Project Aurora

Air Emissions Risk Assessment

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Basis of Report

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1.0 Introduction

SLR Consulting Limited (SLR) have been commissioned by Kellogg Company of Great Britain Limited (the 'Client') to prepare an Air Emissions Risk Assessment (AERA) in support of an Environmental Permit (EP) variation application for the addition of seven temporary generators at their production facility at Wrexham, Bryn Lane, Wrexham, LL13 9UT (the 'Site').

1.1 Background

1.1.1 The Site

The Site is centred on the approximate National Grid Reference (NGR) x338825, y350510, and located off Bryn Lane, Wrexham Industrial Estate, Wrexham, LL13 9UT. It is situated at the northern edge of Wrexham Industrial Estate approximately 5km east of Wrexham town centre. The Site is within the administrative area of Wrexham County Borough Council (WCBC).

To the south and west the installation is bounded by the industrial estate with a range of commercial and industrial activities. To the north and east the Site is bounded by agricultural land with scattered residential dwellings within 1km.

1.1.2 The Proposed Changes (September 2025)

Subsequent to the approval of the proposed production modifications at the Site in August 2025 (application reference: PAN-027445), a further EP variation application is required to account for the installation of seven temporary generators.

The proposed changes will introduce seven additional emission points and have therefore resulted in the need for an AERA to support the EP variation.

1.2 Objective and Scope

The scope of the assessment is limited to consideration of pollutant releases of nitrogen oxides (NO_X), carbon monoxide (CO) and particulate matter (PM_{10}[1] and $PM_{2.5}$[2]).

Therefore, the objective of the study is to assess, using atmospheric dispersion modelling, the impact of NO_X, CO, PM_{10} and $PM_{2.5}$ emissions against the relevant Air Quality Standards for the protection of human health and where necessary the relevant Critical Levels (C_{Le}) (for NO_X) and Critical Loads (C_{Lo}) (for Nitrogen (N) and acid deposition) for the protection of designated ecological receptors.

This report presents the approach, detailed methodology and findings of the AERA.

[1] Particulate matter where particles are less than 10 micrometres in diameter.

[2] Particulate matter where particles are less than 2.5 micrometres in diameter.

2.0 Legislation and Relevant Guidance

2.1 Environmental Permitting Regulations and Guidance

The facility is regulated under the Environmental Permitting (England and Wales) Regulations 2016 (as amended) (EPR).

The assessment has been informed by the Environment Agency (EA) guidance 'Air emissions risk assessment for your environmental permit'[3] (the 'AERA guidance'), as adopted by Natural Resources Wales (NRW).

2.2 Air Quality Legislation and Guidance

2.2.1 Air Quality Standards

The Air Quality Standards (Wales) Regulations 2010 (the AQSR) includes Limit Values, Target Values, Objectives, Critical Levels and Exposure Reduction Targets for the protection of human health and the environment. Following the UK's withdrawal from the EU, the Environment (Miscellaneous Amendments) (Wales) (EU Exit) Regulations 2020[4] was introduced to mirror revisions to supporting EU legislation, including the AQSR.

2.2.2 Air Quality Strategy

In 2020, the Welsh Government published The Clean Air Plan for Wales[5] which sets out the over-arching strategic framework for air quality management in Wales. In 2023, following a review of the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland, which was published in 2007[6], the Welsh Government formerly adopted The Clean Air Plan for Wales as the National AQS for Wales, to replace the 2007 document.

2.3 Standards for Air Quality

The standards applied in this assessment for the protection of human health are provided in Table 2-1 and are taken from the AQSR and AERA guidance, these are collectively termed Air Quality Assessment Levels (AQALs) throughout this report.

Table 2-1: Applied AQALs

Pollutant		Annual AQAL (µg/m^3)	Short Term AQAL (µg/m^3)
Nitrogen dioxide	NO_2	40	200 (1-hour) not to be exceeded more than 18 times per year
Carbon monoxide	CO	-	10,000 (8-hour) and 30,000 (1-hour)
Particulate matter	PM_{10}	40	50 (24-hour mean) not to be exceeded more than 35 times per year
	$PM_{2.5}$	20	-

[3] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

[4] The Environment (Miscellaneous Amendments) (Wales) (EU Exit) Regulations 2020, Wales Statutory Instrument No. 1215 (W. 274).

[5] Welsh Government, The Clean Air Plan for Wales: Healthy Air, Healthy Wales, 2020.

[6] Defra, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, July 2007.

The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance (LAQM.TG22)[7]. According to LAQM.TG22, air quality standards should only apply to locations where *'members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the objective. Authorities should not consider exceedances of the objectives at any location where relevant public exposure would not be realistic'*. Longer term standards, such as annual means, should apply at houses or other locations which the public can be expected to occupy on a continuous basis (examples are presented in Table 2-2).

It should be noted that these standards do not apply to exposure at the workplace.

