20report.pdf
[b] Environmental Agency, 2007, Review of methods for NO to NO2 conversion in plumes at short ranges, 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. A map showing the stack locations is presented in Figure 4.1.

- Emission parameters for the 53 generators with SCR-fitted engine model KD1650-E installed at CWL12 (Permit ID A143-A195) have been updated.
- The emission parameters for the141 permitted generators installed at CWL11remain unchanged as the previous application[14].
- For this assessment, the SCR is assumed to be designed to meet the Medium Combustion Plant Directive[15] (MCPD) Emission Limit Values (ELVs) of 190 mg/m^3 at standard temperature and pressure (STP), dry and 15% oxygen content (equivalent to 500 mg/m^3 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_x 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_x 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 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.

[14] ERM, CWL11/CWL12 Environmental Permit Variation Application – Air Quality Impact Assessment (Permit Reference EPR/BB3599CW/V004), October 2024
[15] European Commission, Directive (EU) 2015/2193, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32015L2193

TABLE 4.3: MODELLED EMISSIONS PARAMETERS

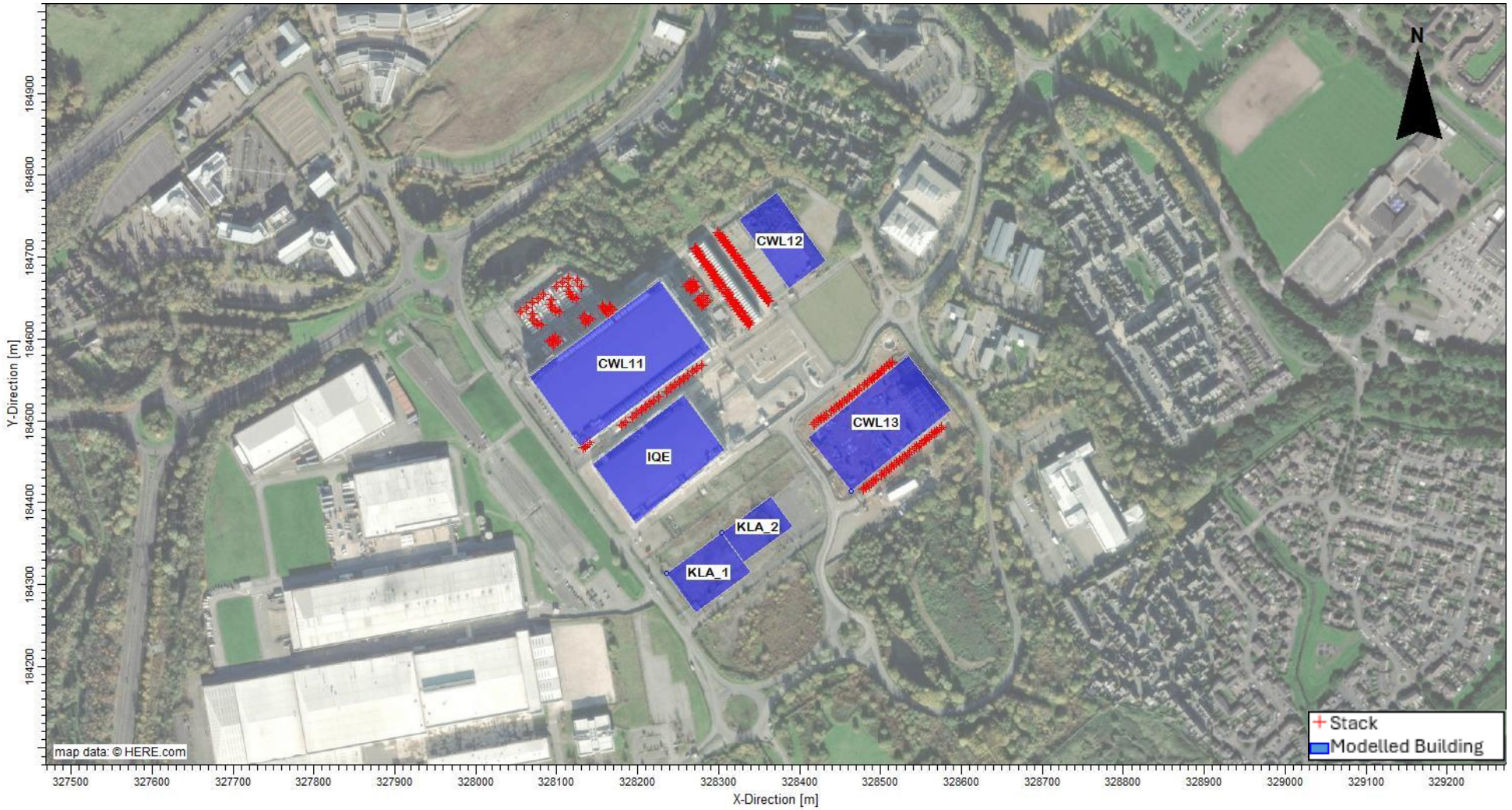
Parameter [a, b]	**CWL11**								**CWL12**	**CWL13** [c]
Site	CWL11_original					CWL11_expansion			CWL_12	CWL_13
Engine Make/Model	Perkins 4006-23TAG3A	MTU 12V1600G20F	Volvo TWD 1642GE	Mitsubishi S12R-F1PTAW2	Kohler KD45V20-5DEP	Kohler KD45V20-5DES@75% [b]	Kohler KD45V20-5DES	Kohler KD1800-F with SCR	**Kohler KD1650-E with SCR**	Kohler KD45V20-5DEP with SCR
Number of generators	10	29	18	5	15	5	41	18	53	60
Stack Orientation	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Stack Height above ground level (m)	3.50	3.20	3.18	3.94	3.65	3.65	9.30	10.4	**11.3**	21.2
Flue Diameter (m)	0.265	0.250	0.215	0.453	0.350	0.350	0.350	0.450	0.350	0.350
Emission Velocity (m/s)	49.8	40.3	49.4	29.8	43.3	31.0 [b]	41.3	27.0	41.3	43.3
Actual Flow Rate (m^3/s)	2.75	1.98	1.79	4.79	4.17	2.98 [b]	3.97	4.30	3.97	4.17
Emission Temperature (K)	773.15	753.15	758.15	823.15	772.15	772.15	772.15	771.15	772.15	772.15
NO_x Concentration (mg/m^3, no SCR) [d]	2,000	1,507	1,742	2,000	2,000	1,929 [b]	3,883	5,589	3,883	2,000
NO_x Concentration (mg/m^3, with SCR) [d]	NA	NA	NA	NA	NA	NA	NA	500 [e]	500 [e]	500 [e]
NO_x Emission Rate (g/s, no SCR)	1.40	0.783	0.815	2.30	2.13	1.75 [b]	4.41	6.87	4.41	2.13
NO_x Emission Rate (g/s, with SCR) [1hour]	NA	NA	NA	NA	NA	NA	NA	1.14 [f]	0.894 [f]	1.07 [g]

Parameter [a, b]	CWL11								CWL12	CWL13 [c]
NO_x Emission Rate (g/s, 100% load, with SCR) [10-minute]	NA	NA	NA	NA	NA	NA	NA	3.75 [f]	2.49 [f]	2.13 [g]
NO_x Emission Rate (g/s, 100% load, with SCR) [30-minute]	NA	NA	NA	NA	NA	NA	NA	1.66 [f]	1.21 [f]	1.60 [g]
NO_x Emission Rate (g/s, with SCR) [4hour]	NA	NA	NA	NA	NA	NA	NA	0.753 [f]	0.655 [f]	0.666 [g]
NO_x Emission Rate (g/s, with SCR) [8hour]	NA	NA	NA	NA	NA	NA	NA	0.688 [f]	0.615 [f]	0.600 [g]
PM_{10} Concentration (mg/m^3) [d]	80	50	29	50	80	4 [b]	3	0	3	3
PM_{10} Emission Rate (g/s, 100% load)	0.0560	0.0260	0.0135	0.0575	0.0852	0.00278 [b]	0.00370	0.0	0.00370	0.00320

[a] 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[16, 17].
[b] The parameters indicate engines operating at 75% load and are derived from the relevant engine datasheets provided by VDC to ERM.
[c] Emission parameters for the generators installed at CWL13 are included in the air modelling dispersion study to assess the cumulative impact on air quality.
[d] 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_2, dry basis.
[e] MCPD NO_x ELV requirement of 190 mg/m^3 at STP, 15% O_2, dry basis (equivalent to 500 mg/m^3 at 5% O_2).
[f] Emission rate calculated from unabated and SCR-abated NOx concentrations on an averaging time basis and taking into account of 5-minute warm-up time for SCR.
[g] Emission rate calculated from unabated and SCR-abated NOx concentrations on an averaging time basis and taking into account of 20-minute warm-up time for SCR.

[16] Atkins, Next Generation Data Ltd Environmental Permit Application Supporting Information (Permit Reference EPR/BB3599/CW), November 2018
[17] 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 1-45, assessed in the previous EP application, were included in the current assessment. Following EA guidance [18], 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. The locations of the sensitive human receptors are 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	24	11 Nant-Y-Moor Close	Residential	327520.3, 184684.7
2	18 Pencarn Avenue	Residential	328366.0, 184839.0	25	5 Nant-Y-Moor Close	Residential	327424.3, 184636.7
3	Celtic Springs Guest House	Recreational	328176.0, 184816.0	26	Greggs	Commercial	328235.5, 184978.3
4	Teddies Nursery	Nursery	327822.0, 184790.0	27	Integra House	Office	328176.8, 185103.7
5	11 Pencarn Avenue	Residential	328470.0, 184780.0	28	Holiday Inn Express Newport	Hotel	328280.9, 185085.0
6	24 Pencarn Avenue	Residential	328290.0, 184888.0	29	Ysgol Gyfun Gwent Is Coed	Education	329820.7, 184951.6
7	2 Sir Briggs Avenue	Residential	328705.0, 184766.0	30	The John Frost School	Education	329890.1, 184895.5
8	95 Edmundsbury Road	Residential	328807.0, 184544.0	31	102 Sandpiper Way	Residential	329214.9, 184908.9
9	Tredegar House Caravan Site	Recreational	328525.0, 185140.0	32	56 Sandpiper Way	Residential	329284.3, 184863.5
10	St Joseph's High School	Education	329080.0, 184750.0	33	5 Craft Workshops	Commercial	328857.3, 185069.0
11	Imperial Way	Industrial	328498.0, 184736.0	34	HSBC	Office	328259.6, 185386.6
12	Imperial Courtyard	Industrial	328590.0, 184574.0	35	Crown Commercial Service	Office	328699.9, 185781.6

[18] 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)
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[19] 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 SINCs, were included in the impact assessment. Based on the MAGIC website[20], the designated ecological sites included in the impact assessment are listed in Table 4.5. 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)
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments [a]	SSSI	9.3 west
Coed-y-Darren [a]	SSSI	8.6 north west
Dan y Graig Quarry Risca [a]	SSSI	7.8 north west
Gwent Levels - Nash and Goldcliff	SSSI	5.7 east
Gwent Levels - Whitson	SSSI	8.9 east
Gwent Levels Rumney	SSSI	3.7 south
Gwent Levels St Brides	SSSI	0.6 south
Gwlyptiroedd Casnewydd / Newport Wetlands	SSSI	5.9 south east
Henllys Bog [a]	SSSI	8.2 north west
Lisvane Reservoir [a]	SSSI	9.7 west
Plas Machen Wood [a]	SSSI	5.2 north west
Rhymney River Section [a]	SSSI	9.0 south west
River Usk	SAC, SSSI	3.6 east
Rumney Quarry [a]	SSSI	8.8 south west
Ruperra Castle and Woodlands [a]	SSSI	5.8 north west
Severn Estuary	SAC, SPA, SSSI	3.4 south east
Ancient woodland C [b]	AW	1.2 south west
Ancient woodland D [b]	AW	0.9 west
Ancient woodland E [b]	AW	1 north west
Ancient woodland F [b]	AW	0.6 north

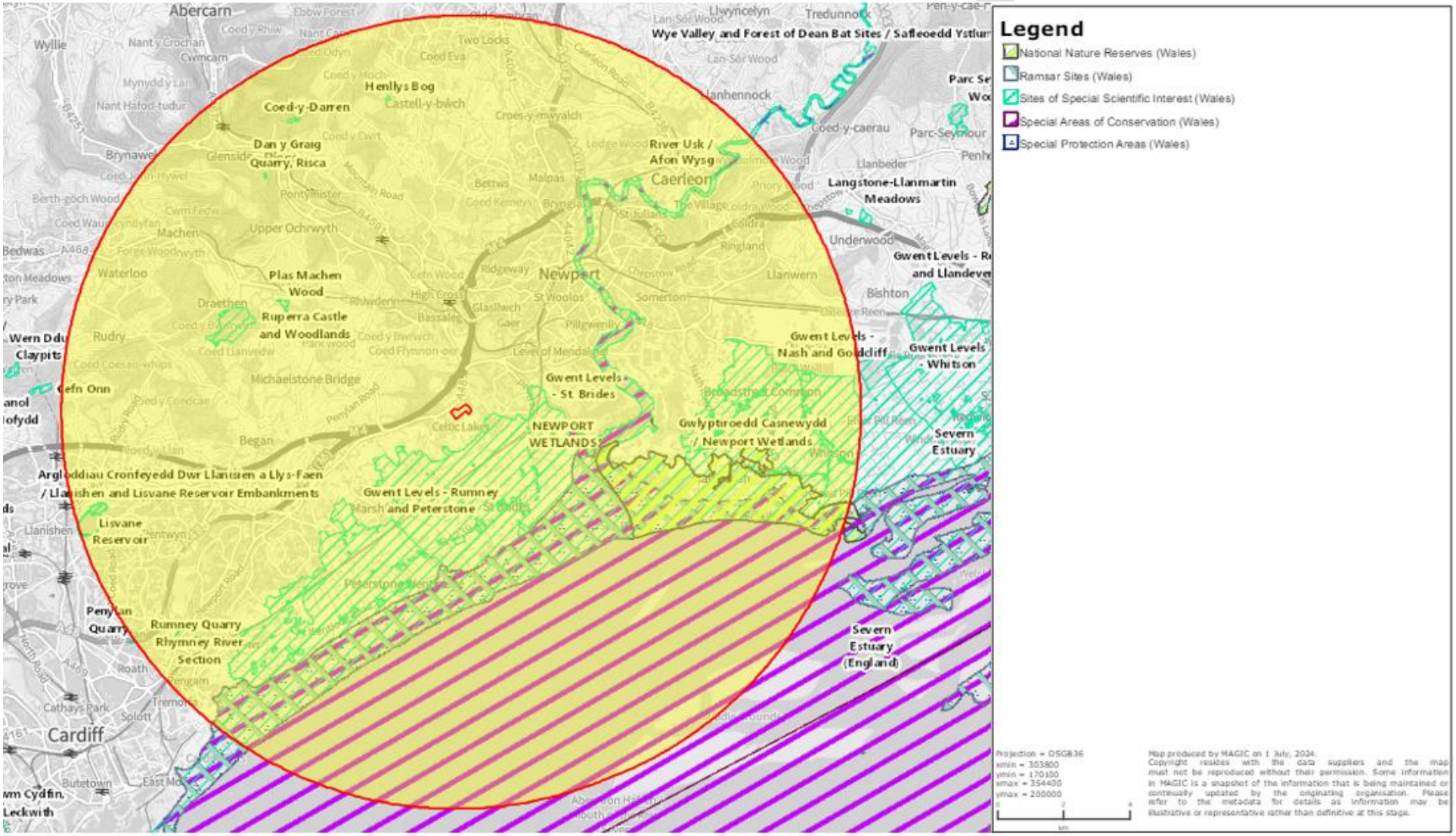
[19] Environment Agency, 2016, Air emissions risk assessment for your environmental permit, https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit
[20] Natural England, 2018, MAGIC Interactive map, https://magic.defra.gov.uk/magicmap.aspx

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

[a:] 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.

[b]: 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: The meteorological data recorded at Cardiff Airport from 2017-2021 was used for this assessment, 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_{10} and SO_2 see Section 5.1 and 5.2. A detailed assessment was undertaken for NO_2, NO and NO_x, 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 CWL12, both independently and cumulatively with CWL11 and CWL13.

5.1 SCREENING ASSESSMENT FOR PM_{10}

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 CWL12, CWL11 and CWL13 Sites will operate in any one 24-hour period;
- The engines operate for no more than 1 hour each; and
- 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_{10} of 28.7 µg/m^3 was used, based on the long-term background concentration presented in Table 3.2.

TABLE 5.1: MODELLED 24-HOUR MEAN CONCENTRATIONS FOR PM_{10}

PM_{10} Concentrations (µg/m^3), Maximum Anywhere on the Grid										
24-hour maximum (100th percentile)						**24-hour 36th highest hour (90.4th 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	32.2	7.0%	64%	Not significant
PM_{10} Concentrations (µg/m^3), Maximum at any Discrete Receptors										
24-hour maximum (100th percentile)						**24-hour 36th highest hour (90.4th 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	1.61	30.3	3.2%	61%	Not significant

The modelled results in Table 5.1 are that the 24-hour PM_{10} AQS of 50 µg/m^3 is not expected to be exceeded in the worst-case scenario assessed. On this basis, the PM_{10} 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_2

A high-level analysis of SO_2 emissions is provided using the results for NO_x 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[21] to no more than 0.001% sulphur by mass, which substantially limits the potential for SO_2 emissions from fuel combustion.

Cell DC1MF2 was evaluated to screen for the potential maximum 1-hour SO_2 PC based on the fuel use, as this cell has been modelled to have the highest 1-hour NO_x 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_2, compared with 4.41 g/s for NO_x.

Applying the ratio of SO_2 to NO_x emission rates in g/s, this results a maximum 1-hour SO_2 PC of 0.0566 µg/m^3 for a single engine or 0.0763 µg/m^3 for the cell. Both values are significantly lower than the 1-hour SO_2 AQS of 350 µg/m^3. On this basis, the SO_2 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_2, NO_X, AND NO

The potential impact of NO_x 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^3 which is the 1-hour NO_2 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 emissions of any of the Site's engines for CWL12 in isolation and from cumulative emissions from the Site's CWL11/12/13 operating

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

as a whole are presented in Table 5.2 and Table 5.3. The potential to exceed the annual mean NO EAL and NO_2 AQS resulting from the two tests at CWL12 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_2 PEC from the quarterly test in Table 5.2 is not modelled to be >200 µg/m^3. 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_2 as a result of the quarterly test are expected from CWL12 or from CWL11/12/13 as a whole.
- The maximum 1-hour NO_2 PEC from the black building test in Table 5.3 is modelled to be >200 µg/m^3 for both CWL12 in isolation and from CWL11/12/13 as a whole. Two modelled test groups of generators from CWL12 had a modelled PEC exceeding the 1-hour NO_2 AQS. Based on the testing regime described in Table 4.1, as the black building test occurs once a year for thirty minutes, it is anticipated that this test has the potential to result in two exceedances of the 1-hour NO_2 AQS in a year, under certain atmospheric conditions, but not a breach of the AQS (18 exceedances are allowed before there is considered to be a breach). Therefore, the anticipated NO_2 emissions from the generator operation of CWL12 in isolation 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 when considering CWL12 in isolation.
- In addition, there are four modelled test groups of generators at CWL12 having a modelled PEC above the AEGL-1 threshold for 10-minute NO_2, with a maximum modelled PEC of 1,530 µg/m^3 vs the threshold of 940 µg/m^3. 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 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_2 are expected. A contour plot of the test group at CWL12 with the highest modelled NO_2 concentrations is presented in Appendix B.
- When considering the cumulative impacts of CWL11, CWL12 and CWL13 together, there are twenty additional modelled test groups from CWL11 that have a PEC modelled to exceed the 1-hour NO_2 AQS due to the black building test. There is also the possibility that the AEGL-1 thresholds for 10-minute and 30-minute NO_2 could be exceeded from test groups at CWL11. Modelling of the black building tests for CWL11/12/13 in combination is modelled to exceed the 1-hour NO_2 AQS 20 times in a year (2 from CWL12 and 18 from CWL11), which would constitute a breach of the AQS.
- The modelled annual mean NO_2 PEC in Table 5.4 is not modelled to be >40 µg/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 testing regime at the Site are expected.

WHEN CONSIDERING CUMULATIVE IMPACTS OF CWL11/12/13 OPERATING TOGETHER, THE MODELLED ANNUAL MEAN NO_2 PEC IN

- Table 5.4 is not modelled to be >40 µg/m^3 as a result of all tests undertaken at the Site. The combined testing regime of CWL11/12/13 is considered insignificant, as whilst the PC is 2.42% (greater than the 1% threshold of significance), the maximum modelled PEC is 32% (less than the 100% threshold of significance). No exceedances of the annual mean NO EAL as a result of the cumulative testing regime at the Site are expected.

TABLE 5.2: MODELLED MAXIMUM CONCENTRATIONS AT DISCRETE SENSITIVE HUMAN RECEPTORS FOR QUARTERLY TESTS (µg/m^3)

Averaging Period	AQS/EAL/AEGL		Baseline	Highest PC	PEC	PC as % of AQS/EAL/AEGL	PEC as % of AQS/EAL/AEGL	Significance
Quarterly Test of CWL12								
NO 1-hour	EAL	4,400	5.14	135	140	3.1%	3.2%	Insignificant
NO_2 1-hour	AQS 1-hour	200	23.8	36.5	60.4	18%	30%	Insignificant
	AQS 1-hour 19th highest	200	23.8	23.1	46.9	12%	23%	Insignificant
NO_2 10-minute	AEGL-1	940	23.8	146	169	15%	18%	Insignificant
	AEGL-2	38,000				0.38%	0.45%	Insignificant
	AEGL-3	64,000				0.23%	0.26%	Insignificant
NO_2 30-minute	AEGL-1	940	23.8	57.0	80.8	6.1%	8.6%	Insignificant
	AEGL-2	28,000				0.15%	0.21%	Insignificant
	AEGL-3	47,000				0.09%	0.13%	Insignificant
NO_2 1-hour	AEGL-1	940	23.8	36.5	60.4	3.9%	6.4%	Insignificant
	AEGL-2	23,000				0.16%	0.26%	Insignificant
	AEGL-3	38,000				0.10%	0.16%	Insignificant
NO_2 4-hour	AEGL-1	940	23.8	6.39	30.2	0.68%	3.2%	Insignificant
	AEGL-2	15,000				0.04%	0.20%	Insignificant
	AEGL-3	23,000				0.03%	0.13%	Insignificant
NO_2 8-hour	AEGL-1	940	23.8	2.53	26.4	0.27%	2.8%	Insignificant
	AEGL-2	13,000				0.02%	0.20%	Insignificant
	AEGL-3	21,000				0.012%	0.13%	Insignificant

Averaging Period	AQS/EAL/AEGL		Baseline	Highest PC	PEC	PC as % of AQS/EAL/AEGL	PEC as % of AQS/EAL/AEGL	Significance
Quarterly test of CWL11/12/13								
NO 1-hour	EAL	4,400	5.14	552	557	13%	13%	Insignificant
NO_2 1-hour	AQS 1-hour	200	23.8	172	196	86%	98%	Insignificant
	AQS 1-hour 19th highest	200	23.8	89.1	113	45%	56%	Insignificant
NO_2 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_2 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_2 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_2 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_2 8-hour	AEGL-1	940	23.8	13.4	37.3	1.4%	4.0%	Insignificant
	AEGL-2	13,000				0.10%	0.29%	Insignificant
	AEGL-3	21,000				0.064%	0.18%	Insignificant

TABLE 5.3: MODELLED MAXIMUM CONCENTRATIONS AT DISCRETE SENSITIVE HUMAN RECEPTORS FOR BLACK BUILDING TEST (µg/m^3)

Averaging Period	AQS/EAL/AEGL		Baseline	Highest PC	PEC	PC as % of AQS/EAL/AEGL	PEC as % of AQS/EAL/AEGL	Significance
Black Building Test of CWL12								
NO 1-hour	EAL	4,400	5.14	699	704	16%	16%	Insignificant
NO_2 1-hour	AQS 1-hour	200	23.8	189	213	95%	106%	Potentially Significant
	AQS 1-hour 19th highest	200	23.8	111	135	56%	68%	Insignificant
NO_2 10-minute	AEGL-1	940	23.8	1,507	1,530	160%	163%	Potentially Significant
	AEGL-2	38,000		1,507	1,530	4.0%	4.0%	Insignificant
	AEGL-3	64,000		1,507	1,530	2.4%	2.4%	Insignificant
NO_2 30-minute	AEGL-1	940	23.8	589	613	63%	65%	Insignificant
	AEGL-2	28,000		589	613	1.6%	1.6%	Insignificant
	AEGL-3	47,000		589	613	0.92%	0.96%	Insignificant
NO_2 1-hour	AEGL-1	940	23.8	189	213	20%	23%	Insignificant
	AEGL-2	23,000		189	213	0.8%	0.9%	Insignificant
	AEGL-3	38,000		189	213	0.50%	0.56%	Insignificant
NO_2 4-hour	AEGL-1	940	23.8	16.6	40.4	1.8%	4.3%	Insignificant
	AEGL-2	15,000		16.6	40.4	0.11%	0.27%	Insignificant
	AEGL-3	23,000		16.6	40.4	0.07%	0.18%	Insignificant
NO_2 8-hour	AEGL-1	940	23.8	6.91	30.7	0.74%	3.3%	Insignificant

Averaging Period	AQS/EAL/AEGL		Baseline	Highest PC	PEC	PC as % of AQS/EAL/AEGL	PEC as % of AQS/EAL/AEGL	Significance
	AEGL-2	13,000		6.91	30.7	0.053%	0.24%	Insignificant
	AEGL-3	21,000		6.91	30.7	0.033%	0.15%	Insignificant
Black Building Test of CWL11/12/13								
NO 1-hour	EAL	4,400	5.14	1286	1291	29%	29%	Insignificant
NO_2 1-hour	AQS 1-hour	200	23.8	465	488	232%	244%	Potentially Significant
	AQS 1-hour 19th highest	200	23.8	214	238	107%	119%	Potentially Significant
NO_2 10-minute	AEGL-1	940	23.8	1507	1530	160%	163%	Potentially Significant
	AEGL-2	38,000				4.0%	4.0%	Insignificant
	AEGL-3	64,000				2.4%	2.4%	Insignificant
NO_2 30-minute	AEGL-1	940	23.8	1068	1091	114%	116%	Potentially Significant
	AEGL-2	28,000				2.8%	2.9%	Insignificant
	AEGL-3	47,000				1.67%	1.71%	Insignificant
NO_2 1-hour	AEGL-1	940	23.8	465	488	49%	52%	Insignificant
	AEGL-2	23,000				2.0%	2.1%	Insignificant
	AEGL-3	38,000				1.22%	1.29%	Insignificant
NO_2 4-hour	AEGL-1	940	23.8	48.8	72.7	5.2%	7.7%	Insignificant
	AEGL-2	15,000				0.33%	0.48%	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	23,000				0.21%	0.32%	Insignificant
NO_2 8-hour	AEGL-1	940	23.8	16.6	40.4	1.76%	4.3%	Insignificant
	AEGL-2	13,000				0.128%	0.31%	Insignificant
	AEGL-3	21,000				0.079%	0.19%	Insignificant

TABLE 5.4: MODELLED ANNUAL MEAN CONCENTRATIONS AT DISCRETE SENSITIVE HUMAN RECEPTORS OF THE TESTING REGIME (µg/m^3)

Averaging Period	AQS/EAL		Baseline	Highest PC	PEC	PC as % of AQS/EAL	PEC as % of AQS/EAL	Significance
Testing Regime – All tests of CWL12								
NO Annual mean	EAL Annual mean	310	2.57	0.0476	2.62	0.015%	0.84%	Insignificant
NO_2 Annual mean	AQS Annual mean	40	11.9	0.170	12.1	0.43%	30%	Insignificant
Testing Regime – All tests of CWL11/12/13								
NO Annual mean	EAL Annual mean	310	2.57	0.271	2.8	0.087%	0.92%	Insignificant
NO_2 Annual mean	AQS Annual mean	40	11.9	0.968	12.9	2.42%	32%	Insignificant

5.3.1.2 POTENTIAL IMPACT OF TESTING REGIME ON ECOLOGY

The potential impact of NO_x 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_x emissions resulting from the testing regime at the Site on the non-statutory ecological sites within 2 km have also been assessed.

Ambient NO_x emissions

The modelled results for the 24-hour and annual NO_x from the Site's testing regime are presented in *Appendix C* and show the following:

- The 24-hour NO_x PC from the testing regime of CWL12 in isolation 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_x from CWL12's testing regime is considered insignificant.
- The 24-hour NO_x PC from the testing regime of CWL11/12/13 in combination in Table C 1 is modelled to be >10% of the 24-hour maximum Critical Level at the River Usk SAC. Expected ambient impacts of 24-hour NO_x from all three sites operating together is predicted to be potentially significant at the River Usk SAC.
- The annual NO_x PC from the testing regime of CWL12 in isolation or CWL11/12/13 combined 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_x from the Site's testing regime is considered insignificant.
- The modelled results for the 24-hour and annual NO_x at the non-statutory ecological sites within 2 km from the Site's testing regime are presented in Table D 1 and Table D 2. The modelled 24-hour and annual mean NO_x 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[22], based on the annual mean NO_x concentrations presented in Table C 2. The results for the nitrogen and acid deposition from the CWL12 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 CWL12 and CWL11/12/13 combined on nitrogen and acid deposition are modelled to be insignificant at all of the identified designated ecological sites located within 10 km.

[22] 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

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^3, i.e. greater than the 1-hour NO_2 AQS. The emergency outage scenarios assumed 1 hour and 72 hours of continuous emissions from all 254 generators (CWL11, CWL12 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, CWL12 and CWL13) and all sites together, the maximum 1-hour NO_2 PEC in Table 5.5 is modelled to exceed the 1-hour NO_2 AQS of 200 µg/m^3, and the 1-hour NO PEC is modelled to exceed the 1-hour NO EAL of 4,400 µg/m^3. There is also the possibility that the AEGL-1 thresholds for 10-minute, 30-minute and 1-hour NO_2 could be exceeded. Exceedances of the AEGL-1 threshold for 4-hour NO_2 may occur in the case of a 1-hour emergency outage scenario for CWL11/12/13 in combination but is not expected for CWL12 alone. No exceedances of the annual mean NO_2 AQS of 40 µg/m^3 and AEGLs threshold for 8-hour NO_2, or the annual mean NO EAL of 310 µg/m^3, are expected.
- In the highly unlikely case of a 72 hour emergency outage at each individual site and all sites together, the maximum 1-hour NO_2 PEC in Table 5.5 is modelled to exceed the 1-hour NO_2 AQS of 200 µg/m^3, and the 1-hour NO PEC is modelled to exceed the 1-hour NO EAL of 4,400 µg/m^3. There is also the possibility that the AEGL-1 thresholds for 10-minute, 30-minute and 1-hour NO_2 could be exceeded. Exceedances of the AEGL-1 threshold for 4-hour and 8-hour NO_2 could occur in the case of a 72-hour emergency outage scenario for all sites together but are not expected for CWL12 alone. No exceedances of the annual mean NO_2 AQS of 40 µg/m^3 or the annual mean NO EAL of 310 µg/m^3 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_2 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 (µg/m^3)

Averaging Period	AQS/EAL/AEGL	Baseline	Scenario	Highest PC	PEC	PC as % of AQS	PEC as % of AQS	Significance
Emergency Outage Scenarios of CWL12, all engines running, 100% load								
NO 1-hour	EAL	4,400	5.14	1 hour	5,188	5,193	118%	118%	Potentially Significant
				72 hour					
NO annual mean	EAL	310	2.57	1 hour	0.00947	2.58	0.0031%	0.83%	Insignificant
				72 hour	0.682	3.25	0.22%	1.0%	Insignificant
NO_2 1-hour	AQS 1-hour	200	23.8	1 hour	1,404	1,428	702%	714%	Potentially Significant
				72 hour					
	AQS 1-hour 19th highest	200	23.8	1 hour	849	872	424%	436%	Potentially Significant
				72 hour					
NO_2 annual mean	AQS	40	11.9	1 hour	0.0339	11.9	0.085%	30%	Insignificant
				72 hour	2.44	14.3	6.1%	36%	Insignificant
NO_2 10-minute	AEGL-1	940	23.8	1 hour	5,595	5,618	595%	598%	Potentially Significant
				72 hour					
	AEGL-2	38,000	23.8	1 hour	5,595	5,618	15%	15%	Insignificant
				72 hour					
	AEGL-3	64,000	23.8	1 hour	5,595	5,618	8.7%	8.8%	Insignificant
				72 hour					
NO_2 30-minute	AEGL-1	940	23.8	1 hour	2,189	2,213	233%	235%	Potentially Significant
				72 hour					
	AEGL-2	28,000	23.8	1 hour	2,189	2,213	5.8%	5.8%	Insignificant

Averaging Period	AQS/EAL/AEGL		Baseline	Scenario	Highest PC	PEC	PC as % of AQS	PEC as % of AQS	Significance
				72 hour					
	AEGL-3	47,000	23.8	1 hour	2,189	2,213	3.4%	3.5%	Insignificant
				72 hour					
NO_2 1-hour	AEGL-1	940	23.8	1 hour	1,404	1,428	149%	152%	Potentially Significant
				72 hour					
	AEGL-2	23,000	23.8	1 hour	1,404	1,428	6.1%	6.2%	Insignificant
				72 hour					
	AEGL-3	38,000	23.8	1 hour	1,404	1,428	3.7%	3.8%	Insignificant
				72 hour					
NO_2 4-hour	AEGL-1	940	23.8	1 hour	121	144	13%	15%	Insignificant
				72 hour	482	506	51%	54%	Insignificant
	AEGL-2	15,000	23.8	1 hour	121	144	0.8%	1.0%	Insignificant
				72 hour	482	506	3.2%	3.4%	Insignificant
	AEGL-3	23,000	23.8	1 hour	121	144	0.52%	0.63%	Insignificant
				72 hour	482	506	2.1%	2.2%	Insignificant
NO_2 8-hour	AEGL-1	940	23.8	1 hour	47.6	71.4	5.1%	7.6%	Insignificant
				72 hour	381	405	41%	43%	Insignificant
	AEGL-2	13,000	23.8	1 hour	47.6	71.4	0.37%	0.55%	Insignificant
				72 hour	381	405	2.9%	3.1%	Insignificant
	AEGL-3	21,000	23.8	1 hour	47.6	71.4	0.23%	0.34%	Insignificant
				72 hour	381	405	1.8%	1.9%	Insignificant

Averaging Period	AQS/EAL/AEGL		Baseline	Scenario	Highest PC	PEC	PC as % of AQS	PEC as % of AQS	Significance
Emergency Outage Scenarios of CWL11/12/13, all engines running, 100% load									
NO 1-hour	EAL	4,400	5.14	1 hour	21,853	21,858	497%	497%	Potentially Significant
				72 hour					
NO annual mean	EAL	310	2.57	1 hour	0.0413	2.61	0.013%	0.84%	Insignificant
				72 hour	2.97	5.54	0.96%	1.8%	Insignificant
NO_2 1-hour	AQS 1-hour	200	23.8	1 hour	11,047	11,071	5,523%	5,535%	Potentially Significant
				72 hour					
	AQS 1-hour 19th highest	200	23.8	1 hour	5438	5462	2,719%	2,731%	Potentially Significant
				72 hour					
NO_2 annual mean	AQS	40	11.9	1 hour	0.148	12.1	0.37%	30%	Insignificant
				72 hour	10.6	22.5	27%	56%	Insignificant
NO_2 10-minute	AEGL-1	940	23.8	1 hour	20,545	20,568	2,186%	2,188%	Potentially Significant
				72 hour					
	AEGL-2	38,000	23.8	1 hour	20,545	20,568	54%	54%	Insignificant
				72 hour					
	AEGL-3	64,000	23.8	1 hour	20,545	20,568	32%	32%	Insignificant
				72 hour					
NO_2 30-minute	AEGL-1	940	23.8	1 hour	13,598	13,622	1,447%	1,449%	Potentially Significant
				72 hour					
	AEGL-2	28,000	23.8	1 hour	13,598	13,622	36%	36%	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	13,598	13,622	21%	21%	Insignificant
				72 hour					
NO_2 1-hour	AEGL-1	940	23.8	1 hour	11,047	11,071	1,175%	1,178%	Potentially Significant
				72 hour					
	AEGL-2	23,000	23.8	1 hour	11,047	11,071	48%	48%	Insignificant
				72 hour					
	AEGL-3	38,000	23.8	1 hour	11,047	11,071	29%	29%	Insignificant
				72 hour					
NO_2 4-hour	AEGL-1	940	23.8	1 hour	1,436	1,459	153%	155%	Potentially Significant
				72 hour	5,742	5,766	611%	613%	Potentially Significant
	AEGL-2	15,000	23.8	1 hour	1,436	1,459	10%	10%	Insignificant
				72 hour	5,742	5,766	38%	38%	Insignificant
	AEGL-3	23,000	23.8	1 hour	1,436	1,459	6.2%	6.3%	Insignificant
				72 hour	5,742	5,766	25%	25%	Insignificant
NO_2 8-hour	AEGL-1	940	23.8	1 hour	470	493	50%	52%	Insignificant
				72 hour	3,756	3,780	400%	402%	Potentially Significant
	AEGL-2	13,000	23.8	1 hour	470	493	3.6%	3.8%	Insignificant
				72 hour	3,756	3,780	29%	29%	Insignificant
	AEGL-3	21,000	23.8	1 hour	470	493	2.2%	2.3%	Insignificant
				72 hour	3,756	3,780	18%	18%	Insignificant

5.3.2.2 POTENTIAL IMPACT OF EMERGENCY OUTAGE SCENARIOS ON ECOLOGY

The potential impact of NO_x emissions, nitrogen and acid deposition resulting from the two emergency scenarios at CWL12 and across CWL11/12/13 combined 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_x 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_x emissions

The modelled results for the 24-hour and annual NO_x 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_x PC in the case of 1 hour and 72 hours emergency outage scenarios of CWL12 operating in isolation (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_x among all the designated sites due to its proximity to the Site (28% of the CL during a 1-hour emergency outage and 671% of the CL during a 72-hour emergency outage). The Gwent Levels St-Brides SSSI also exceeds the CL (170% during a 72-hour outage at CWL12).
- The 24-hour NO_x PC in the case of 1-hour and 72 hour emergency outage scenarios of the CWL11/12/13 facility operating together (Table C 5 and Table C 6) are modelled to be >10% of the 24-hour maximum CL at a number of the identified ecological designated sites located within the 10 km of the Site. The River Usk SAC is modelled to have the highest modelled 24-hour NO_x concentration among all of the designated sites due to its proximity to the Site (146% of the CL during a 1-hour emergency outage and 3,496% of the CL during a 72-hour outage).
- The annual NO_x PC in the case of a 1 hour emergency outage scenario of CWL12 operating in isolation or in combination with CWL11/13 (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 CWL12 in isolation or in combination with CWL11/13 (Table C 8), the modelling suggest that the annual NO_x 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_x among all the designated sites due to its proximity to the Site.