Table 2-2: Relevant Public Exposure

Averaging Period	Relevant Locations	Standards should apply at:	Standards don't apply at:
Annual mean	Where individuals are exposed for a cumulative period of six months in a year	Building facades of residential properties, schools, hospitals etc.	Facades of offices Hotels Gardens of residences Kerbside sites
24-hour mean and 8-hour mean	Where individuals may be exposed for eight hours or more in a day	As above together with hotels and gardens of residential properties	Kerbside sites where public exposure is expected to be short term
1-hour mean	Where individuals might reasonably be expected to spend one hour or longer	As above together with kerbside sites of regular access, car parks, bus stations etc.	Kerbside sites where public would not be expected to have regular access

2.4 Protection of Ecological Receptors

Sites of nature conservation importance at an International / European, national and local level are provided environmental protection with respect to air quality. Standards for the protection of ecological receptors are known as C_{Le} for airborne concentrations and C_{Lo} for deposition to land from air.

The EA AERA guidance (as adopted by NRW) provides the following screening distances for designated ecological sites to determine where an assessment is required:

- Within 10km of the Site:
  - Special Protection Areas (SPAs);
  - Special Areas of Conservation (SACs); and
  - Ramsar sites (protected wetlands).
- Within 2km of the Site:
  - Sites of Special Scientific Interest (SSSIs); and
  - Other nature sites (ancient woods, local wildlife sites and national and local nature reserves).

[7] Local Air Quality Management Technical Guidance (TG22), Published by Defra in partnership with the Scottish Government, Welsh Government and Department of Agriculture, Environment and Rural Affairs. May 2025.

2.4.1 Critical Levels (C_{Le})

C_{Le} are a quantitative estimate of exposure to one or more airborne pollutants in gaseous form, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge. The relevant C_{Le} for the protection of vegetation and ecosystems are presented in Table 2-3.

Table 2-3: Critical Levels for the Protection of Vegetation and Ecosystems

Pollutant	CLe (µg/m^3)	Habitat and Averaging Period
NO_x	30	Annual mean (all ecosystems)
	75	Daily mean (all ecosystems)

2.4.2 Critical Loads (C_{Lo})

C_{Lo} are a quantitative estimate of exposure to deposition of one or more pollutants, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge. C_{Lo} are set for the deposition of various substances to sensitive ecosystems. In relation to combustion emissions C_{Lo} for acidification are relevant which can occur via both wet and dry deposition; however, on a local scale only dry (direct deposition) is considered significant. Deposition of nitrogen can cause eutrophication and acidification; the relevant C_{Lo} are presented in Section 3.4.4.

3.0 Assessment Methodology

Detailed atmospheric dispersion modelling has been undertaken with due consideration to the AERA guidance (the dispersion modelling checklist is included in Appendix A). The assessment approach is based upon the following stages:

- Review of emission sources;
- Compilation of the existing air quality baseline and review of Local Air Quality Management (LAQM) status;
- Identification of sensitive receptors;
- Dispersion modelling; and
- Calculation of process contribution (PC) to ground level concentrations and evaluation against relevant environmental standards for human and ecological receptors.

3.1 Modelling Scenarios

The modelling has accounted for the emissions associated with the seven proposed temporary generators in addition the proposed dust sources associated with the plant upgrades.

In assessing the potential air quality impacts of proposed additional emission sources, it is appropriate to model only the contributions associated with these new sources to assess any incremental changes.

Existing emissions from the Site (which has been operational for a number of years) are already accounted for within the measured or assumed background concentrations used in the assessment. To include these existing source contributions within the dispersion modelling would therefore result in double-counting, artificially inflating the predicted concentrations. By isolating the proposed sources, the assessment ensures that the results represent the incremental impact of the new activities, relative to the established baseline.

The results of the modelling are presented in Section 5.0.

3.2 Quantification of Emissions

3.2.1 NOx

The emission parameters applied for NO_X have been taken from specification sheets provided by the client.

3.2.2 CO

The emission parameters applied for CO have been taken from specification sheets provided by the client.

3.2.3 PM_{10} and $PM_{2.5}$

The emission parameters applied for PM_{10} / $PM_{2.5}$ have been based on information provided by the Project's Engineers.

At the time of writing, detailed information regarding the specific fraction of $PM_{2.5}$ in the overall particulate matter fraction is not available. Therefore, it has been assumed that the entire particulate matter fraction exists as both PM_{10} and $PM_{2.5}$. This assumption represents a worst-case scenario for the purpose of the assessment.

The emission parameters applied in the modelling are provided in Table 3-1 and Table 3-2.