The modelled results for the 24-hour and annual NO_x at the non-statutory ecological sites within 2 km from the Site's emergency outage scenarios are presented in Appendix D and show the following:

- In the case of 1 hour emergency outage scenario of CWL12 (Table D 3), the 24-hour mean NO_x 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 CWL12 (Table D 5), the 24-hour mean NO_x 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_x PC in the case of 1 hour and 72 hours emergency outage scenarios of 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[23], based on the annual mean NO_x 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 1 hour 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 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 CWL12 on nitrogen deposition are expected to be insignificant at most of the sites, except Gwent Levels St Brides (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.
- Potential impacts from the 1 hour emergency outage scenario of CWL11/12/13 operating together 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 CWL11/12/13 operating together on nitrogen deposition are expected to be insignificant at most of the sites, except Gwent Levels St Brides (SSSI), Gwent Levels Rumney 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.

[23] 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

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 CWL12 data centre.

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.

Following the submission of the previous application in September 2024, ERM has reviewed the Newport City Council planning portal for significant developments and new permits that have been issued for local sites that may have a potential impact on air quality. No new developments have been identified so the in-combination assessment has continued to focus on cumulative impacts from the Microsoft, IQE and Vital Energi facilities.

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_x, 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 0 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_x: 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. 4.0% of the total PC at River Usk and 0.19% 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_x: Potentially significant impacts may occur at River Usk (SAC, SSSI), Severn Estuary (SAC, SPA, 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 three ecological sites have relatively high baseline levels of NO_x 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. 4.9% of the total PC at River Usk and 1.7% 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_x 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_x , 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 EP for CWL12 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: increase of the stack heights for all 53 engines at CWL12 and updates to the engines testing regime for CWL11/12/13. It also considers the potential impacts from the Site independently and cumulatively with the nearby CWL11 and CWL13 data centres.

Operations of CWL12 in isolation

The key findings of the AQIA are:

- The screening assessment for potential PM_{10} emissions from the generators concluded that the 24-hour PM_{10} AQS of 50 µg/m^3 is not expected to be breached at any of the data centres.
- The screening assessment for SO_2 emissions from the generators concluded that the 1-hour SO_2 AQS of 350 µg/m^3 is not expected to be breached at any of the data centres.
- NH_3 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_x emissions on human health and ecology resulting from the modelled testing regime of CWL12 shows that:
    - The quarterly testing of single generators at CWL12 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 from operation of CWL12 in isolation.
    - The black building test of generators in groups at CWL12 is modelled to exceed the 1-hour NO_2 AQS and 10-minute NO_2 AEGL-1 threshold. Two modelled test groups of generators from CWL12 had a modelled PEC exceeding the 1-hour NO_2 AQS. Based on the testing regime described in Table 4.1, as the black building test occurs once a year for thirty minutes, it is anticipated that this test has the potential to result in two exceedances of the 1-hour NO_2 AQS in a year, only under certain atmospheric conditions, but not a breach of the AQS (18 exceedances are allowed before there is considered to be a breach). Therefore, the anticipated NO_2 emissions from the generator operation at CWL12 in isolation 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 when considering CWL12 in isolation. In addition, there are four modelled test groups of generators at CWL12 having a modelled PEC above the AEGL-1 threshold for 10-minute NO_2, with a maximum modelled PEC of 1,530 µg/m^3 vs the threshold of 940 µg/m^3.
    - 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 1-hour AQS or the 10-minute AEGL-1 threshold for NO_2 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 CWL12, the modelled impacts of ambient 24-hour NO_x, ambient annual NO_x, nitrogen and acid deposition from the testing regime of the CWL12 in isolation are considered insignificant.

- The potential impact of NO_x emissions on human health and ecology resulting from the modelling two emergency outage scenarios of CWL12 (being 1 hour in length and 72 hours in length) have been modelled with results as follows:
  - In both scenarios, an exceedance of the 1-hour NO_2 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. An outage totalling up to 72 hours a year is even less likely and therefore the risk of breaching the 1-hour NO_2 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 from CWL12 operating in isolation, significant impacts on the ambient 24-hour NO_x are modelled with exceedances of the CL at the River Usk SAC but no significant impacts on the annual mean NO_x, nitrogen and acid deposition are expected.
  - In the case of a 72 hour emergency scenario from CWL12 operating in isolation, there may potentially be significant impacts on the ambient 24-hour and annual mean NO_x, nitrogen and acid deposition at designated ecological sites in close proximity to the Site. Neither the 1-hour or the 72-hour emergency outage scenarios are considered likely 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 NOx 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 NOx, 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.

Cumulative operations of CWL11/12/13

The key findings of the AQIA are:

- The assessment of potential impact of NO_x emissions on human health and ecology resulting from the modelled testing regime of 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 from operation of CWL12 in isolation or from CWL11/12/13 as a whole.
  - The black building test of generators in groups at the Site is modelled to exceed the 1-hour NO_2 AQS and 10-minute NO_2 AEGL-1 threshold from CWL11/12/13 operating as a whole. When considering the cumulative impacts of CWL11, CWL12 and CWL13 together, there are twenty modelled test groups from CWL11 that have a PEC exceeding the 1-

hour NO_2 AQS due to the black building test in addition to the two test groups from CWL12. There is also the possibility that the AEGL-1 thresholds for 10-minute and 30-minute NO_2 could be exceeded from test groups at CWL11. It is anticipated that the black building test from CWL11/12/13 in combination could result in 22 exceedances of the 1-hour NO_2 AQS in a year (2 from CWL12 and 20 from CWL11), which would constitute a breach of the AQS.

- 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_x, ambient annual NO_x, nitrogen and acid deposition from the testing regime of CWL11/12/13 operating together is predicted to be potentially significant at the River Usk SAC.

- The potential impact of NO_x emissions on human health and ecology resulting from the modelled emergency outage scenarios of CWL11/12/13 have been modelled with results as follows:
  - In both scenarios, an exceedance of the 1-hour NO_2 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_2 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 from CWL11/12/13 operating together, significant impacts on the ambient 24-hour NO_x are modelled with exceedances of the CL at the River Usk SAC but no significant impacts on the annual mean NO_x, nitrogen and acid deposition are expected. In the case of a 72 hour emergency scenario from CWL11/12/13 operating together there may potentially be significant impacts on the ambient 24-hour and annual mean NO_x, 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 NOx 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 24-hour mean NOx, 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



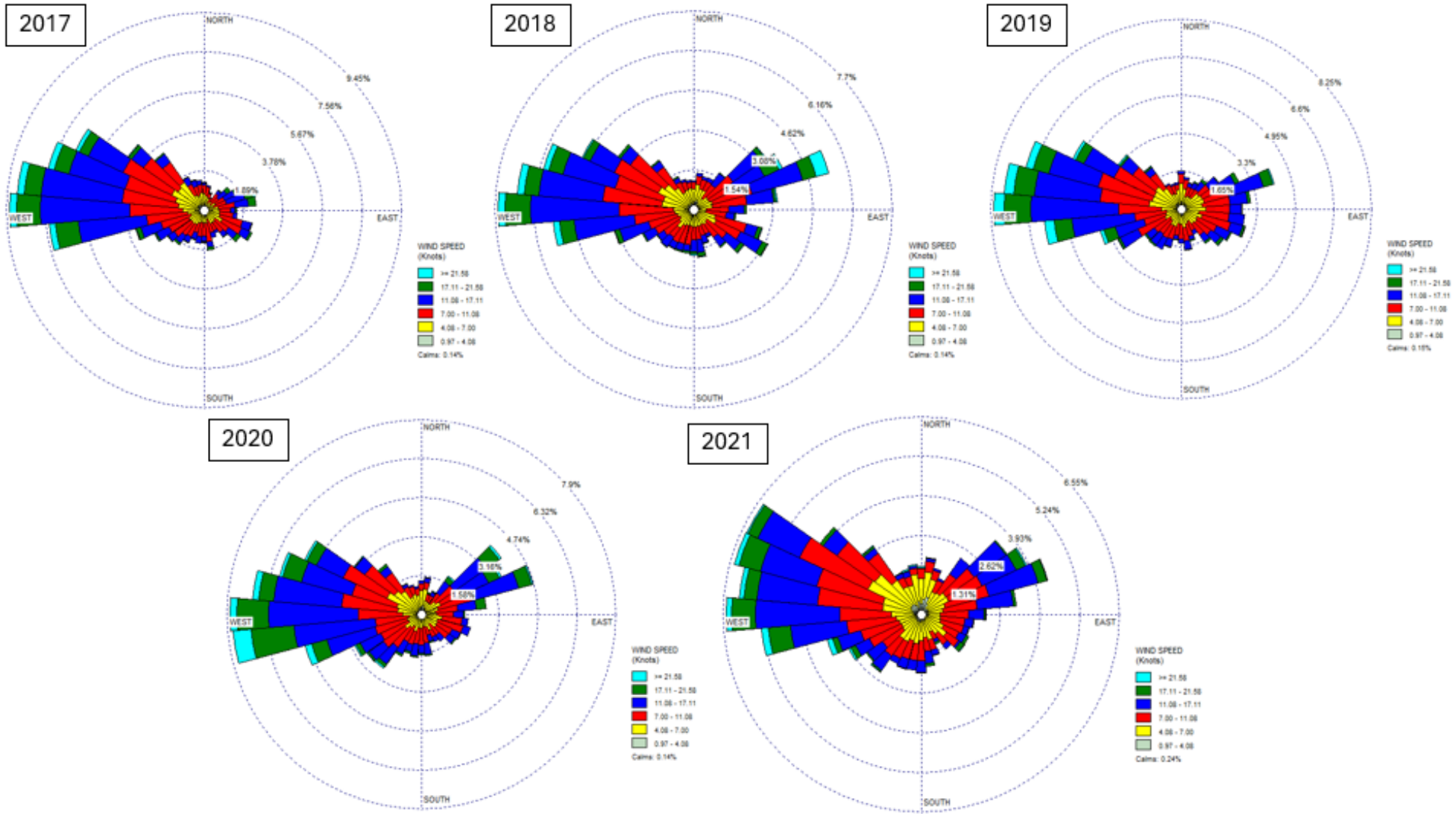
FIGURE A 2 MODELLED BUILDINGS LOCATIONS



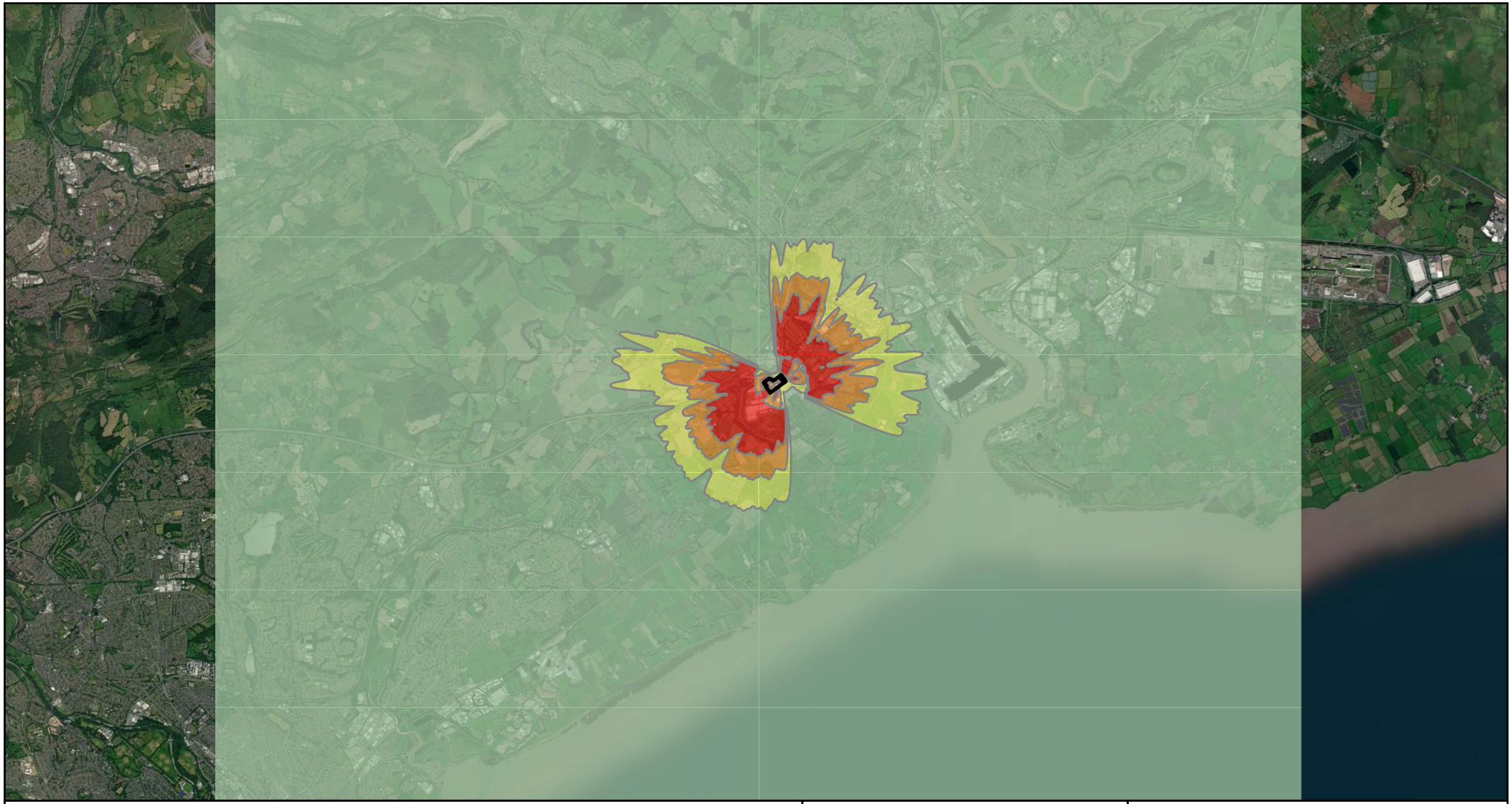
TABLE A 1 MODELLED BUILDINGS HEIGHTS

Building	Height (m)
CWL11	23.5
CWL12	24.1
CWL13	20.2
IQE	17.6
KLA Building Section 1	18.3
KLA Building Section 2	15.0

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



APPENDIX B CONTOUR PLOTS



Site Boundary

PEC for NO_2 1-hour maximum, 100th percentile (µg/m^3) - Black Building Test CWL11

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

0 0.5 1 1.5 2 2.5

Kilometres

N

Figure B1
PEC for NO_2 1-hour maximum, 100th percentile (µg/m^3) - Black Building Test CWL11

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PROJECT: 0770849	CHECKED: JE
DATE: 24/04/2025	APPROVED:

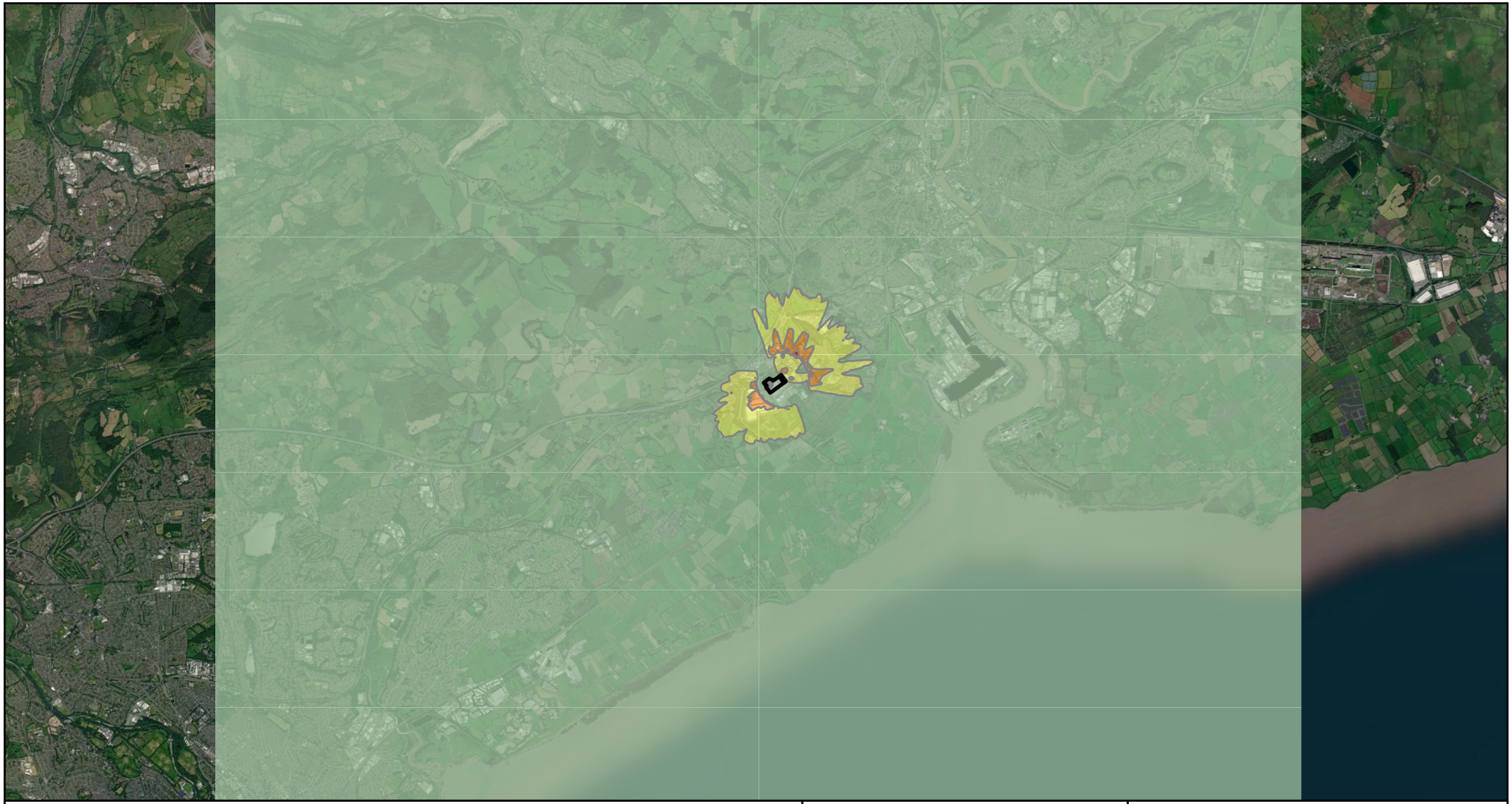
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VANTAGE DATA CENTERS

PROJECTION: British National Grid

Earthstar Geographics

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Site Boundary

PEC for NO_2 1-hour maximum, 100th percentile (µg/m^3) - Black Building Test CWL12

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

0 0.5 1 1.5 2 2.5

Kilometres

N

Figure B2
PEC for NO_2 1-hour maximum, 100th percentile (µg/m^3) - Black Building Test CWL12

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SIZE: A4	DRAWN: MC
PROJECT: 0770849	CHECKED: JE
DATE: 24/04/2025	APPROVED:

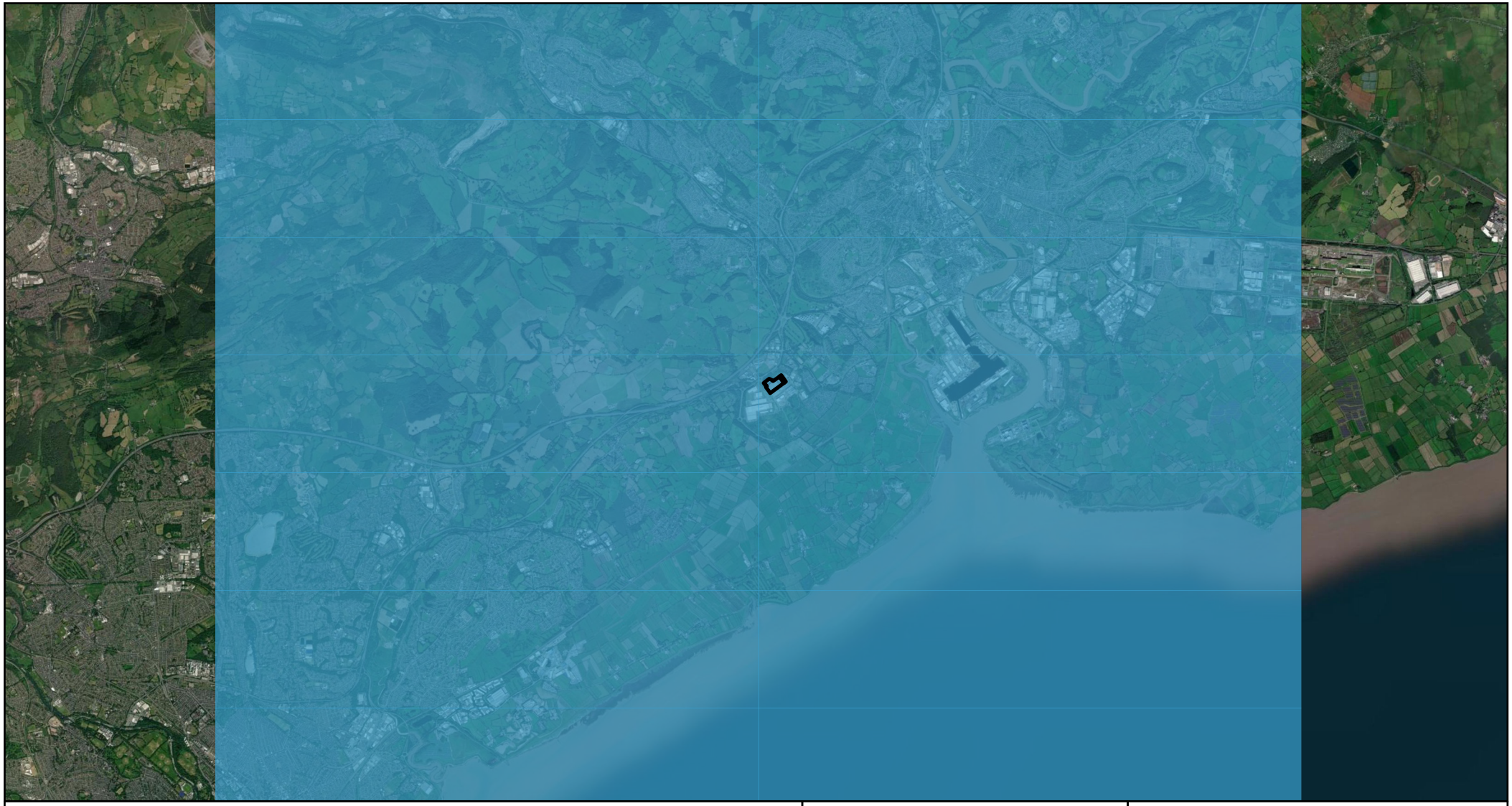
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VANTAGE DATA CENTERS

PROJECTION: British National Grid

Earthstar Geographics

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Site Boundary

PC for NO_2 annual mean ($\mu g/m^3$) - Testing Regime CWL11

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

0 0.5 1 1.5 2 2.5

Kilometres

N

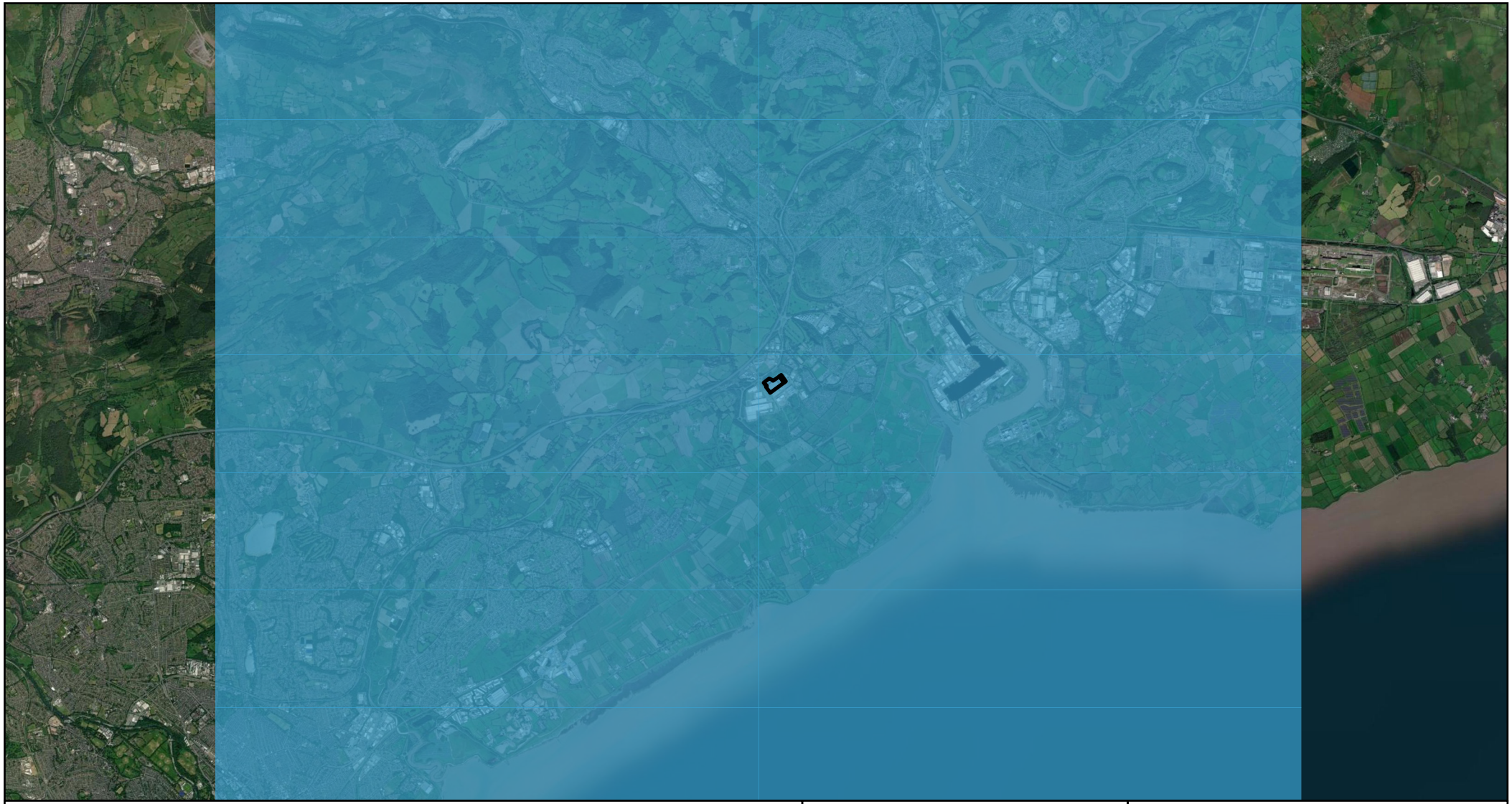
Figure B3
PC for NO_2 annual mean ($\mu g/m^3$) - Testing Regime CWL11

SCALE: See Scale Bar	VERSION: A01
SIZE: A4	DRAWN: MC
PROJECT: 0770849	CHECKED: JE
DATE: 24/04/2025	APPROVED:

PROJECTION: British National Grid

Earthstar Geographics

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Site Boundary

PC for NO_2 annual mean ($\mu g/m^3$) - Testing Regime CWL12

- <0.5
- <4
- <40
- >40

0 0.5 1 1.5 2 2.5

Kilometres

N

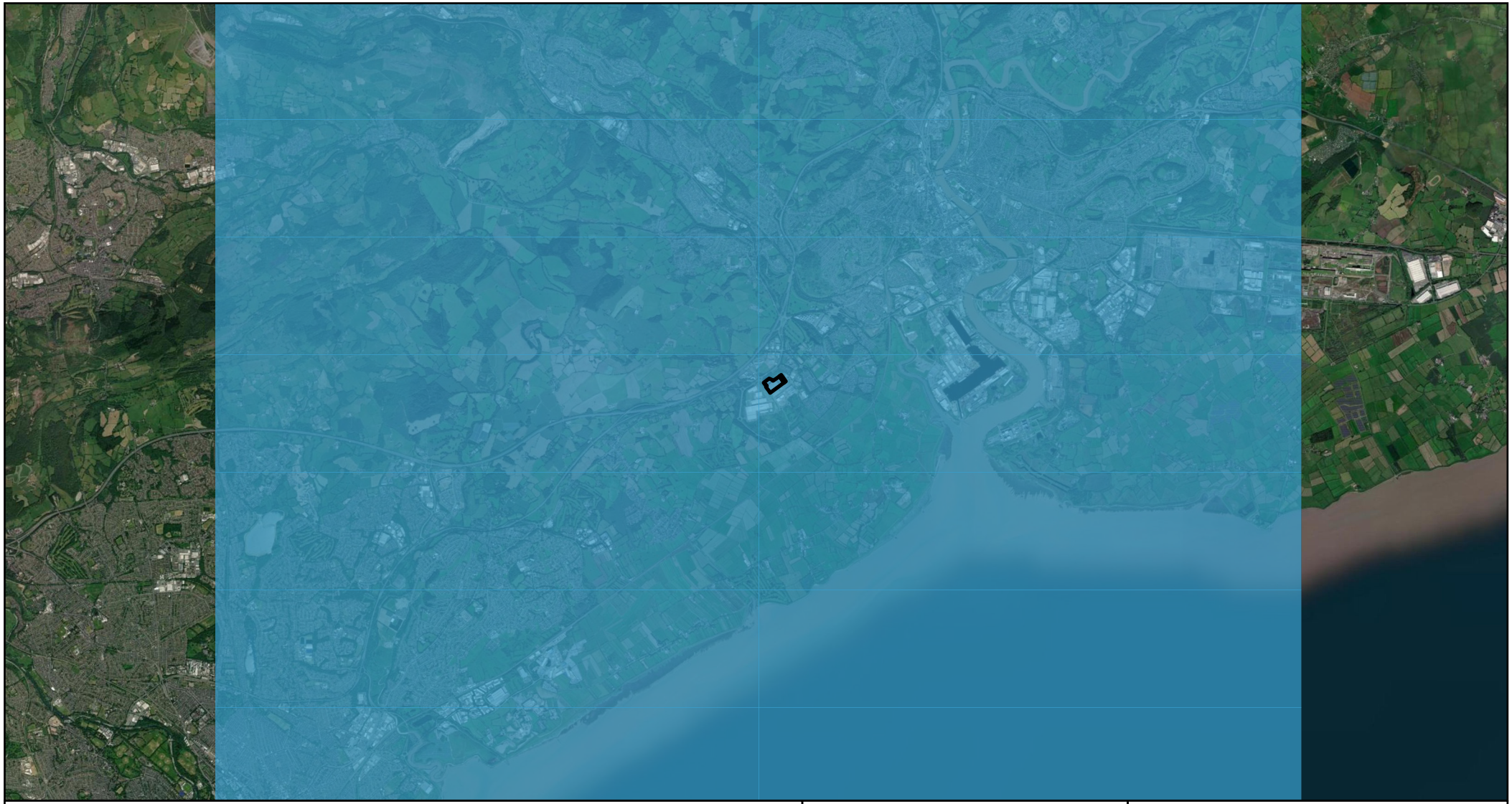
Figure B4
PC for NO_2 annual mean ($\mu g/m^3$) - Testing Regime CWL12

SCALE: See Scale Bar	VERSION: A01
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PROJECT: 0770849	CHECKED: JE
DATE: 24/04/2025	APPROVED:

PROJECTION: British National Grid

Earthstar Geographics

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Site Boundary

PC for NO_2 annual mean ($\mu g/m^3$) - Testing Regime all in-combined

- <0.6
- <4
- <40
- >40

0 0.5 1 1.5 2 2.5

Kilometres

N

Figure B5
PC for NO_2 annual mean ($\mu g/m^3$) - Testing Regime all in-combined

SCALE: See Scale Bar	VERSION: A01
SIZE: A4	DRAWN: MC
PROJECT: 0770849	CHECKED: JE
DATE: 24/04/2025	APPROVED:

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Site Boundary

PEC for NO_2 1-hour maximum, 100th percentile (µg/m^3) - Emergency Scenario CWL11

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

0 0.5 1 1.5 2 2.5

Kilometres

N

Figure B6
PEC for NO_2 1-hour maximum, 100th percentile (µg/m^3) - Emergency Scenario CWL11

SCALE: See Scale Bar	VERSION: A01
SIZE: A4	DRAWN: MC
PROJECT: 0770849	CHECKED: JE
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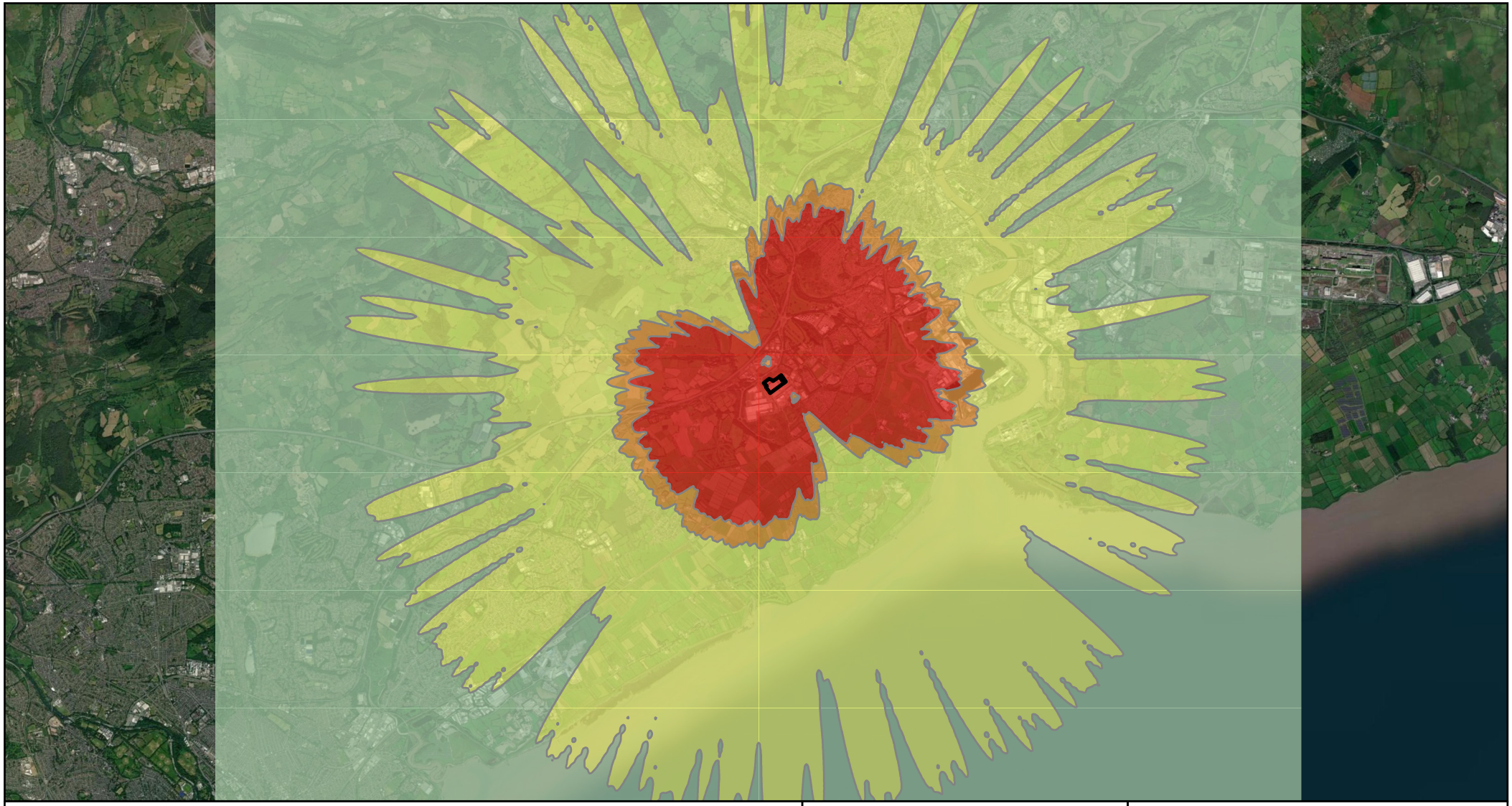
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VANTAGE DATA CENTERS

PROJECTION: British National Grid

Earthstar Geographics

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Site Boundary

PEC for NO_2 1-hour maximum, 100th percentile (µg/m^3) - Emergency Scenario CWL12

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

0 0.5 1 1.5 2 2.5

Kilometres

N

Figure B7
PEC for NO_2 1-hour maximum, 100th percentile (µg/m^3) - Emergency Scenario CWL12

SCALE: See Scale Bar	VERSION: A01
SIZE: A4	DRAWN: MC
PROJECT: 0770849	CHECKED: JE
DATE: 24/04/2025	APPROVED:

ERM

VANTAGE DATA CENTERS

PROJECTION: British National Grid

Earthstar Geographics

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Site Boundary

PEC for NO_2 1-hour maximum, 100th percentile (µg/m^3) - Emergency Scenario all in-combined

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

0 0.5 1 1.5 2 2.5

Kilometres

N

Figure B8
PEC for NO_2 1-hour maximum, 100th percentile (µg/m^3) - Emergency Scenario all in-combined

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DATE: 24/04/2025	APPROVED:

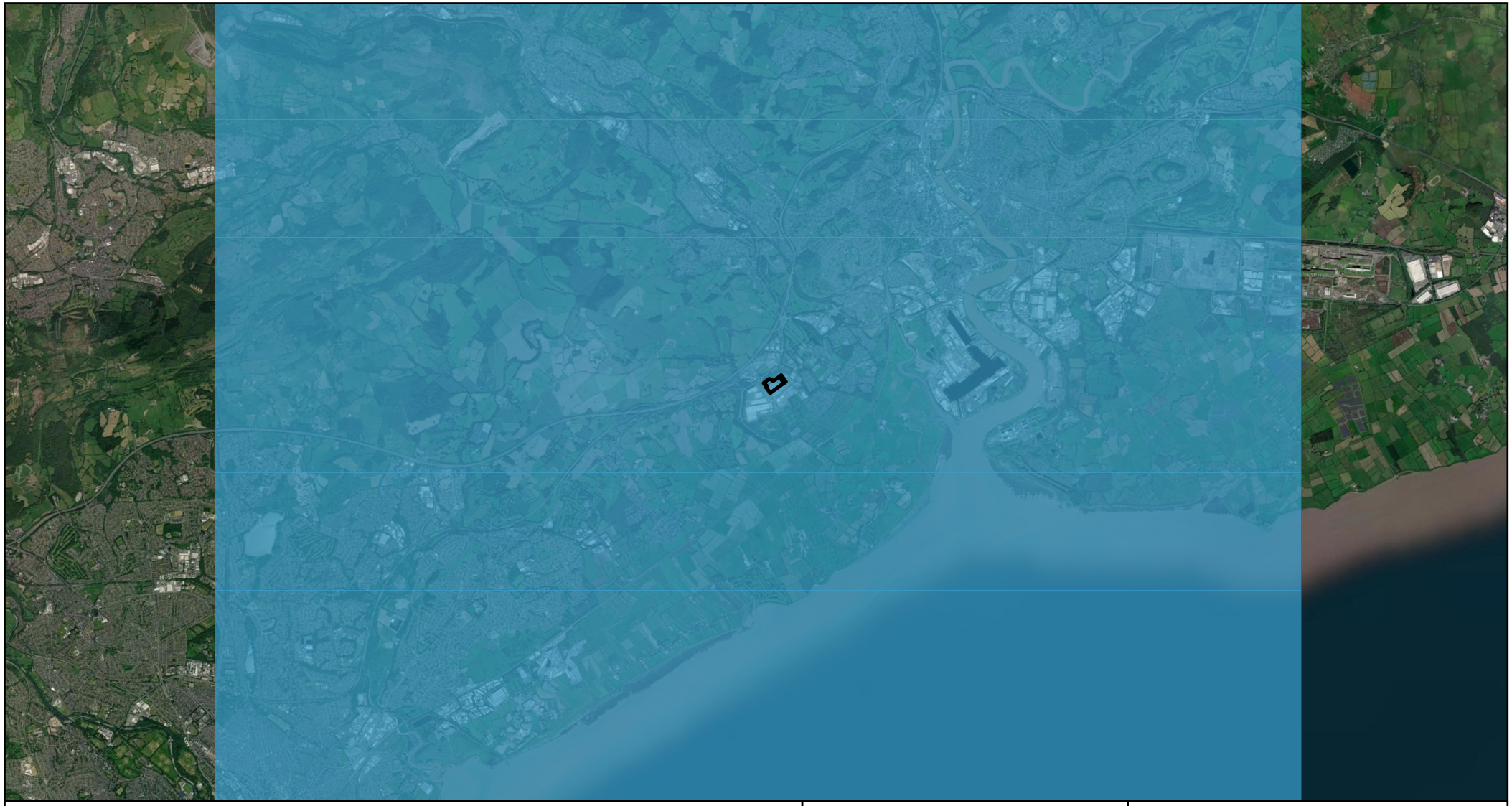
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VANTAGE DATA CENTERS