Table 3-1: Emission Parameters

Drawing Reference	Permit Reference	Source Name	Pollutant	Stack Location (NGR)		Stack Height (m AGL)	Emission Temperature (ºK)	Moisture Content (%)	O_2 Content (%)	Actual Air Flow (Am^3/s)	Emission Velocity (m/s)	Normalised Flow (Nm^3/s) [(a)]
				x	y							
Proposed Emissions Points												
N/A	TG_1	600kva Gen Set (T4F/Stage)	NOx, CO & PM_{10} / $PM_{2.5}$	338853	350370	5.9	758	7.4	9.8	1.7	46	0.6
N/A	TG_2	600kva Gen Set (T4F/Stage)	NOx, CO & PM_{10} / $PM_{2.5}$	338853	350366	5.9	758	7.4	9.8	1.7	46	0.6
N/A	TG_3	600kva Gen Set (T4F/Stage)	NOx, CO & PM_{10} / $PM_{2.5}$	338854	350362	5.9	758	7.4	9.8	1.7	46	0.6
N/A	TG_4	300kva Gen Set (Stage V fleet)	NOx, CO & PM_{10} / $PM_{2.5}$	338762	350301	2.9	758	7.6	9.4	1.1	56	0.4
N/A	TG_5	300kva Gen Set (Stage V fleet)	NOx, CO & PM_{10} / $PM_{2.5}$	338762	350303	2.9	758	7.6	9.4	1.1	56	0.4
N/A	TG_6	300kva Gen Set (Stage V fleet)	NOx, CO & PM_{10} / $PM_{2.5}$	338762	350305	2.9	758	7.6	9.4	1.1	56	0.4
N/A	TG_7	300kva Gen Set (Stage V fleet)	NOx, CO & PM_{10} / $PM_{2.5}$	338762	350307	2.9	758	7.6	9.4	1.1	56	0.4
EP125	A35	Process 5 – Wet dust collection system serving process & packing	PM_{10} / $PM_{2.5}$	338860	350411	11.0	288	0	21	10.8	22	10.3
EP126	A36	Process 3 – Wet dust collection system serving temperers	PM_{10} / $PM_{2.5}$	338842	350608	11.0	288	0	21	13.6	21	12.9
EP127	A37	Process 3 – Wet dust collection system serving coating dryer	PM_{10} / $PM_{2.5}$	338842	350537	11.0	288	0	21	18.1	19	17.1
EP128	A38	Process 3 – Wet dust collection system serving transfer lines	PM_{10} / $PM_{2.5}$	338842	350532	10.5	288	0	21	2.9	15	2.8
EP129	A39	Process 3 – Wet dust collection system serving coating dryer	PM_{10} / $PM_{2.5}$	338842	350541	10.5	288	0	21	1.1	15	1.0
EP130	A40	Process 3 – Dry dust collector serving big bag area	PM_{10} / $PM_{2.5}$	338837	350609	10.5	288	0	21	0.7	21	0.6
EP131	A41	Process 3 – Dry dust collector serving flour transport	PM_{10} / $PM_{2.5}$	338833	350593	10.5	288	0	21	0.8	15	0.7
EP132	A42	Process 3 – Dry dust collector serving salt and flour receivers	PM_{10} / $PM_{2.5}$	338851	350640	8.0 [(b)]	288	0	21	8.7	20	8.2
EP133	A43	Process 3 – Cyclone serving Jet Zone Cooler	PM_{10} / $PM_{2.5}$	338834	350555	16.0 [(b)]	323	0	21	6.1	22	5.2
EP134	A44	Syrup Centre No 1	PM_{10} / $PM_{2.5}$	338840	350526	8.0	288	0	21	0.2	9	0.2
EP135	A45	Syrup Centre No 2	PM_{10} / $PM_{2.5}$	338836	350526	15.0	288	0	21	0.4	12	0.4

Table Notes:
(a) Normalised to 273.15k, dry, 11% O_2 moisture and oxygen content as above.

Table 3-2: Pollutants Emission Rates

Drawing Reference	Permit Reference	Source Name	Pollutant	Emission Concentration (mg/m³)			Release Rate (g/s)			Source
				NOx	$PM_{10/2.5}$	CO	NOx	$PM_{10/2.5}$	CO	
Proposed Emission Points										
N/A	TG_1	600kva Gen Set (T4F/Stage)	NOx, CO & PM_{10} / $PM_{2.5}$	190	10	6.67	0.11	0.01	0.004	Client input[(c)]
N/A	TG_2	600kva Gen Set (T4F/Stage)	NOx, CO & PM_{10} / $PM_{2.5}$	190	10	6.67	0.11	0.01	0.004	Client input[(c)]
N/A	TG_3	600kva Gen Set (T4F/Stage)	NOx, CO & PM_{10} / $PM_{2.5}$	190	10	6.67	0.11	0.01	0.004	Client input[(c)]
N/A	TG_4	300 kvs Gen Set (Stage V fleet)	NOx, CO & PM_{10} / $PM_{2.5}$	190	10	6.67	0.07	0.004	0.003	Client input[(c)]
N/A	TG_5	300 kvs Gen Set (Stage V fleet)	NOx, CO & PM_{10} / $PM_{2.5}$	190	10	6.67	0.07	0.004	0.003	Client input[(c)]
N/A	TG_6	300 kvs Gen Set (Stage V fleet)	NOx, CO & PM_{10} / $PM_{2.5}$	190	10	6.67	0.07	0.004	0.003	Client input[(c)]
N/A	TG_7	300 kvs Gen Set (Stage V fleet)	NOx, CO & PM_{10} / $PM_{2.5}$	190	10	6.67	0.07	0.004	0.003	Client input[(c)]
EP125	A35	Process 5 – Wet dust collection system serving process & packing	PM_{10} / $PM_{2.5}$	-	10	-	-	0.10	-	Client input[(c)]
EP126	A36	Process 3 – Wet dust collection system serving temperers	PM_{10} / $PM_{2.5}$	-	10	-	-	0.13	-	Client input[(c)]
EP127	A37	Process 3 – Wet dust collection system serving coating dryer	PM_{10} / $PM_{2.5}$	-	10	-	-	0.17	-	Client input[(c)]
EP128	A38	Process 3 – Wet dust collection system serving transfer lines	PM_{10} / $PM_{2.5}$	-	10	-	-	0.03	-	Client input[(c)]
EP129	A39	Process 3 – Wet dust collection system serving coating dryer	PM_{10} / $PM_{2.5}$	-	10	-	-	0.01	-	Client input[(c)]
EP130	A40	Process 3 – Dry dust collector serving big bag area	PM_{10} / $PM_{2.5}$	-	10	-	-	0.01	-	Client input[(c)]
EP131	A41	Process 3 – Dry dust collector serving flour transport	PM_{10} / $PM_{2.5}$	-	10	-	-	0.01	-	Client input[(c)]
EP132	A42	Process 3 – Dry dust collector serving salt and flour receivers	PM_{10} / $PM_{2.5}$	-	10	-	-	0.08	-	Client input[(c)]
EP133	A43	Process 3 – Cyclone serving Jet Zone Cooler	PM_{10} / $PM_{2.5}$	-	10	-	-	0.05	-	Client input[(c)]
EP134	A44	Syrup Centre No 1	PM_{10} / $PM_{2.5}$	-	15	-	-	0.002	-	Client input[(c)]
EP135	A45	Syrup Centre No 2	PM_{10} / $PM_{2.5}$	-	15	-	-	0.01	-	Client input[(c)]