PROJECTION: British National Grid

Earthstar Geographics

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Site Boundary

PC for NO_2 annual mean ($\mu g/m^3$) - Emergency Scenario CWL11

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

0 0.5 1 1.5 2 2.5

Kilometres

N

Figure B9
PC for NO_2 annual mean ($\mu g/m^3$) - Emergency Scenario CWL11

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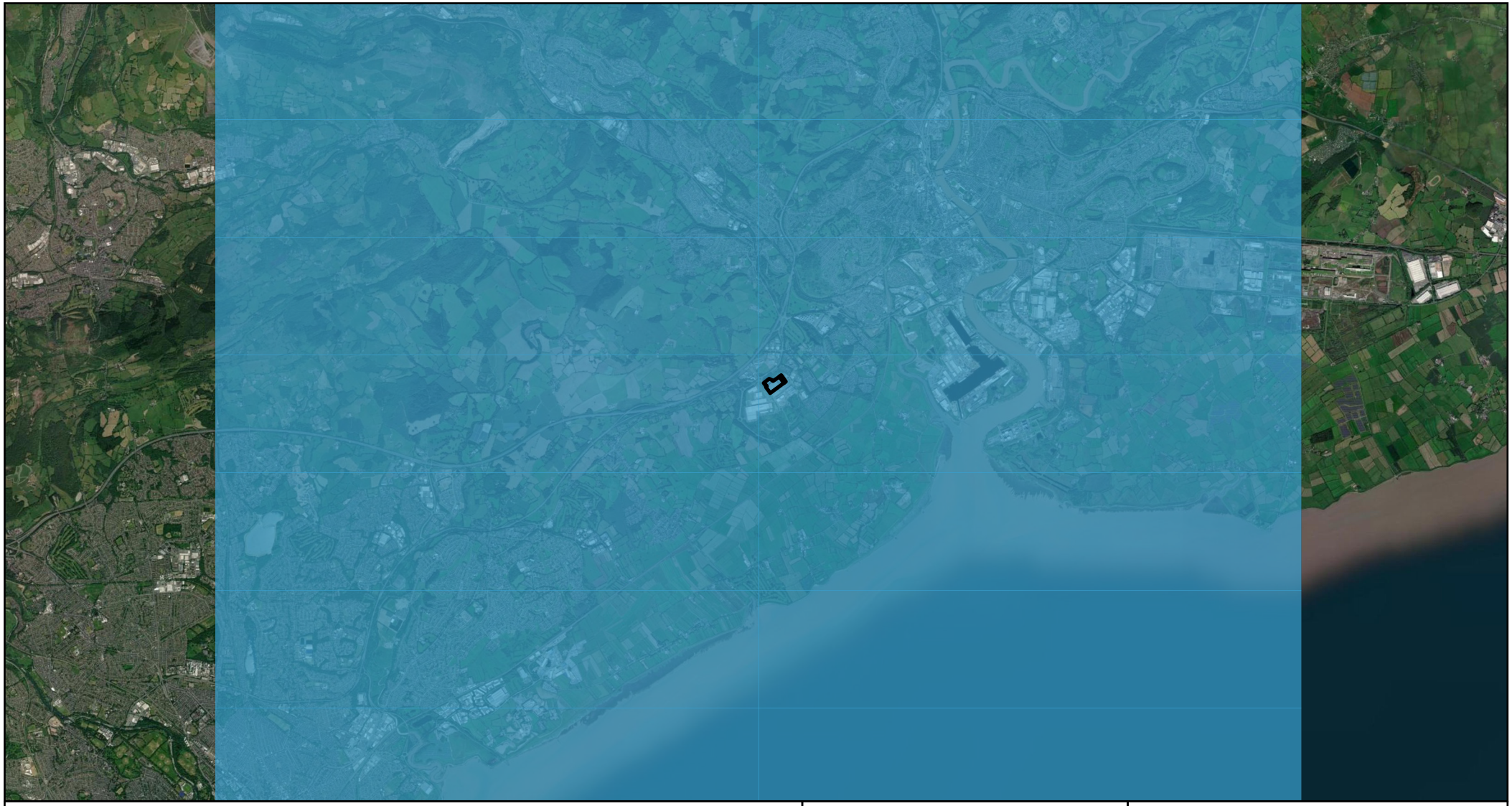
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VANTAGE DATA CENTERS

PROJECTION: British National Grid

Earthstar Geographics

Path: \\uksprdgisfs01\Data\London\Projects\0770849 - Vantage Newport R3\Map\0770849 - Vantage Newport R3.aprx\0770849 - AQ_PC_NO2_AnnualMean_EmergencyScenarioCWL11 - A01



Site Boundary

PC for NO_2 annual mean ($\mu g/m^3$) - Emergency Scenario CWL12

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

0 0.5 1 1.5 2 2.5

Kilometres

N

Figure B10
PC for NO_2 annual mean ($\mu g/m^3$) - Emergency Scenario CWL12

SCALE: See Scale Bar	VERSION: A01
SIZE: A4	DRAWN: MC
PROJECT: 0770849	CHECKED: JE
DATE: 24/04/2025	APPROVED:

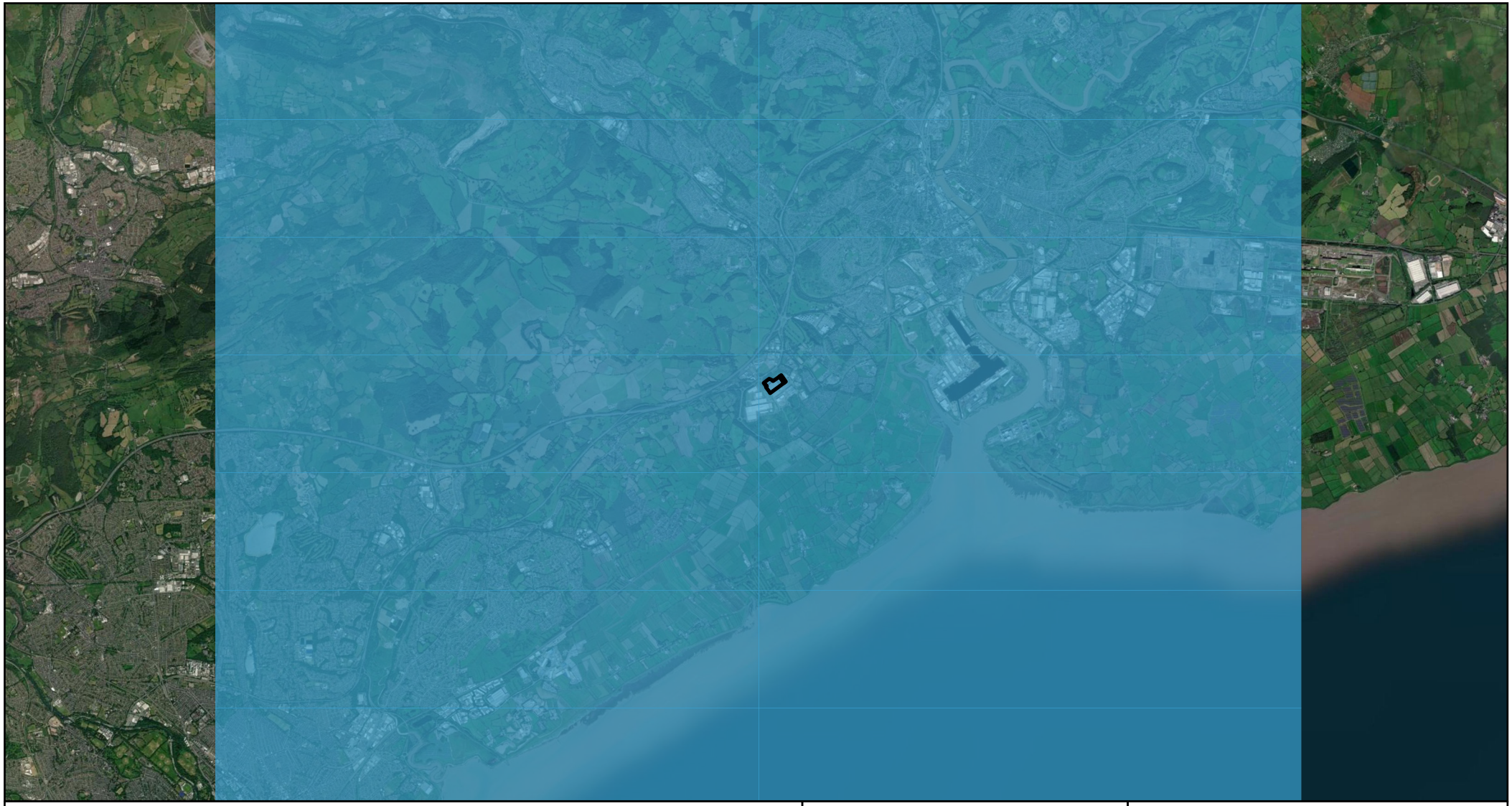
ERM

VANTAGE DATA CENTERS

PROJECTION: British National Grid

Earthstar Geographics

Path: \\uksprdgisfs01\Data\London\Projects\0770849 - Vantage Newport R3\Map\0770849 - Vantage Newport R3.aprx\0770849 - AQ_PC_NO2_AnnualMean_EmergencyScenarioCWL12 - A01



Site Boundary

PC for NO_2 annual mean ($\mu g/m^3$) - Emergency Scenario all in-combined

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

0 0.5 1 1.5 2 2.5

Kilometres

N

Figure B11
PC for NO_2 annual mean ($\mu g/m^3$) - Emergency Scenario all in-combined

SCALE: See Scale Bar	VERSION: A01
SIZE: A4	DRAWN: MC
PROJECT: 0770849	CHECKED: JE
DATE: 24/04/2025	APPROVED:

ERM

VANTAGE DATA CENTERS

PROJECTION: British National Grid

Earthstar Geographics

Path: \\uksprdgisfs01\Data\London\Projects\0770849 - Vantage Newport R3\Map\0770849 - Vantage Newport R3.aprx\0770849 - AQ_PC_NO2_AnnualMean_EmergencyScenarioCombined - A01



Site Boundary

PC for NO_x 24-hour maximum, 100th percentile ($\mu g/m^3$) - Emergency Scenario all in-combined

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

0 0.5 1 1.5 2 2.5

Kilometres

N

Figure B12
PC for NO_x 24-hour maximum, 100th percentile ($\mu g/m^3$) - Emergency Scenario all in-combined

SCALE: See Scale Bar	VERSION: A01
SIZE: A4	DRAWN: MC
PROJECT: 0770849	CHECKED: JE
DATE: 24/04/2025	APPROVED:

ERM

VANTAGE DATA CENTERS

PROJECTION: British National Grid

Earthstar Geographics

Path: \\uksprdgisfs01\Data\London\Projects\0770849 - Vantage Newport R3\Map\0770849 - Vantage Newport R3.aprx\0770849 - AQ_PC_NOx_24hr_max_100thPercentile_EmergencyScenarioCombined - A01

APPENDIX C MODELLED RESULTS OF THE POTENTIAL IMPACT ON ECOLOGY

TABLE C 1: MODELLED MAXIMUM 24-HOUR MEAN NO_X CONCENTRATIONS – TESTING REGIME (µg/m^3)

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
Quarterly test of CWL12							
Severn Estuary (SSSI)	200	52.2	0.0631	0.032%	52.2	26%	Insignificant
Severn Estuary (SAC)		52.2	0.0451	0.023%	52.2	26%	Insignificant
Severn Estuary (SPA)		52.2	0.0631	0.032%	52.2	26%	Insignificant
Gwent Levels St Brides (SSSI)		36.8	0.535	0.27%	37.3	19%	Insignificant
Gwent Levels Rumney (SSSI)		37.3	0.0451	0.02%	37.3	19%	Insignificant
River Usk (SSSI)		43.9	0.0456	0.02%	44.0	22%	Insignificant
River Usk (SAC)		43.9	2.11	1.1%	46.0	23%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		30.5	0.0166	0.0083%	30.5	15%	Insignificant
Coed-y-Darren (SSSI)		17.6	0.0138	0.0069%	17.6	8.8%	Insignificant
Dan y Graig Quarry Risca (SSSI)		22.6	<0.01	<0.01%	22.6	11%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		25.7	0.0254	0.013%	25.7	13%	Insignificant
Gwent Levels - Whitson (SSSI)		18.3	0.0192	0.010%	18.3	9.2%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		22.1	0.0392	0.020%	22.1	11.0%	Insignificant
Henllys Bog (SSSI)		17.5	0.0129	0.0064%	17.5	8.7%	Insignificant
Lisvane Reservoir (SSSI)		30.4	0.0158	0.0079%	30.4	15%	Insignificant
Plas Machen Wood (SSSI)		20.2	0.0177	0.0088%	20.2	10%	Insignificant
Rhymney River Section (SSSI)		41.9	0.0187	0.0093%	41.9	21%	Insignificant
Rumney Quarry (SSSI)		36.8	<0.010	<0.01%	36.8	18%	Insignificant
Ruperra Castle and Woodlands (SSSI)		19.8	0.0207	0.010%	19.8	10%	Insignificant
Quarterly test 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	0.450	0.23%	52.6	26%	Insignificant
Severn Estuary (SAC)		52.2	0.309	0.15%	52.5	26%	Insignificant
Severn Estuary (SPA)		52.2	0.450	0.23%	52.6	26%	Insignificant
Gwent Levels St Brides (SSSI)		36.8	2.68	1.34%	39.4	20%	Insignificant
Gwent Levels Rumney (SSSI)		37.3	0.366	0.18%	37.6	19%	Insignificant
River Usk (SSSI)		43.9	0.263	0.13%	44.2	22%	Insignificant
River Usk (SAC)		43.9	7.46	3.73%	51.4	26%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		30.5	0.0921	<0.01%	30.6	15%	Insignificant
Coed-y-Darren (SSSI)		17.6	0.0778	0.039%	17.7	8.9%	Insignificant
Dan y Graig Quarry Risca (SSSI)		22.6	<0.01	<0.01%	22.6	11%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		25.7	0.143	0.071%	25.8	13%	Insignificant
Gwent Levels - Whitson (SSSI)		18.3	0.104	0.052%	18.4	9.2%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		22.1	0.258	0.129%	22.3	11%	Insignificant
Henllys Bog (SSSI)		17.5	0.0674	0.034%	17.5	8.8%	Insignificant
Lisvane Reservoir (SSSI)		30.4	0.0864	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	<0.01	<0.01%	36.8	18%	Insignificant
Ruperra Castle and Woodlands (SSSI)		19.8	0.118	0.059%	19.9	10%	Insignificant
Black building test of CWL12							
Severn Estuary (SSSI)	200	52.2	0.207	0.10%	52.4	26%	Insignificant
Severn Estuary (SAC)		52.2	0.135	0.07%	52.3	26%	Insignificant

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
Severn Estuary (SPA)		52.2	0.207	0.10%	52.4	26%	Insignificant
Gwent Levels St Brides (SSSI)		36.8	1.94	0.97%	38.7	19%	Insignificant
Gwent Levels Rumney (SSSI)		37.3	0.138	0.07%	37.4	19%	Insignificant
River Usk (SSSI)		43.9	0.144	0.07%	44.1	22%	Insignificant
River Usk (SAC)		43.9	8.41	4.2%	52.3	26%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		30.5	0.0500	0.025%	30.5	15%	Insignificant
Coed-y-Darren (SSSI)		17.6	0.0414	0.021%	17.7	8.8%	Insignificant
Dan y Graig Quarry Risca (SSSI)		22.6	<0.01	<0.01%	22.6	11%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		25.7	0.0757	0.038%	25.8	13%	Insignificant
Gwent Levels - Whitson (SSSI)		18.3	0.0577	0.029%	18.3	9.2%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		22.1	0.119	0.059%	22.2	11%	Insignificant
Henllys Bog (SSSI)		17.5	0.0385	0.019%	17.5	8.7%	Insignificant
Lisvane Reservoir (SSSI)		30.4	0.0480	0.024%	30.5	15%	Insignificant
Plas Machen Wood (SSSI)		20.2	0.0536	0.027%	20.2	10%	Insignificant
Rhymney River Section (SSSI)		41.9	0.0565	0.028%	41.9	21%	Insignificant
Rumney Quarry (SSSI)		36.8	<0.01	<0.01%	36.8	18%	Insignificant
Ruperra Castle and Woodlands (SSSI)		19.8	0.0622	0.031%	19.8	10%	Insignificant
Black building test of CWL11/12/13							
Severn Estuary (SSSI)	200	52.2	1.05	0.52%	53.2	27%	Insignificant
Severn Estuary (SAC)		52.2	0.840	0.42%	53.0	27%	Insignificant
Severn Estuary (SPA)		52.2	1.05	0.52%	53.2	27%	Insignificant
Gwent Levels St Brides (SSSI)		36.8	7.22	3.6%	44.0	22%	Insignificant

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
Gwent Levels Rumney (SSSI)		37.3	0.97	0.48%	38.2	19%	Insignificant
River Usk (SSSI)		43.9	0.71	0.35%	44.6	22%	Insignificant
River Usk (SAC)		43.9	28.6	14.3%	72.5	36%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		30.5	0.261	0.13%	30.8	15%	Insignificant
Coed-y-Darren (SSSI)		17.6	0.218	0.11%	17.8	8.9%	Insignificant
Dan y Graig Quarry Risca (SSSI)		22.6	<0.01	<0.01%	22.6	11%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		25.7	0.398	0.20%	26.1	13%	Insignificant
Gwent Levels - Whitson (SSSI)		18.3	0.298	0.15%	18.6	9.3%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		22.1	0.641	0.32%	22.7	11%	Insignificant
Henllys Bog (SSSI)		17.5	0.197	0.099%	17.7	8.8%	Insignificant
Lisvane Reservoir (SSSI)		30.4	0.248	0.12%	30.7	15%	Insignificant
Plas Machen Wood (SSSI)		20.2	0.280	0.14%	20.5	10%	Insignificant
Rhymney River Section (SSSI)		41.9	0.295	0.15%	42.2	21%	Insignificant
Rumney Quarry (SSSI)		36.8	<0.01	<0.01%	36.8	18%	Insignificant
Ruperra Castle and Woodlands (SSSI)		19.8	0.329	0.16%	20.1	10%	Insignificant

TABLE C 2: MODELLED ANNUAL MEAN NO_X CONCENTRATIONS – TESTING REGIME (µg/m^3)

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
Testing Regime – All tests of CWL12							
Severn Estuary (SSSI)	30	26.1	$1.67x10^{-04}$	<0.01%	26.1	87%	Insignificant
Severn Estuary (SAC)		26.1	$7.96x10^{-05}$	<0.01%	26.1	87%	Insignificant
Severn Estuary (SPA)		26.1	$1.67x10^{-04}$	<0.01%	26.1	87%	Insignificant
Gwent Levels St Brides (SSSI)		18.4	$2.03x10^{-03}$	<0.01%	18.4	61%	Insignificant
Gwent Levels Rumney (SSSI)		18.6	$7.29x10^{-05}$	<0.01%	18.6	62%	Insignificant
River Usk (SSSI)		22.0	$1.24x10^{-04}$	<0.01%	22.0	73%	Insignificant
River Usk (SAC)		22.0	$1.27x10^{-02}$	0.042%	22.0	73%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		15.2	$1.96x10^{-05}$	<0.01%	15.2	51%	Insignificant
Coed-y-Darren (SSSI)		8.81	$1.14x10^{-05}$	<0.01%	8.81	29%	Insignificant
Dan y Graig Quarry Risca (SSSI)		11.3	<0.01	<0.01%	11.3	38%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		12.8	$5.60x10^{-05}$	<0.01%	12.8	43%	Insignificant
Gwent Levels - Whitson (SSSI)		9.14	$3.16x10^{-05}$	<0.01%	9.14	30%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		11.0	$9.56\ x10^{-05}$	<0.01%	11.0	37%	Insignificant
Henllys Bog (SSSI)		8.73	$1.40x10^{-05}$	<0.01%	8.73	29%	Insignificant
Lisvane Reservoir (SSSI)		15.2	$1.89x10^{-05}$	<0.01%	15.2	51%	Insignificant
Plas Machen Wood (SSSI)		10.1	$2.16x10^{-05}$	<0.01%	10.1	34%	Insignificant
Rhymney River Section (SSSI)		20.9	$2.29x10^{-05}$	<0.01%	20.9	70%	Insignificant
Rumney Quarry (SSSI)		18.4	<0.01	<0.01%	18.4	61%	Insignificant
Ruperra Castle and Woodlands (SSSI)		9.88	$2.00x10^{-05}$	<0.01%	9.88	33%	Insignificant

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
Testing Regime – All tests of CWL11/12/13							
Severn Estuary (SSSI)	30	26.1	$8.95x10^{-04}$	<0.01%	26.1	87%	Insignificant
Severn Estuary (SAC)		26.1	$4.23x10^{-04}$	<0.01%	26.1	87%	Insignificant
Severn Estuary (SPA)		26.1	$8.95x10^{-04}$	<0.01%	26.1	87%	Insignificant
Gwent Levels St Brides (SSSI)		18.4	$9.21x10^{-03}$	0.031%	18.4	61%	Insignificant
Gwent Levels Rumney (SSSI)		18.6	$4.58x10^{-04}$	<0.01%	18.6	62%	Insignificant
River Usk (SSSI)		22.0	$6.62x10^{-04}$	<0.01%	22.0	73%	Insignificant
River Usk (SAC)		22.0	0.0496	0.165%	22.0	73%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		15.2	$1.04x10^{-04}$	<0.01%	15.2	51%	Insignificant
Coed-y-Darren (SSSI)		8.81	$6.09x10^{-05}$	<0.01%	8.81	29%	Insignificant
Dan y Graig Quarry Risca (SSSI)		11.3	<0.01	<0.01%	11.3	38%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		12.8	$2.96x10^{-04}$	<0.01%	12.8	43%	Insignificant
Gwent Levels - Whitson (SSSI)		9.14	$1.67x10^{-04}$	<0.01%	9.14	30%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		11.0	$5.08x10^{-04}$	<0.01%	11.0	37%	Insignificant
Henllys Bog (SSSI)		8.73	$7.42x10^{-05}$	<0.01%	8.73	29%	Insignificant
Lisvane Reservoir (SSSI)		15.2	$1.00x10^{-04}$	<0.01%	15.2	51%	Insignificant
Plas Machen Wood (SSSI)		10.1	$1.15x10^{-04}$	<0.01%	10.1	34%	Insignificant
Rhymney River Section (SSSI)		20.9	$1.22x10^{-04}$	<0.01%	20.9	70%	Insignificant
Rumney Quarry (SSSI)		18.4	<0.01	<0.01%	18.4	61%	Insignificant
Ruperra Castle and Woodlands (SSSI)		9.88	$1.07x10^{-04}$	<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
Testing Regime – All tests of CWL12								
Severn Estuary (SSSI)	Grassland	10	12.8	$1.69x10^{-05}$	<0.01%	12.8	128%	Insignificant
Severn Estuary (SAC)	Grassland	20	12.8	$8.02x10^{-06}$	<0.01%	12.8	64%	Insignificant
Severn Estuary (SPA)	Grassland	10	12.8	$1.69x10^{-05}$	<0.01%	12.8	128%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland	2 [a]	8.71	$2.04x10^{-04}$	<0.01%	8.71	435%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland	2 [a]	8.32	$7.34x10^{-06}$	<0.01%	8.32	416%	Insignificant
River Usk (SSSI)	Grassland	10	15.9	$1.25x10^{-05}$	<0.01%	15.9	159%	Insignificant
River Usk (SAC)	Grassland	5	15.9	$1.28x10^{-03}$	<0.01%	15.9	318%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	Grassland	2 [a]	11.1	$1.97x10^{-06}$	<0.01%	11.1	555%	Insignificant
Coed-y-Darren (SSSI)	Grassland	2 [a]	16.5	$1.15x10^{-06}$	<0.01%	16.5	826%	Insignificant
Dan y Graig Quarry Risca (SSSI)	Grassland	2 [a]	15.0	<0.001	<0.01%	15.0	752%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland	2 [a]	8.58	$5.64x10^{-06}$	<0.01%	8.58	429%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland	2 [a]	8.06	$3.18x10^{-06}$	<0.01%	8.06	403%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland	10	8.88	$9.63x10^{-06}$	<0.01%	8.88	89%	Insignificant
Henllys Bog (SSSI)	Woodland	2 [a]	13.7	$2.81x10^{-06}$	<0.01%	13.7	685%	Insignificant
Lisvane Reservoir (SSSI)	Grassland	10	11.1	$1.90x10^{-06}$	<0.01%	11.1	111%	Insignificant
Plas Machen Wood (SSSI)	Woodland	10	12.8	$4.35x10^{-06}$	<0.01%	12.8	128%	Insignificant
Rhymney River Section (SSSI)	Grassland	2 [a]	9.72	$2.31x10^{-06}$	<0.01%	9.72	486%	Insignificant
Rumney Quarry (SSSI)	Grassland	2 [a]	9.26	<0.0001	<0.01%	9.26	463%	Insignificant
Ruperra Castle and Woodlands (SSSI)	Woodland	2 [a]	13.2	$4.02x10^{-06}$	<0.01%	13.2	658%	Insignificant

Ecological Site Name	Type	Minimum CL	Background	PC	PC as % of CL	PEC	PEC as % of CL	Significance
Testing Regime – All tests of CWL11/12/13								
Severn Estuary (SSSI)	Grassland	10	12.8	$9.01x10^{-05}$	<0.01%	12.8	128%	Insignificant
Severn Estuary (SAC)	Grassland	20	12.8	$4.26x10^{-05}$	<0.01%	12.8	64%	Insignificant
Severn Estuary (SPA)	Grassland	10	12.8	$9.01x10^{-05}$	<0.01%	12.8	128%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland	2 [a]	8.71	$9.28x10^{-04}$	0.05%	8.71	435%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland	2 [a]	8.32	$4.61x10^{-05}$	<0.01%	8.32	416%	Insignificant
River Usk (SSSI)	Grassland	10	15.9	$6.66x10^{-05}$	<0.01%	15.9	159%	Insignificant
River Usk (SAC)	Grassland	5	15.9	$4.99x10^{-03}$	0.10%	15.9	318%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	Grassland	2 [a]	11.1	$1.04x10^{-05}$	<0.01%	11.1	555%	Insignificant
Coed-y-Darren (SSSI)	Grassland	2 [a]	16.5	$6.13x10^{-06}$	<0.01%	16.5	826%	Insignificant
Dan y Graig Quarry Risca (SSSI)	Grassland	2 [a]	15.0	<0.0001	<0.01%	15.0	752%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland	2 [a]	8.58	$2.98x10^{-05}$	<0.01%	8.58	429%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland	2 [a]	8.06	$1.68x10^{-05}$	<0.01%	8.06	403%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland	10	8.88	$5.11x10^{-05}$	<0.01%	8.88	89%	Insignificant
Henllys Bog (SSSI)	Woodland	2 [a]	13.7	$1.49x10^{-05}$	<0.01%	13.7	685%	Insignificant
Lisvane Reservoir (SSSI)	Grassland	10	11.1	$1.01x10^{-05}$	<0.01%	11.1	111%	Insignificant
Plas Machen Wood (SSSI)	Woodland	10	12.8	$2.32x10^{-05}$	<0.01%	12.8	128%	Insignificant
Rhymney River Section (SSSI)	Grassland	2 [a]	9.72	$1.23x10^{-05}$	<0.01%	9.72	486%	Insignificant
Rumney Quarry (SSSI)	Grassland	2 [a]	9.26	<0.001	<0.01%	9.26	463%	Insignificant
Ruperra Castle and Woodlands (SSSI)	Woodland	2 [a]	13.2	$2.15x10^{-05}$	<0.01%	13.2	658%	Insignificant

[a]: 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 [a]	Type	Minimum CL	Background		PC	PC as % of CL	PEC	PEC as % of CL	Significance
			S	N					
Testing Regime – All tests of CWL12									
Severn Estuary (SSSI)	Grassland	Cf. **Table 2.3**	0.144	1.24	$1.20x10^{-06}$	<0.01%	1.38	17%	Insignificant
Severn Estuary (SAC)	Grassland		0.144	1.24	$5.72x10^{-07}$	<0.01%	1.38	17%	Insignificant
Severn Estuary (SPA)	Grassland		0.144	1.24	$1.20x10^{-06}$	<0.01%	1.38	17%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland		0.208	0.975	$1.46x10^{-05}$	<0.01%	1.18	197%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland		0.254	0.606	$5.24x10^{-07}$	<0.01%	0.860	143%	Insignificant
River Usk (SSSI)	Grassland		0.301	2.58	$8.94x10^{-07}$	<0.01%	2.88	219%	Insignificant
River Usk (SAC)	Grassland		0.301	2.58	$9.10x10^{-05}$	<0.01%	2.88	480%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland		0.155	0.942	$4.02x10^{-07}$	<0.01%	1.10	183%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland		0.133	0.941	$2.27x10^{-07}$	<0.01%	1.07	179%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland		0.155	0.918	$6.87x10^{-07}$	<0.01%	1.07	3.9%	Insignificant
Testing Regime – All tests of CWL11/12/13									
Severn Estuary (SSSI)	Grassland	Cf. **Table 2.3**	0.144	1.24	$6.43x10^{-06}$	<0.01%		17%	Insignificant
Severn Estuary (SAC)	Grassland		0.144	1.24	$3.04x10^{-06}$	<0.01%		17%	Insignificant
Severn Estuary (SPA)	Grassland		0.144	1.24	$6.43x10^{-06}$	<0.01%	1.38	17%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland		0.208	0.975	$6.62x10^{-05}$	0.011%	1.38	197%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland		0.254	0.606	$3.29x10^{-06}$	<0.01%	1.38	143%	Insignificant
River Usk (SSSI)	Grassland		0.301	2.58	$4.75x10^{-06}$	<0.01%	1.18	219%	Insignificant

Ecological Site Name [a]	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	$3.56x10^{-04}$	0.059%	0.860	480%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland		0.155	0.942	$2.13x10^{-06}$	<0.01%	2.88	183%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland		0.133	0.941	$1.20x10^{-06}$	<0.01%	2.88	179%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland		0.155	0.918	$3.65x10^{-06}$	<0.01%	1.10	3.9%	Insignificant

[a]: 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_X CONCENTRATIONS – 1-HOUR EMERGENCY OUTAGE SCENARIO ($\mu g/m^3$)

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
1 hour Emergency Outage Scenario of CWL12							
Severn Estuary (SSSI)	200	52.2	1.67	0.84%	53.8	27%	Insignificant
Severn Estuary (SAC)		52.2	1.19	0.60%	53.4	27%	Insignificant
Severn Estuary (SPA)		52.2	1.67	0.84%	53.8	27%	Insignificant
Gwent Levels St Brides (SSSI)		36.8	14.2	7.1%	50.9	25%	Insignificant
Gwent Levels Rumney (SSSI)		37.3	1.20	0.60%	38.5	19%	Insignificant
River Usk (SSSI)		43.9	1.21	0.60%	45.1	23%	Insignificant
River Usk (SAC)		43.9	56.0	28%	100	50%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		30.5	0.441	0.22%	30.9	15%	Insignificant
Coed-y-Darren (SSSI)		17.6	0.365	0.18%	18.0	9.0%	Insignificant
Dan y Graig Quarry Risca (SSSI)		22.6	<0.01	<0.01%	22.6	11%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		25.7	0.672	0.34%	26.4	13%	Insignificant
Gwent Levels - Whitson (SSSI)		18.3	0.508	0.25%	18.8	9.4%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		22.1	1.04	0.52%	23.1	12%	Insignificant
Henllys Bog (SSSI)		17.5	0.342	0.17%	17.8	8.9%	Insignificant
Lisvane Reservoir (SSSI)		30.4	0.419	0.21%	30.8	15%	Insignificant
Plas Machen Wood (SSSI)		20.2	0.468	0.23%	20.7	10%	Insignificant
Rhymney River Section (SSSI)		41.9	0.495	0.25%	42.4	21%	Insignificant
Rumney Quarry (SSSI)		36.8	<0.01	<0.01%	36.8	18%	Insignificant
Ruperra Castle and Woodlands (SSSI)		19.8	0.550	0.27%	20.3	10%	Insignificant

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
1 hour Emergency Outage Scenario of CWL11/12/13							
Severn Estuary (SSSI)	200	52.2	26.6	13%	78.8	39%	Potentially Significant
Severn Estuary (SAC)		52.2	17.8	8.9%	69.9	35%	Insignificant
Severn Estuary (SPA)		52.2	26.6	13%	78.8	39%	Potentially Significant
Gwent Levels St Brides (SSSI)		36.8	139	69%	176	88%	Potentially Significant
Gwent Levels Rumney (SSSI)		37.3	22.1	11%	59.3	30%	Potentially Significant
River Usk (SSSI)		43.9	15.2	7.6%	59.1	30%	Insignificant
River Usk (SAC)		43.9	291	146%	335	168%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		30.5	5.33	2.7%	35.8	18%	Insignificant
Coed-y-Darren (SSSI)		17.6	4.48	2.2%	22.1	11%	Insignificant
Dan y Graig Quarry Risca (SSSI)		22.6	<0.01	<0.01%	22.6	11%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		25.7	8.28	4.1%	34.0	17%	Insignificant
Gwent Levels - Whitson (SSSI)		18.3	5.84	2.9%	24.1	12%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		22.1	15.5	7.7%	37.5	19%	Insignificant
Henllys Bog (SSSI)		17.5	3.76	1.9%	21.2	11%	Insignificant
Lisvane Reservoir (SSSI)		30.4	5.04	2.5%	35.4	18%	Insignificant
Plas Machen Wood (SSSI)		20.2	5.84	2.9%	26.0	13%	Insignificant
Rhymney River Section (SSSI)		41.9	6.51	3.3%	48.4	24%	Insignificant

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
Rumney Quarry (SSSI)		36.8	<0.01	<0.01%	36.8	18%	Insignificant
Ruperra Castle and Woodlands (SSSI)		19.8	6.79	3.4%	26.5	13%	Insignificant

TABLE C 6: MODELLED MAXIMUM 24-HOUR MEAN NO_X CONCENTRATIONS – 72-HOUR EMERGENCY OUTAGE SCENARIO (µg/m^3)

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
72 hour Emergency Outage Scenario of CWL12							
Severn Estuary (SSSI)	200	52.2	40.1	20%	92.3	46%	Potentially Significant
Severn Estuary (SAC)		52.2	28.7	14%	80.8	40%	Potentially Significant
Severn Estuary (SPA)		52.2	40.1	20%	92.3	46%	Potentially Significant
Gwent Levels St Brides (SSSI)		36.8	340	170%	377	189%	Potentially Significant
Gwent Levels Rumney (SSSI)		37.3	28.7	14%	66.0	33%	Potentially Significant
River Usk (SSSI)		43.9	29.0	14%	72.9	36%	Potentially Significant
River Usk (SAC)		43.9	1343	671%	1387	693%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		30.5	10.6	5.3%	41.1	21%	Insignificant
Coed-y-Darren (SSSI)		17.6	8.75	4.4%	26.4	13%	Insignificant
Dan y Graig Quarry Risca (SSSI)		22.6	<0.01	<0.01%	22.6	11%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		25.7	16.1	8.1%	41.8	21%	Insignificant
Gwent Levels - Whitson (SSSI)		18.3	12.2	6.1%	30.5	15%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		22.1	25.0	12%	47.0	24%	Potentially Significant
Henllys Bog (SSSI)		17.5	8.20	4.1%	25.7	13%	Insignificant
Lisvane Reservoir (SSSI)		30.4	10.1	5.0%	40.5	20%	Insignificant
Plas Machen Wood (SSSI)		20.2	11.2	5.6%	31.4	16%	Insignificant

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
Rhymney River Section (SSSI)		41.9	11.9	5.9%	53.7	27%	Insignificant
Rumney Quarry (SSSI)		36.8	<0.01	<0.01%	36.8	18%	Insignificant
Ruperra Castle and Woodlands (SSSI)		19.8	13.2	6.6%	32.9	16%	Insignificant
72 hour Emergency Outage Scenario of CWL11/12/13							
Severn Estuary (SSSI)	200	52.2	639	319%	691	346%	Potentially Significant
Severn Estuary (SAC)		52.2	426	213%	479	239%	Potentially Significant
Severn Estuary (SPA)		52.2	639	319%	691	346%	Potentially Significant
Gwent Levels St Brides (SSSI)		36.8	3330	1665%	3367	1683%	Potentially Significant
Gwent Levels Rumney (SSSI)		37.3	529	265%	567	283%	Potentially Significant
River Usk (SSSI)		43.9	365	183%	409	205%	Potentially Significant
River Usk (SAC)		43.9	6992	3496%	7036	3518%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		30.5	128	64%	158	79%	Potentially Significant
Coed-y-Darren (SSSI)		17.6	108	54%	125	63%	Potentially Significant
Dan y Graig Quarry Risca (SSSI)		22.6	<0.01	<0.01%	22.6	11%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		25.7	199	99%	224	112%	Potentially Significant
Gwent Levels - Whitson (SSSI)		18.3	140	70%	158	79%	Potentially Significant

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		22.1	371	186%	394	197%	Potentially Significant
Henllys Bog (SSSI)		17.5	90.3	45%	108	54%	Potentially Significant
Lisvane Reservoir (SSSI)		30.4	121	60%	151	76%	Potentially Significant
Plas Machen Wood (SSSI)		20.2	140	70%	160	80%	Potentially Significant
Rhymney River Section (SSSI)		41.9	156	78%	198	99%	Potentially Significant
Rumney Quarry (SSSI)		36.8	<0.01	<0.01%	36.8	18%	Insignificant
Ruperra Castle and Woodlands (SSSI)		19.8	163	82%	183	91%	Potentially Significant

TABLE C 7: MODELLED ANNUAL MEAN NO_X CONCENTRATIONS – 1-HOUR EMERGENCY OUTAGE SCENARIO ($\mu g/m^3$)