Table Notes:
(a) Data provided to SLR by the Client.

3.3 Dispersion Model Setup

For this assessment the AERMOD model[8] has been applied; this model is widely used and accepted by NRW for undertaking such assessments and its predictions have been validated against real-time monitoring data by the United States (US) Environmental Protection Agency (EPA). It is therefore considered a suitable model for this assessment.

3.3.1 Model Domain / Receptors

The modelling has been undertaken using a receptor grid across mapping of the study area. Pollutant exposure isopleths have been generated by interpolation between receptor points and superimposed onto the map. This method allows the maximum ground level concentration outside the Site boundary to be assessed. A receptor grid was applied as follows:

- 200m x 200m at 20m grid resolution;
- 500m x 500m at 50m grid resolution;
- 2000m x 2000m at 200m grid resolution; and
- 5000m x 5000m at 500m grid resolution.

In addition, a number of discrete receptor locations at relevant exposure locations surrounding the Site have been modelled, as described in Section 4.1, to facilitate the discussion of results.

3.3.2 Building Downwash

Building downwash occurs when turbulence, induced by nearby structures, causes pollutants emitted from an elevated source to be displaced and dispersed rapidly towards the ground, resulting in elevated ground level concentrations. Building downwash has been considered for buildings that have a maximum height equivalent to at least 40% of the emission height and which are within a distance defined as five times the lesser of the height or maximum projected width of the building.

The integrated Building Profile Input Programme (BPIP) module within AERMOD was used to assess the potential impact of building downwash upon predicted dispersion characteristics. Structures input to the model are represented in Figure 3-1.

[8] Software used: Lakes AERMOD View, (V13.0.0)