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
1 hour Emergency Outage Scenario of CWL12							
Severn Estuary (SSSI)	30	26.1	$5.39x10^{-04}$	<0.01%	26.1	87%	Insignificant
Severn Estuary (SAC)		26.1	$2.57x10^{-04}$	<0.01%	26.1	87%	Insignificant
Severn Estuary (SPA)		26.1	$5.39x10^{-04}$	<0.01%	26.1	87%	Insignificant
Gwent Levels St Brides (SSSI)		18.4	$6.08x10^{-03}$	0.020%	18.4	61%	Insignificant
Gwent Levels Rumney (SSSI)		18.6	$2.34x10^{-04}$	<0.01%	18.6	62%	Insignificant
River Usk (SSSI)		22.0	$4.01x10^{-04}$	<0.01%	22.0	73%	Insignificant
River Usk (SAC)		22.0	0.0361	0.12%	22.0	73%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		15.2	$6.27x10^{-05}$	<0.01%	15.2	51%	Insignificant
Coed-y-Darren (SSSI)		8.81	$3.65x10^{-05}$	<0.01%	8.81	29%	Insignificant
Dan y Graig Quarry Risca (SSSI)		11.3	<0.01	<0.01%	11.3	38%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		12.8	$1.80x10^{-04}$	<0.01%	12.8	43%	Insignificant
Gwent Levels - Whitson (SSSI)		9.14	$1.02x10^{-04}$	<0.01%	9.14	30%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		11.0	$3.08x10^{-04}$	<0.01%	11.0	37%	Insignificant
Henllys Bog (SSSI)		8.73	$4.48x10^{-05}$	<0.01%	8.73	29%	Insignificant
Lisvane Reservoir (SSSI)		15.2	$6.05x10^{-05}$	<0.01%	15.2	51%	Insignificant
Plas Machen Wood (SSSI)		10.1	$6.90x10^{-05}$	<0.01%	10.1	34%	Insignificant
Rhymney River Section (SSSI)		20.9	$7.36x10^{-05}$	<0.01%	20.9	70%	Insignificant
Rumney Quarry (SSSI)		18.4	<0.01	<0.01%	18.4	61%	Insignificant
Ruperra Castle and Woodlands (SSSI)		9.88	$6.40x10^{-05}$	<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	$6.65x10^{-03}$	0.022%	26.1	87%	Insignificant
Severn Estuary (SAC)		26.1	$3.04x10^{-03}$	0.010%	26.1	87%	Insignificant
Severn Estuary (SPA)		26.1	$6.65x10^{-03}$	0.022%	26.1	87%	Insignificant
Gwent Levels St Brides (SSSI)		18.4	0.0668	0.22%	18.4	61%	Insignificant
Gwent Levels Rumney (SSSI)		18.6	$3.56x10^{-03}$	0.012%	18.6	62%	Insignificant
River Usk (SSSI)		22.0	$4.83x10^{-03}$	0.016%	22.0	73%	Insignificant
River Usk (SAC)		22.0	0.229	0.76%	22.0	74%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		15.2	$7.48x10^{-04}$	<0.01%	15.2	51%	Insignificant
Coed-y-Darren (SSSI)		8.81	$4.49x10^{-04}$	<0.01%	8.81	29%	Insignificant
Dan y Graig Quarry Risca (SSSI)		11.3	<0.01	<0.01%	11.3	38%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		12.8	$2.12x10^{-03}$	<0.01%	12.8	43%	Insignificant
Gwent Levels - Whitson (SSSI)		9.14	$1.18x10^{-03}$	<0.01%	9.14	30%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		11.0	$3.65x10^{-03}$	<0.01%	11.0	37%	Insignificant
Henllys Bog (SSSI)		8.73	$5.39x10^{-04}$	<0.01%	8.73	29%	Insignificant
Lisvane Reservoir (SSSI)		15.2	$7.22x10^{-04}$	<0.01%	15.2	51%	Insignificant
Plas Machen Wood (SSSI)		10.1	$8.47x10^{-04}$	<0.01%	10.1	34%	Insignificant
Rhymney River Section (SSSI)		20.9	$8.91x10^{-04}$	<0.01%	20.9	70%	Insignificant
Rumney Quarry (SSSI)		18.4	<0.01	<0.01%	18.4	61%	Insignificant
Ruperra Castle and Woodlands (SSSI)		9.88	$7.77x10^{-04}$	<0.01%	9.88	33%	Insignificant

TABLE C 8: MODELLED ANNUAL MEAN NO_X CONCENTRATIONS – 72-HOUR EMERGENCY OUTAGE SCENARIO (µg/m^3)

Ecological Site Name	AQS	Baseline	PC	PC as % of AQS	PEC	PEC as % of AQS	Significance
72 hour Emergency Outage Scenario of CWL12							
Severn Estuary (SSSI)		**26.1**	**0.0388**	**0.13%**	**26.1**	**87%**	**Insignificant**
Severn Estuary (SAC)		26.1	0.0185	0.062%	26.1	87%	Insignificant
Severn Estuary (SPA)		26.1	0.0388	0.13%	26.1	87%	Insignificant
Gwent Levels St Brides (SSSI)		18.4	0.438	1.5%	18.8	63%	Insignificant
Gwent Levels Rumney (SSSI)		18.6	0.0169	0.056%	18.7	62%	Insignificant
River Usk (SSSI)		22.0	0.0289	0.10%	22.0	73%	Insignificant
River Usk (SAC)		22.0	2.60	8.7%	24.6	82%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)		15.2	$4.52x10^{-03}$	0.015%	15.3	51%	Insignificant
Coed-y-Darren (SSSI)	**30**	8.81	$2.63x10^{-03}$	<0.01%	8.81	29%	Insignificant
Dan y Graig Quarry Risca (SSSI)		11.3	<0.001	<0.01%	11.3	38%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		12.8	0.0130	0.043%	12.9	43%	Insignificant
Gwent Levels - Whitson (SSSI)		9.14	0.00732	0.024%	9.15	30%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		11.0	0.0222	0.074%	11.0	37%	Insignificant
Henllys Bog (SSSI)		8.73	$3.22x10^{-03}$	0.011%	8.73	29%	Insignificant
Lisvane Reservoir (SSSI)		15.2	$4.35x10^{-03}$	0.015%	15.2	51%	Insignificant
Plas Machen Wood (SSSI)		10.1	$4.97x10^{-03}$	0.017%	10.1	34%	Insignificant
Rhymney River Section (SSSI)		20.9	$5.30x10^{-03}$	0.018%	20.9	70%	Insignificant
Rumney Quarry (SSSI)		18.4	<0.001	<0.01%	18.4	61%	Insignificant
Ruperra Castle and Woodlands (SSSI)		9.88	0.00461	0.015%	9.88	33%	Insignificant

72 hour Emergency Outage Scenario of CWL11/12/13							
Severn Estuary (SSSI)		**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	4.811	16%	23.2	77%	Potentially Significant
Gwent Levels Rumney (SSSI)		18.6	0.256	0.85%	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%	38.4	128%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	**30**	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	<0.001	<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	<0.001	<0.01%	18.4	61%	Insignificant
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
1 hour Emergency Outage Scenario of CWL12								
Severn Estuary (SSSI)	Grassland	10	12.8	$5.43x10^{-05}$	<0.01%	12.8	128%	Insignificant
Severn Estuary (SAC)	Grassland	20	12.8	$2.58x10^{-05}$	<0.01%	12.8	64%	Insignificant
Severn Estuary (SPA)	Grassland	10	12.8	$5.43x10^{-05}$	<0.01%	12.8	128%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland	2 [a]	8.71	$6.12x10^{-04}$	0.031%	8.71	435%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland	2 [a]	8.32	$2.36x10^{-05}$	<0.01%	8.32	416%	Insignificant
River Usk (SSSI)	Grassland	10	15.9	$4.03x10^{-05}$	<0.01%	15.9	159%	Insignificant
River Usk (SAC)	Grassland	5	15.9	$3.64x10^{-03}$	0.073%	15.9	318%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	Grassland	2 [a]	11.1	$6.32x10^{-06}$	<0.01%	11.1	555%	Insignificant
Coed-y-Darren (SSSI)	Grassland	2 [a]	16.5	$3.67E^{-06}$	<0.01%	16.5	826%	Insignificant

Ecological Site Name	Type	Minimum CL	Background	PC	PC as % of CL	PEC	PEC as % of CL	Significance
Dan y Graig Quarry Risca (SSSI)	Grassland	2 [a]	15.0	<0.01	<0.01%	15.0	752%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland	2 [a]	8.58	$1.82x10^{-05}$	<0.01%	8.58	429%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland	2 [a]	8.06	$1.02x10^{-05}$	<0.01%	8.06	403%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland	10	8.88	$3.10x10^{-05}$	<0.01%	8.88	89%	Insignificant
Henllys Bog (SSSI)	Woodland	2 [a]	13.7	$9.02x10^{-06}$	<0.01%	13.7	685%	Insignificant
Lisvane Reservoir (SSSI)	Grassland	10	11.1	$6.09x10^{-06}$	<0.01%	11.1	111%	Insignificant
Plas Machen Wood (SSSI)	Woodland	10	12.81	$1.39x10^{-05}$	<0.01%	12.8	128%	Insignificant
Rhymney River Section (SSSI)	Grassland	2 [a]	9.72	$7.41x10^{-06}$	<0.01%	9.72	486%	Insignificant
Rumney Quarry (SSSI)	Grassland	2 [a]	9.26	<0.01	<0.01%	9.26	463%	Insignificant
Ruperra Castle and Woodlands (SSSI)	Woodland	2 [a]	13.2	$1.29x10^{-05}$	<0.01%	13.2	658%	Insignificant

Ecological Site Name	Type	Minimum CL	Background	PC	PC as % of CL	PEC	PEC as % of CL	Significance
1 hour Emergency Outage Scenario of CWL11/12/13								
Severn Estuary (SSSI)	Grassland	10	12.8	$6.69x10^{-04}$	<0.01%	12.8	128%	Insignificant
Severn Estuary (SAC)	Grassland	20	12.8	3.06x10-04	<0.01%	12.8	64%	Insignificant
Severn Estuary (SPA)	Grassland	10	12.8	$6.69x10^{-04}$	<0.01%	12.8	128%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland	2 [a]	8.71	$6.73x10^{-03}$	0.34%	8.71	436%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland	2 [a]	8.32	$3.58x10^{-04}$	0.018%	8.32	416%	Insignificant
River Usk (SSSI)	Grassland	10	15.9	$4.86x10^{-04}$	<0.01%	15.9	159%	Insignificant
River Usk (SAC)	Grassland	5	15.9	$2.30x10^{-02}$	0.46%	15.9	318%	Insignificant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	Grassland	2 [a]	11.1	$7.53x10^{-05}$	<0.01%	11.1	555%	Insignificant
Coed-y-Darren (SSSI)	Grassland	2 [a]	16.5	$4.52x10^{-05}$	<0.01%	16.5	826%	Insignificant

Ecological Site Name	Type	Minimum CL	Background	PC	PC as % of CL	PEC	PEC as % of CL	Significance
Dan y Graig Quarry Risca (SSSI)	Grassland	2 [a]	15.0	<0.01	<0.01%	15.0	752%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland	2 [a]	8.58	$2.13x10^{-04}$	0.011%	8.58	429%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland	2 [a]	8.06	$1.19x10^{-04}$	<0.01%	8.06	403%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland	10	8.88	$3.68x10^{-04}$	<0.01%	8.88	89%	Insignificant
Henllys Bog (SSSI)	Woodland	2 [a]	13.7	$1.08x10^{-04}$	<0.01%	13.7	685%	Insignificant
Lisvane Reservoir (SSSI)	Grassland	10	11.1	$7.27x10^{-05}$	<0.01%	11.1	111%	Insignificant
Plas Machen Wood (SSSI)	Woodland	10	12.81	$1.71x10^{-04}$	<0.01%	12.8	128%	Insignificant
Rhymney River Section (SSSI)	Grassland	2 [a]	9.72	$8.97x10^{-05}$	<0.01%	9.72	486%	Insignificant
Rumney Quarry (SSSI)	Grassland	2 [a]	9.26	<0.01	<0.01%	9.26	463%	Insignificant
Ruperra Castle and Woodlands (SSSI)	Woodland	2 [a]	13.2	$1.56x10^{-04}$	<0.01%	13.2	658%	Insignificant

[a]: 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
72 hour Emergency Outage Scenario of CWL12								
Severn Estuary (SSSI)	Grassland	10	12.8	$3.91x10^{-03}$	0.039%	12.8	128%	Insignificant
Severn Estuary (SAC)	Grassland	20	12.8	$1.86x10^{-03}$	0.009%	12.8	64%	Insignificant
Severn Estuary (SPA)	Grassland	10	12.8	$3.91x10^{-03}$	0.039%	12.8	128%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland	2 [a]	8.71	0.0441	2.2%	8.75	437%	Potentially Significant
Gwent Levels Rumney (SSSI)	Grassland	2 [a]	8.32	$1.70x10^{-03}$	0.085%	8.32	416%	Insignificant
River Usk (SSSI)	Grassland	10	15.9	$2.91x10^{-03}$	0.029%	15.9	159%	Insignificant
River Usk (SAC)	Grassland	5	15.9	0.262	5.2%	16.2	323%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	Grassland	2 [a]	11.1	$4.55x10^{-04}$	0.023%	11.1	555%	Insignificant
Coed-y-Darren (SSSI)	Grassland	2 [a]	16.5	$2.64x10^{-04}$	0.013%	16.5	826%	Insignificant
Dan y Graig Quarry Risca (SSSI)	Grassland	2 [a]	15.0	<0.01	<0.001%	15.0	752%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland	2 [a]	8.58	$1.31x10^{-03}$	0.065%	8.58	429%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland	2 [a]	8.06	$7.37x10^{-04}$	0.037%	8.06	403%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland	10	8.88	$2.23x10^{-03}$	0.022%	8.89	89%	Insignificant
Henllys Bog (SSSI)	Woodland	2 [a]	13.7	$6.49x10^{-04}$	0.032%	13.7	685%	Insignificant
Lisvane Reservoir (SSSI)	Grassland	10	11.1	$4.38x10^{-04}$	0.004%	11.1	111%	Insignificant
Plas Machen Wood (SSSI)	Woodland	10	12.81	$1.00x10^{-03}$	0.010%	12.8	128%	Insignificant

Ecological Site Name	Type	Minimum CL	Background	PC	PC as % of CL	PEC	PEC as % of CL	Significance
Rhymney River Section (SSSI)	Grassland	2 [a]	9.72	$5.33x10^{-04}$	0.027%	9.72	486%	Insignificant
Rumney Quarry (SSSI)	Grassland	2 [a]	9.26	<0.01	<0.001%	9.26	463%	Insignificant
Ruperra Castle and Woodlands (SSSI)	Woodland	2 [a]	13.2	$9.28x10^{-04}$	0.046%	13.2	658%	Insignificant
72 hour Emergency Outage Scenario of CWL11/12/13								
Severn Estuary (SSSI)	Grassland	10	12.8	$4.82x10^{-02}$	0.48%	12.9	129%	Insignificant
Severn Estuary (SAC)	Grassland	20	12.8	$2.20x10^{-02}$	0.11%	12.8	64%	Insignificant
Severn Estuary (SPA)	Grassland	10	12.8	$4.82x10^{-02}$	0.48%	12.9	129%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland	2 [a]	8.71	$4.84x10^{-01}$	24%	9.19	459%	Potentially Significant
Gwent Levels Rumney (SSSI)	Grassland	2 [a]	8.32	$2.58x10^{-02}$	1.3%	8.35	417%	Potentially Significant
River Usk (SSSI)	Grassland	10	15.9	$3.50x10^{-02}$	0.35%	15.9	159%	Insignificant
River Usk (SAC)	Grassland	5	15.9	1.66	33%	17.5	351%	Potentially Significant
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	Grassland	2 [a]	11.1	$5.42x10^{-03}$	0.27%	11.1	555%	Insignificant
Coed-y-Darren (SSSI)	Grassland	2 [a]	16.5	$3.25x10^{-03}$	0.16%	16.5	826%	Insignificant
Dan y Graig Quarry Risca (SSSI)	Grassland	2 [a]	15.0	<0.01	<0.001%	15.0	752%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland	2 [a]	8.58	$1.53x10^{-02}$	0.77%	8.60	430%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland	2 [a]	8.06	$8.54x10^{-03}$	0.43%	8.07	403%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland	10	8.88	$2.65x10^{-02}$	0.26%	8.91	89%	Insignificant

Ecological Site Name	Type	Minimum CL	Background	PC	PC as % of CL	PEC	PEC as % of CL	Significance
Henllys Bog (SSSI)	Woodland	2 [a]	13.7	$7.81x10^{-03}$	0.39%	13.7	686%	Insignificant
Lisvane Reservoir (SSSI)	Grassland	10	11.1	$5.23x10^{-03}$	0.05%	11.1	111%	Insignificant
Plas Machen Wood (SSSI)	Woodland	10	12.81	$1.23x10^{-02}$	0.12%	12.8	128%	Insignificant
Rhymney River Section (SSSI)	Grassland	2 [a]	9.72	$6.46x10^{-03}$	0.32%	9.73	486%	Insignificant
Rumney Quarry (SSSI)	Grassland	2 [a]	9.26	<0.01	<0.001%	9.26	463%	Insignificant
Ruperra Castle and Woodlands (SSSI)	Woodland	2 [a]	13.2	$1.13x10^{-02}$	0.56%	13.2	659%	Insignificant

[a]: 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 [a]	Type	Minimum CL	Background		PC	PC as % of CL	PEC	PEC as % of CL	Significance
			S	N					
1 hour Emergency Outage Scenario of CWL12									
Severn Estuary (SSSI)	Grassland	Cf. **Table 2.3**	0.144	1.24	$3.87x10^{-06}$	<0.01%	1.38	17%	Insignificant
Severn Estuary (SAC)	Grassland		0.144	1.24	$1.84x10^{-06}$	<0.01%	1.38	17%	Insignificant
Severn Estuary (SPA)	Grassland		0.144	1.24	$3.87x10^{-06}$	<0.01%	1.38	17%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland		0.208	0.975	$4.37x10^{-05}$	<0.01%	1.18	197%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland		0.254	0.606	$1.68x10^{-06}$	<0.01%	0.860	143%	Insignificant
River Usk (SSSI)	Grassland		0.301	2.58	$2.88x10^{-06}$	<0.01%	2.88	219%	Insignificant
River Usk (SAC)	Grassland		0.301	2.58	$2.60x10^{-04}$	0.04%	2.88	480%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland		0.155	0.942	$1.30x10^{-06}$	<0.01%	1.10	183%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland		0.133	0.941	$7.30x10^{-07}$	<0.01%	1.07	179%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland		0.155	0.918	$2.21x10^{-06}$	<0.01%	1.07	3.9%	Insignificant
1 hour Emergency Outage Scenario of CWL11/12/13									
Severn Estuary (SSSI)	Grassland	Cf. **Table 2.3**	0.144	1.24	$4.77x10^{-05}$	<0.01%	1.38	17%	Insignificant

Ecological Site Name [a]	Type	Minimum CL	Background		PC	PC as % of CL	PEC	PEC as % of CL	Significance
			S	N					
Severn Estuary (SAC)	Grassland		0.144	1.24	$2.18x10^{-05}$	<0.01%	1.38	17%	Insignificant
Severn Estuary (SPA)	Grassland		0.144	1.24	$4.77x10^{-05}$	<0.01%	1.38	17%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland		0.208	0.975	$4.80x10^{-04}$	0.08%	1.18	197%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland		0.254	0.606	$2.55x10^{-05}$	<0.01%	0.860	143%	Insignificant
River Usk (SSSI)	Grassland		0.301	2.58	$3.47x10^{-05}$	<0.01%	2.88	219%	Insignificant
River Usk (SAC)	Grassland		0.301	2.58	$1.64x10^{-03}$	0.27%	2.88	480%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland		0.155	0.942	$1.52x10^{-05}$	<0.01%	1.10	183%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland		0.133	0.941	$8.46x10^{-06}$	<0.01%	1.07	179%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland		0.155	0.918	$2.62x10^{-05}$	<0.01%	1.07	3.9%	Insignificant

[a]: 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 [a]	Type	Minimum CL	Background		PC	PC as % of CL	PEC	PEC as % of CL	Significance
			S	N					
72 hour Emergency Outage Scenario of CWL12									
Severn Estuary (SSSI)	Grassland	Cf. **Table 2.3**	0.144	1.24	$2.79x10^{-04}$	<0.01%	1.38	17%	Insignificant
Severn Estuary (SAC)	Grassland		0.144	1.24	$1.33x10^{-04}$	<0.01%	1.38	17%	Insignificant
Severn Estuary (SPA)	Grassland		0.144	1.24	$2.79x10^{-04}$	<0.01%	1.38	17%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland		0.208	0.975	$3.14x10^{-03}$	0.52%	1.19	197%	Insignificant
Gwent Levels Rumney (SSSI)	Grassland		0.254	0.606	$1.21x10^{-04}$	0.020%	0.860	143%	Insignificant
River Usk (SSSI)	Grassland		0.301	2.58	$2.07x10^{-04}$	0.02%	2.88	220%	Insignificant
River Usk (SAC)	Grassland		0.301	2.58	0.0187	3.1%	2.90	483%	Potentially Significant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland		0.155	0.942	$9.32x10^{-05}$	0.016%	1.10	183%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland		0.133	0.941	$5.26x10^{-05}$	<0.01%	1.07	179%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland		0.155	0.918	$1.59x10^{-04}$	<0.01%	1.07	3.9%	Insignificant
72 hour Emergency Outage Scenario of CWL11/12/13									
Severn Estuary (SSSI)	Grassland	Cf. **Table 2.3**	0.144	1.24	$3.44x10^{-03}$	<0.01%	1.39	17%	Insignificant
Severn Estuary (SAC)	Grassland		0.144	1.24	$1.57x10^{-03}$	<0.01%	1.39	17%	Insignificant
Severn Estuary (SPA)	Grassland		0.144	1.24	$3.44x10^{-03}$	<0.01%	1.39	17%	Insignificant
Gwent Levels St Brides (SSSI)	Grassland		0.208	0.975	$3.46x10^{-02}$	5.8%	1.22	203%	Potentially Significant
Gwent Levels Rumney (SSSI)	Grassland		0.254	0.606	$1.84x10^{-03}$	0.31%	0.862	143%	Insignificant

Ecological Site Name [a]	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	$2.50x10^{-03}$	0.19%	2.88	220%	Insignificant
River Usk (SAC)	Grassland		0.301	2.58	$1.18x10^{-01}$	20%	3.00	499%	Potentially Significant
Gwent Levels - Nash and Goldcliff (SSSI)	Grassland		0.155	0.942	$1.09x10^{-03}$	0.18%	1.10	183%	Insignificant
Gwent Levels - Whitson (SSSI)	Grassland		0.133	0.941	$6.09x10^{-04}$	0.10%	1.07	179%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	Grassland		0.155	0.918	$1.89x10^{-03}$	<0.01%	1.07	3.9%	Insignificant

[a]: 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_X CONCENTRATIONS – TESTING REGIME (µg/m^3)

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	0.835	0.42%	0.201	0.10%	2.62	1.3%	0.881	0.44%
Ancient woodland D		0.837	0.42%	0.194	0.10%	2.28	1.1%	0.940	0.47%
Ancient woodland E		0.479	0.24%	0.062	0.031%	0.703	0.35%	0.289	0.14%
Ancient woodland F		1.178	0.59%	0.425	0.21%	4.23	2.1%	1.69	0.84%
Ancient woodland G		0.795	0.40%	0.247	0.12%	2.76	1.4%	1.17	0.58%
Ancient woodland H		0.638	0.32%	0.181	0.090%	1.92	0.96%	0.890	0.44%
Celtic Springs SINC		1.76	0.88%	0.633	0.32%	7.72	3.9%	2.85	1.4%
LG Duffryn Site 1/2 SINC		1.33	0.67%	0.299	0.15%	3.28	1.6%	1.19	0.60%
Duffryn Pond SINC		1.33	0.67%	0.299	0.15%	3.28	1.64%	1.19	0.60%
Coed Ffynon-Oer SINC		0.254	0.13%	0.031	0.016%	0.362	0.18%	0.144	0.072%
Court Wood SINC		0.264	0.13%	0.036	0.018%	0.477	0.24%	0.169	0.084%
Afon Ebbw River SINC		0.478	0.24%	0.140	0.070%	1.69	0.85%	0.665	0.33%
Gaer Fort SINC		0.395	0.20%	0.118	0.059%	1.34	0.67%	0.548	0.27%
Cwm Pensidan SINC		0.259	0.13%	0.0608	0.030%	0.646	0.32%	0.319	0.16%

TABLE D 2 MODELLED ANNUAL MEAN NO_X CONCENTRATIONS – TESTING REGIME (µg/m^3)

Non-Statutory Ecological Sites	AQS	All tests of CWL12	
		PC	PC as % of AQS
Ancient woodland C	200	$3.48x10^{-04}$	0.0012%
Ancient woodland D		$2.73x10^{-04}$	0.0009%
Ancient woodland E		$1.18x10^{-04}$	0.0004%
Ancient woodland F		$6.68x10^{-04}$	0.0022%
Ancient woodland G		$3.85x10^{-04}$	0.0013%
Ancient woodland H		$6.07x10^{-04}$	0.0020%
Celtic Springs SINC		$1.02x10^{-03}$	0.003%
LG Duffryn Site 1/2 SINC		$4.39x10^{-04}$	0.001%
Duffryn Pond SINC		$4.39x10^{-04}$	0.001%
Coed Ffynon-Oer SINC		$4.86x10^{-05}$	0.00016%
Court Wood SINC		$5.04x10^{-05}$	0.00017%
Afon Ebbw River SINC		$1.35x10^{-04}$	0.0004%
Gaer Fort SINC		$1.46x10^{-04}$	0.0005%
Cwm Pensidan SINC		$8.23x10^{-05}$	0.0003%

TABLE D 3 MODELLED MAXIMUM 24-HOUR MEAN NO_X CONCENTRATIONS – 1-HOUR EMERGENCY OUTAGE SCENARIO (µg/m^3)

Non-Statutory Ecological Sites	AQS	CWL11		CWL12	
		PC	PC as % of AQS	PC	PC as % of AQS
Ancient woodland C	200	58.9	29%	5.32	2.7%
Ancient woodland D		59.0	30%	5.13	2.6%
Ancient woodland E		33.8	17%	1.64	0.8%
Ancient woodland F		83.1	42%	11.3	5.6%
Ancient woodland G		56.0	28%	6.55	3.3%
Ancient woodland H		45.0	22%	4.79	2.4%
Celtic Springs SINC		124	62%	16.8	8.4%
LG Duffryn Site 1/2 SINC		93.9	47%	7.93	4.0%
Duffryn Pond SINC		93.9	47%	7.93	4.0%
Coed Ffynon-Oer SINC		17.9	8.9%	0.825	0.41%
Court Wood SINC		18.6	9.3%	0.966	0.48%
Afon Ebbw River SINC		33.7	17%	3.70	1.9%
Gaer Fort SINC		27.9	14%	3.12	1.6%
Cwm Pensidan SINC		18.3	9.1%	1.61	0.81%

TABLE D 4 MODELLED ANNUAL MEAN NO_X CONCENTRATIONS – 1-HOUR EMERGENCY OUTAGE SCENARIO (µg/m^3)

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%	$1.35x10^{-03}$	0.0045%
Ancient woodland D		0.0127	0.042%	$1.00x10^{-03}$	0.0033%
Ancient woodland E		0.00711	0.024%	$4.49x10^{-04}$	0.0015%
Ancient woodland F		0.0244	0.081%	$2.68x10^{-03}$	0.009%
Ancient woodland G		0.0126	0.042%	$1.49x10^{-03}$	0.005%
Ancient woodland H		0.0221	0.074%	$2.34x10^{-03}$	0.0078%
Celtic Springs SINC		0.0020	0.007%	$3.79x10^{-03}$	0.013%
LG Duffryn Site 1/2 SINC		0.0525	0.18%	$2.10x10^{-03}$	0.0070%
Duffryn Pond SINC		0.0466	0.155%	$2.10x10^{-03}$	0.007%
Coed Ffynon-Oer SINC		0.00265	0.0088%	$1.87x10^{-04}$	0.00062%
Court Wood SINC		0.00286	0.010%	$1.95x10^{-04}$	0.00065%
Afon Ebbw River SINC		0.00494	0.016%	$5.20x10^{-04}$	0.0017%
Gaer Fort SINC		0.00555	0.019%	$5.73x10^{-04}$	0.0019%
Cwm Pensidan SINC		0.00365	0.012%	$3.11x10^{-04}$	0.0010%

TABLE D 5 MODELLED MAXIMUM 24-HOUR MEAN NO_X CONCENTRATIONS – 72-HOUR EMERGENCY OUTAGE SCENARIO ($\mu g/m^3$)

Non-Statutory Ecological Sites	AQS	CWL11		CWL12	
		PC	PC as % of AQS	PC	PC as % of AQS
Ancient woodland C	200	1,413	707%	128	64%
Ancient woodland D		1,416	708%	123	62%
Ancient woodland E		811	406%	39.2	20%
Ancient woodland F		1,994	997%	271	135%
Ancient woodland G		1,344	672%	157	79%
Ancient woodland H		1,080	540%	115	58%
Celtic Springs SINC		2,979	1,490%	403	201%
LG Duffryn Site 1/2 SINC		2,254	1,127%	190	95%
Duffryn Pond SINC		2,254	1,127%	190	95%
Coed Ffynon-Oer SINC		429	215%	19.8	10%
Court Wood SINC		447	224%	23.2	12%
Afon Ebbw River SINC		809	404%	88.9	44%
Gaer Fort SINC		669	334%	74.8	37%
Cwm Pensidan SINC		439	219%	38.7	19%

TABLE D 6 MODELLED ANNUALMEAN NO_X CONCENTRATIONS – 72-HOUR EMERGENCY OUTAGE SCENARIO (µg/m^3)

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%	0.0972	0.32%
Ancient woodland D		0.914	3.0%	0.0723	0.24%
Ancient woodland E		0.512	1.7%	0.0324	0.11%
Ancient woodland F		1.75	5.8%	0.193	0.64%
Ancient woodland G		0.907	3.0%	0.107	0.36%
Ancient woodland H		1.59	5.3%	0.168	0.56%
Celtic Springs SINC		3.78	12.6%	0.273	0.91%
LG Duffryn Site 1/2 SINC		3.35	11.2%	0.151	0.50%
Duffryn Pond SINC		3.35	11.2%	0.151	0.50%
Coed Ffynon-Oer SINC		0.191	0.64%	0.0135	0.045%
Court Wood SINC		0.206	0.69%	0.0140	0.047%
Afon Ebbw River SINC		0.356	1.2%	0.0375	0.12%
Gaer Fort SINC		0.400	1.3%	0.0413	0.14%
Cwm Pensidan SINC		0.263	0.88%	0.0224	0.075%

APPENDIX E IN-COMBINATION IMPACT

TABLE E 1 IN-COMBINATION IMPACT OF TESTING OPERATIONS ON ANNUAL MEAN NO_X ($\mu g/m^3$)

Statutory Sites where pollution overlap is anticipated	AQS	Baseline	PC				PC as % of AQS	PEC	PEC as % of AQS	Significance
			CWL11/12/13	MSFT	IQE	ERF				
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	30	15.2	1.04 x10^{-04}	1.48 x10^{-04}	NA	NA	0.0008%	15.2	51%	Insignificant
Coed-y-Darren (SSSI)		8.8	6.09 x10^{-05}	7.35 x10^{-05}	NA	NA	0.0004%	8.8	29%	Insignificant
Dan y Graig Quarry Risca (SSSI)		11.3	0.00	NA	NA	NA	0.0000%	11.3	38%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)		12.8	2.96 x10^{-04}	3.99 x10^{-04}	NA	NA	0.0023%	12.8	43%	Insignificant
Gwent Levels - Whitson (SSSI)		9.1	1.67x10^{-04}	2.34 x10^{-04}	NA	NA	0.0013%	9.1	30%	Insignificant
Gwent Levels Rumney (SSSI)		18.6	4.58 x10^{-04}	5.42 x10^{-04}	NA	NA	0.0033%	18.6	62%	Insignificant
Gwent Levels St Brides (SSSI)		18.4	9.21E-03	1.00 x10^{-02}	0.06	0.64	2.4%	19.1	64%	Insignificant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		11.0	5.08 x10^{-04}	6.30 x10^{-04}	NA	0.34	1.1%	11.4	38%	Insignificant
Henllys Bog (SSSI)		8.7	7.42 x10^{-05}	9.44 x10^{-05}	NA	NA	0.0006%	8.7	29%	Insignificant
Lisvane Reservoir (SSSI)		15.2	1.00 x10^{-04}	1.51 x10^{-04}	NA	NA	0.0008%	15.2	51%	Insignificant
Plas Machen Wood (SSSI)		10.1	1.15 x10^{-04}	1.91E-04	NA	NA	0.0010%	10.1	34%	Insignificant
Rhymney River Section (SSSI)		20.9	1.22 x10^{-04}	1.67 x10^{-04}	NA	NA	0.0010%	20.9	70%	Insignificant
River Usk (SAC, SSSI)		22.0	4.96 x10^{-02}	8.07 x10^{-04}	0.00	1.2	4.2%	23.2	77%	Potentially Significant

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
			PC							
Rumney Quarry (SSSI)		18.4	0.00	1.44×10^{-04}	NA	NA	0.0005%	18.4	61%	Insignificant
Ruperra Castle and Woodlands (SSSI)		9.9	1.07×10^{-04}	1.88×10^{-04}	NA	NA	0.0010%	9.9	33%	Insignificant
Severn Estuary (SAC, SPA, SSSI)		26.1	8.95×10^{-04}	1.02×10^{-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_X ($\mu g/m^3$)

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
			PC							
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	200	30.5	0.353	4.47	NA	NA	2%	35.3	18%	Insignificant
Coed-y-Darren (SSSI)		17.6	0.296	2.63	NA	NA	1%	20.5	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	0.541	5.94	NA	NA	3%	32.2	16%	Insignificant
Gwent Levels - Whitson (SSSI)		18.3	0.402	4.69	NA	NA	3%	23.4	12%	Insignificant
Gwent Levels Rumney (SSSI)		37.3	1.334	14	NA	NA	8%	52.6	26%	Insignificant
Gwent Levels St Brides (SSSI)		36.8	9.90	124	0.52	10.3	72%	181.5	91%	Potentially Significant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)		22.1	0.899	6.57	NA	2.7	5%	32.2	16%	Insignificant
Henllys Bog (SSSI)		17.5	0.265	3.17	NA	NA	2%	20.9	10%	Insignificant
Lisvane Reservoir (SSSI)		30.4	0.335	4.49	NA	NA	2%	35.2	18%	Insignificant
Plas Machen Wood (SSSI)		20.2	0.386	12.3	NA	NA	6%	32.9	16%	Insignificant
Rhymney River Section (SSSI)		41.9	0.405	4.85	NA	NA	3%	47.1	24%	Insignificant

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
			PC							
River Usk (SAC, SSSI)		43.9	36.0	14.0	0.05	8.9	29%	102.9	51%	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	0.448	9.11	NA	NA	5%	29.3	15%	Insignificant
Severn Estuary (SAC, SPA, SSSI)		52.2	1.497	9.04	0.06	9.6	10%	72.4	36%	Potentially Significant

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[a]	Baseline	CWL11/12/13	MSFT	IQE[b]	ERF	PC as % of AQS	PEC	PEC as % of AQS	Significance
			PC							
Argloddiau Cronfeyedd Dwr Llanisien a Llys-Faen / Llanishen and Lisvane Reservoir Embankments (SSSI)	2	15.2	$7.26x10^{-05}$	$3.95x10^{-05}$	NA	NA	0.001%	15.2	762%	Insignificant
Coed-y-Darren (SSSI)	2	8.8	$4.26x10^{-05}$	$1.96x10^{-05}$	NA	NA	0.000%	8.81	441%	Insignificant
Dan y Graig Quarry Risca (SSSI)	2	11.3	0.00	NA	NA	NA	0.000%	11.3	564%	Insignificant
Gwent Levels - Nash and Goldcliff (SSSI)	2	12.8	$2.07x10^{-04}$	$5.76x10^{-05}$	NA	NA	0.001%	12.8	642%	Insignificant
Gwent Levels - Whitson (SSSI)	2	9.1	$1.17x10^{-04}$	$3.38x10^{-05}$	NA	NA	0.001%	9.14	457%	Insignificant
Gwent Levels Rumney (SSSI)	2	18.6	$3.20x10^{-04}$	$1.44x10^{-04}$	NA	NA	0.003%	18.6	932%	Insignificant
Gwent Levels St Brides (SSSI)	2	18.4	$6.45x10^{-03}$	$1.44x10^{-03}$	NA	0.37	2.7%	18.4	922%	Potentially Significant
Gwlyptiroedd Casnewydd / Newport Wetlands (SSSI)	10	11.0	$3.55\ x10^{-04}$	$9.08x10^{-05}$	NA	0.2	0.29%	11.1	111%	Insignificant
Henllys Bog (SSSI)	2	8.7	$5.19\ x10^{-05}$	$2.50x10^{-05}$	NA	NA	0.000%	8.73	436%	Insignificant
Lisvane Reservoir (SSSI)	10	15.2	$7.00\ x10^{-05}$	$4.04x10^{-05}$	NA	NA	0.000%	15.2	152%	Insignificant
Plas Machen Wood (SSSI)	10	10.1	$8.07x10^{-05}$	$5.09x10^{-05}$	NA	NA	0.000%	10.1	101%	Insignificant

Statutory Sites where pollution overlap is anticipated	Minimum Critical Load[a]	Baseline	CWL11/12/13	MSFT	IQE[b]	ERF	PC as % of AQS	PEC	PEC as % of AQS	Significance
			PC							
Rhymney River Section (SSSI)	2	20.9	$8.57x10^{-05}$	$4.45x10^{-05}$	NA	NA	0.001%	20.9	1047%	Insignificant
River Usk (SAC, SSSI)	5	22.0	$3.47x10^{-02}$	$2.15x10^{-04}$	NA	0.68	2.0%	22.1	441%	Potentially Significant
Rumney Quarry (SSSI)	2	18.4	0.00	$3.85x10^{-05}$	NA	NA	0.001%	18.4	919%	Insignificant
Ruperra Castle and Woodlands (SSSI)	2	9.9	$7.46x10^{-05}$	$5.01x10^{-05}$	NA	NA	0.001%	9.88	494%	Insignificant
Severn Estuary (SAC, SPA, SSSI)	10	26.1	$6.27x10^{-04}$	$2.72x10^{-04}$	NA	0.27	0.78%	26.2	262%	Insignificant

Note:
The nutrient nitrogen deposition impact does not necessarily arise at the same locations.
[a] A minimum critical load of 2 was used for sites with no available critical loads from the APIS website as a worst-case scenario.
[b] 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[a]	MSFT	IQE[b]	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)	0.00035%	<1%	NA	NA
Gwent Levels - Whitson (SSSI)	0.00020%	<1%	NA	NA
Gwent Levels Rumney (SSSI)	0.00055%		NA	NA
Gwent Levels St Brides (SSSI)	0.0110%	<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)	0.0593%	<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%

Statutory Sites where pollution overlap is anticipated	CWL11/12/13[a]	MSFT	IQE[b]	ERF
	PC as % of CL			

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.
[a] Acid deposition have been assessed only for the ecological sites with site-specific Critical Loads for acidity information available from the APIS website.
[b] 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 Nm3/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
14th October 2024



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