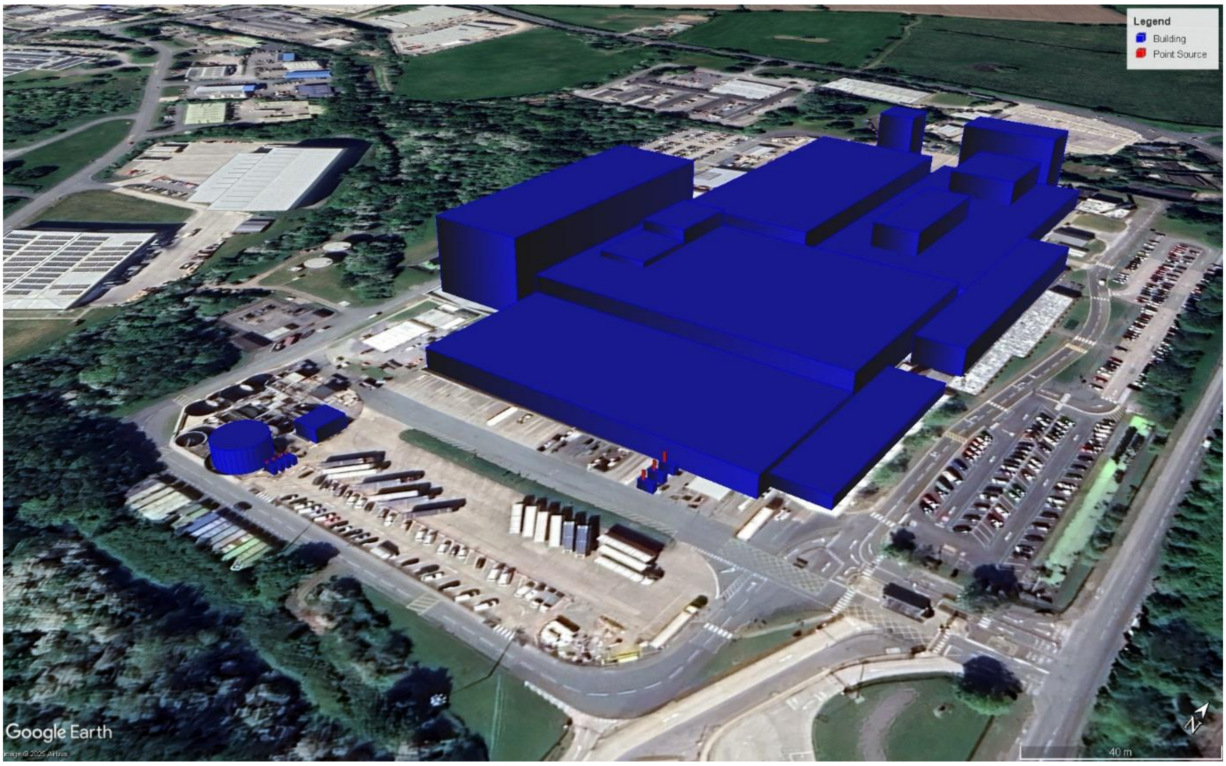

Figure 3-1: Modelled Buildings and Structures

3.3.3 Topography

The presence of elevated terrain can affect the dispersion of pollutants and the resulting ground level concentration in a number of ways. Elevated terrain reduces the distance between the plume centre line and the ground level, thereby increasing ground level concentrations. Elevated terrain can also increase turbulence and, hence, plume mixing with the effect of increasing concentrations near to a source and reducing concentrations further away.

AERMOD utilises digital elevation data to determine the impact of topography on dispersion from a source. Topography was incorporated within the modelling using 30m resolution Shuttle Radar Topography Mission (SRTM) terrain data files. Data was processed by the AERMAP function within AERMOD to calculate terrain heights (see Figure 4-5).

3.3.4 Meteorological Data Preparation

Hawarden meteorological station is the closest and most representative station to the Site, located approximately 15km north, and was selected for use in the assessment. The meteorological data (5 years hourly sequential data 2017-2021) was obtained in .met format from the data supplier and converted to the required surface and profile formats for use in AERMOD using the AERMET View meteorological pre-processor. Details specific to the station location were used to define surface roughness, albedo and bowen ratio in the conversion (see Table 3-3). A windrose is presented in Figure 4-4.

Table 3-3: Meteorological Station Surface Characteristics

Zone (Start)	Zone (End)	Albedo	Bowen Ratio	Surface Roughness (m)
0	30	0.18	0.66	0.075
30	67			0.075
67	130			0.075

Zone (Start)	Zone (End)	Albedo	Bowen Ratio	Surface Roughness (m)
130	240			0.055
240	300			0.056
300	0			0.060

3.3.5 Dispersion Model Uncertainty

Model validation studies[9] for AERMOD generally suggest that these dispersion models are for the vast majority of cases able to predict maximum short-term high percentiles concentrations well within a factor of two and the latest evaluation studies for AERMOD show the composite (geometric mean) ratio of predicted to observed short-term averages from 'test sites' (where real-time monitoring data is available to validate model performance), to be between 0.96 and 1.2.

3.4 Assessment of Impacts on Air Quality

3.4.1 Operational Envelope

It has been assumed that the emission sources operate for a maximum envelope of 8,760 hours per year. In practice, it will be less than this.

3.4.2 Treatment of Model Output

The assessment of impacts against the AQALs as defined in Sections 2.3 and 2.4 has been undertaken using model output as described in Table 3-4.

Table 3-4: Model Outputs

Criteria	Model Output – Process Contribution (PC)	Predicted Environmental Concentration (PEC)
Annual Mean NO_x and NO_2	Annual Mean, factored by 0.7	PC + annual mean background
1-hour Mean NO_2	99.79%ile of 1-hour means, factored by 0.35	PC + 2 x annual mean background
24-hour Mean NOx	Maximum 24-hour mean	PC + 2 x annual mean background
1-hour Mean CO	1-hour Mean	PC + 2 x annual mean background
8-hour Mean CO	8-hour Mean	PC + 2 x annual mean background
Annual Mean PM_{10}	Annual Mean	PC + annual mean background
24-hour Mean PM_{10}	90.4%ile of 24-hour means	PC + annual mean background
Annual Mean $PM_{2.5}$	Annual Mean	PC + annual mean background

3.4.3 Assessment of Impact and Significance

To assess the potential impact on air quality the predicted exposure is compared to the AQALs. The results of the dispersion modelling have been presented in the form of:

[9] AERMOD: Latest Features and Evaluation Results, EPA-454/R-03-003, June 2003 (United States Environmental Protection Agency).

- Tabulated concentrations at discrete receptor locations to facilitate the discussion of results; and
- Illustrations of the impact as isopleths (contours of concentration) for the criteria selected, enabling determination of impact at any location within the study area.

In accordance with the AERA guidance, the impact is considered to be insignificant or negligible if:

- The long-term PC is <1% of the long-term AQAL; and
- The short-term PC is <10% of the short-term AQAL.

For PCs that cannot be considered insignificant further assessment has been undertaken and the Predicted Environmental Concentration (PEC: PC + existing background pollutant concentration) determined for comparison as a percentage of the relevant AQAL.

The AERA guidance indicates that no further assessment is required if the resulting PEC is below the AQAL, and the applied emission levels comply with the Best Available Techniques (BAT) requirements.

3.4.4 Assessment of Impacts on Vegetation and Ecosystems

3.4.4.1 Calculation of Contribution to Critical Loads

Deposition rates have been calculated using empirical methods recommended by the EA AQTAG06[10]. Dry deposition flux was calculated using the following equation:

> Dry deposition flux ($\mu g/m^2/s$) = ground level concentration ($\mu g/m^3$) x deposition velocity (m/s)

Wet deposition occurs via the incorporation of the pollutant into water droplets which are then removed in rain or snow, and is not considered significant over short distances compared with dry deposition and therefore for the purposes of this assessment (in accordance with AQTAG06), wet deposition has not been considered.

The applied deposition velocities for the relevant chemical species are as shown in Table 3-5.

Table 3-5: Applied Deposition Velocities

Chemical Species	Recommended deposition velocity (m/s)	
NO_2	Grassland	0.0015
	Woodland	0.0030

3.4.4.2 Critical Loads – Eutrophication

The C_{Lo} for nitrogen deposition (N) are recorded in units of kgN/ha/yr. The deposition PC is converted from $\mu g/m^2/s$ to units of kgN/ha/year by multiplying the dry deposition flux by the standard conversion factor of 95.9.

[10] AQTAG06 – Technical Guidance on detailed modelling approach for an appropriate assessment for emissions to air. Environment Agency, March 2014 version.

3.4.4.3 Critical Loads – Acidification

The deposition PC is converted to units of equivalents (k_{eq}/ha/year), which is a measure of how acidifying the chemical species can be, by multiplying the deposition rate µg/m^2/s by the standard conversion factor of 6.84.

3.4.4.4 Calculation of PC as a percentage of Acid Critical Load Function

The calculation of the PC of N to the C_{Lo} function has been carried out according to the guidance on Air Pollution Information System (APIS), which is as follows:

> *"The potential impacts of additional sulphur and/or nitrogen deposition from a source are partly determined by PEC, because only if PEC of nitrogen deposition is greater than CLminN will the additional nitrogen deposition from the source contribute to acidity. Consequently, if PEC is less that CLminN only the acidifying affects of sulphur from the process need to be considered:*
>
> *Where PEC N Deposition < CLminN*
>
> *PC as % CL function = (PC S deposition/CLmaxS)*100*
>
> *Where PEC is greater than CLminN (the majority of cases), the combined inputs of sulphur and nitrogen need to be considered. In such cases, the total acidity input should be calculated as a proportion of the CLmaxN.*
>
> *Where PEC N Deposition > CLminN*
>
> *PC as %CL function = ((PC of S+N deposition)/CLmaxN)*100"*

3.4.4.5 Assessment of Impact and Significance

In addition to the AERA guidance, the EA's Operational Instruction 66_12[11] details how the air quality impacts on ecological sites should be assessed. This guidance provides risk-based screening criteria to determine whether impacts will have 'no likely significant effects (alone and in-combination)' for International / European sites, 'no likely damage' for SSSIs and 'no significant pollution' for other sites, as follows:

- PC does not exceed 1% long-term C_{Le} and/or C_{Lo} or that the PEC does not exceed 70% long-term C_{Le} and/or C_{Lo} for International / European sites and SSSIs;
- PC does not exceed 10% short-term C_{Le} for NO_x for International / European sites and SSSIs;
- PC does not exceed 100% long-term C_{Le} and/or C_{Lo} for other conservation sites; and
- PC does not exceed 100% short-term C_{Le} for NO_x for other conservation sites.

Where impacts cannot be classified as resulting in 'no likely significant effect', more detailed assessment may be required depending on the sensitivity of the feature in accordance with the EA's Operational Instruction 67_12[12]. This can require the consideration of the potential for in-combination effects, the actual distribution of sensitive features within the site, and local factors (such as the water table).

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[11] EA Working Instruction 66_12 - Simple assessment of the impact of aerial emissions from new or expanding IPPC regulated industry for impacts on nature conservation

[12] EA Working Instruction 67_12 - Detailed assessment of the impact of aerial emissions from new or expanding IPPC regulated industry for impacts on nature conservation

The guidance provides the following further criteria:

- If the PEC does not exceed 100% of the appropriate limit it can be assumed there will be no adverse effect;
- If the background is below the limit, but a small PC leads to an exceedance – decision based on local considerations;
- If the background is currently above the limit and the additional PC will cause a small increase – decision based on local considerations;
- If the background is below the limit, but a significant PC leads to an exceedance – cannot conclude no adverse effect; and
- If the background is currently above the limit and the additional PC is large – cannot conclude no adverse effect.

4.0 Baseline Environment

4.1 Site Setting and Sensitive Receptors

The Site is situated at the northern edge of Wrexham Industrial Estate approximately 5km east of Wrexham town centre.

Further information on human and ecological receptors is provided in the following sections.

4.1.1 Human Receptors

The nearest residential properties are located approximately 55m to the northeast of the Site, off Bryn Lane.

The modelled sensitive human receptors selected to inform the risk assessment are presented in Figure 4-1 and Table 4-1. All the selected receptor locations are modelled at a height of 1.5m.

Furthermore, the dispersion modelling has been completed using a receptor grid (see Section 3.3.1) to allow potential short-term exposure to be assessed at all locations surrounding the Site.

Table 4-1: Modelled Discrete Receptors – Human Receptors

Ref.	Description	NGR	
		x	y
HR_1	Bryn Lane No.1	338908	350738
HR_2	Bryn Lane No.2	338897	350761
HR_3	Bryn Lane No.3	338882	350783
HR_4	Bryn Lane No.4	338482	350885
HR_5	Hugmore Lane No.1	338013	351074
HR_6	Hugmore Lane No.2	338024	351096
HR_7	Francis Lane No.1	338302	351228
HR_8	Ridley Wood Lane No.1	339428	351114
HR_9	Ridley Wood Lane No.2	339469	351086
HR_10	Holt Road No.1	339628	351208
HR_11	Holt Road No.2	339620	351119
HR_12	Holt Road No.3	339583	350845
HR_13	Holt Road No.4	339725	350675
HR_14	Holt Road No.5	339766	350616
HR_15	Holt Road No.6	339788	350450
HR_16	Holt Road No.7	339827	350296
HR_17	Bryn Lane No.5	338852	349724
HR_18	Bryn Lane No.6	338822	349733

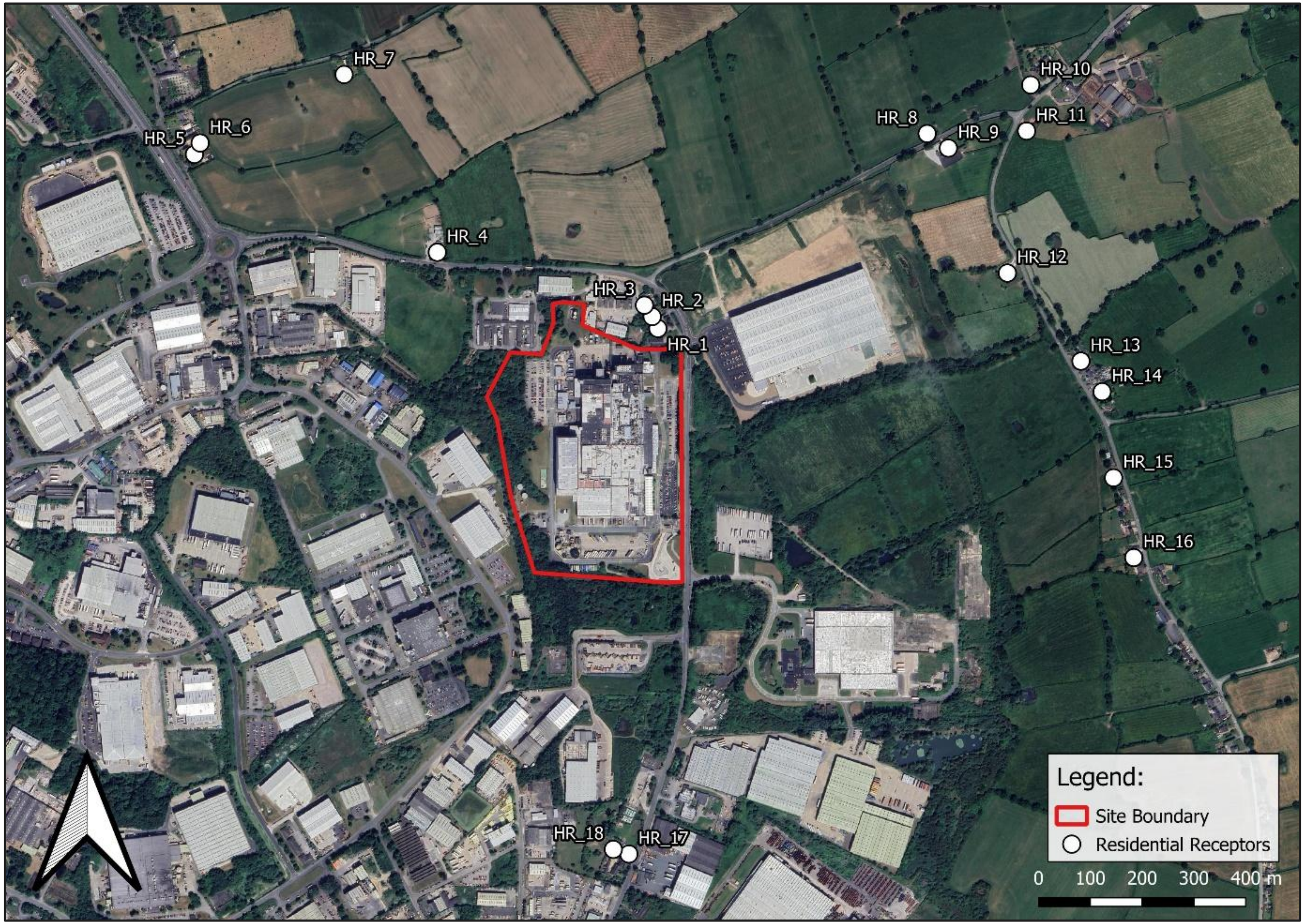

Figure 4-1: Site Setting and Modelled Human Receptors

4.1.2 Ecological Receptors

There are two SACs and one Ramsar site within the 10km screening distance, the closest of which (Midland Meres & Mosses Phase 2) lies approximately 3.9km northwest of the Site.

There are no SSSIs within the 2km screening distance

There are six small Ancient Woodlands within the 2km screening distance, the closest of which lies approximately 900m west of the Site.

Identified designated ecological sites are presented in Figure 4-2 and Table 4-2. All the selected receptor locations are modelled at ground level (i.e. 0m).

Table 4-2: Designated Ecological Sites

Ref.	Designation	Site Name	Approx. Distance and Direction from Site (km)
ER1	Ramsar	Midland Meres & Mosses Phase 2 (Wales)	3.9, north
ER2	SAC	Johnstown Newt Sites	8, southeast
ER3	SAC	River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid (England/Wales)	3.1, west
ER4	Ancient woodland	Unnamed Ancient Woodland	1.7, west
ER5	Ancient woodland		0.8, west
ER6	Ancient woodland		1.5, west
ER7	Ancient woodland		1.4, southwest
ER8	Ancient woodland		2.0, west
ER9	Ancient woodland		1.0, west
ER10	Ancient woodland		1.5 west

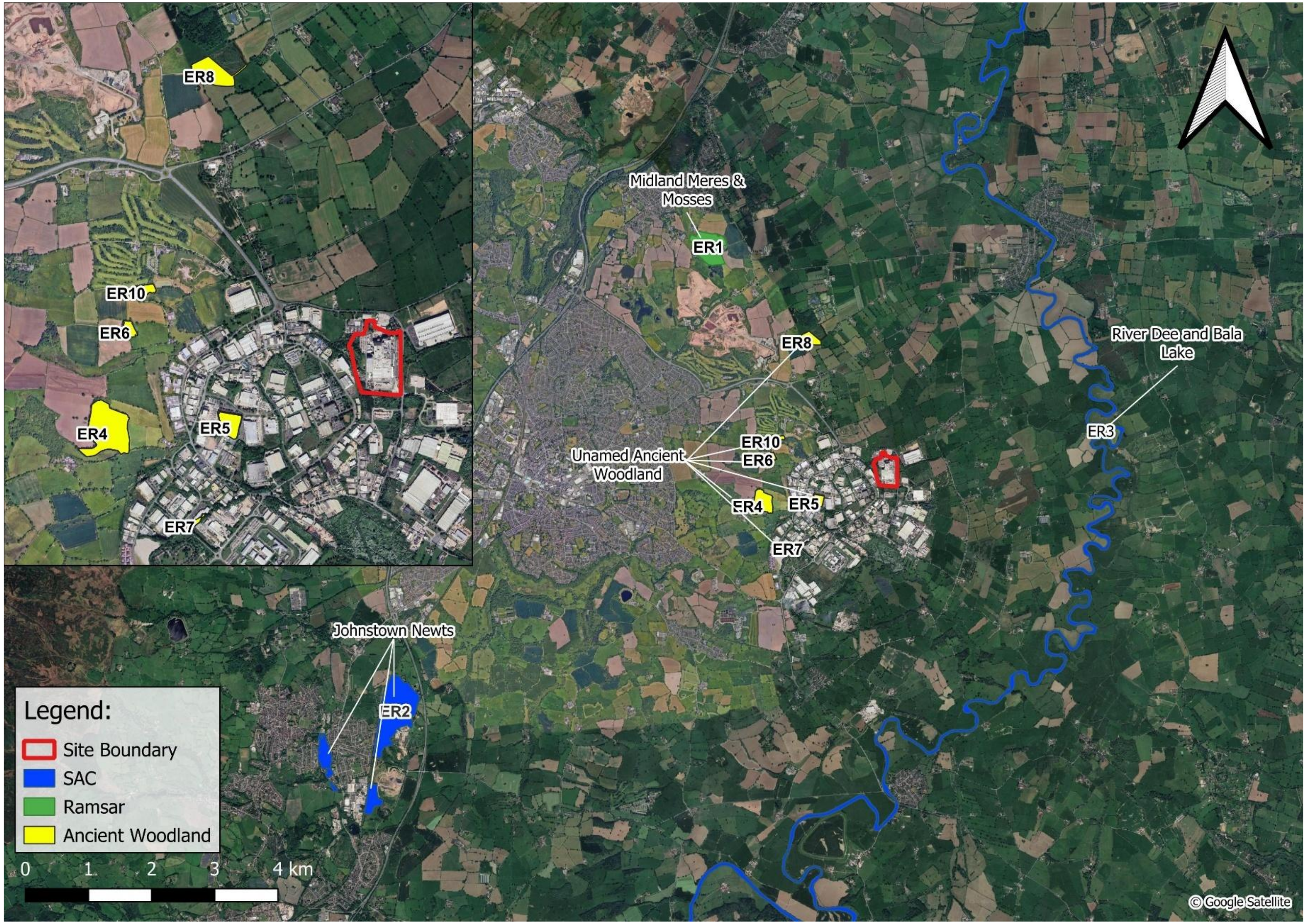

Figure 4-2: Site Setting and Modelled Ecological Receptors

4.2 Ambient Air Quality

Monitoring data collected during the COVID-19 pandemic (i.e. 2020/2021) is expected to be atypical and has therefore not been used to characterise the baseline environment.

4.2.1 Local Air Quality Management

The Site is located within the administrative boundary of WCBC. WCBC are part of the North Wales Authorities Collaborative Project (NWACP) which collectively manage and report on air quality throughout the area in fulfilment of the LAQM regime.

WCBC do not have any declared AQMAs. It is noted that the administrative boundary of Cheshire West and Chester Council (CWCC) is located approximately 2.7km east of the Site. CWCC currently have four declared AQMAs, the closest of which is approximately 15km north of the Site. The declared AQMAs within CWCC have therefore not been considered in the assessment given the separation distance.

4.2.2 Air Quality Monitoring

The latest publicly available NWACP Annual Progress Report (APR)[13] at the time of writing is the 2024 APR (containing monitoring data up to the end of 2023).

The closest monitoring locations are presented in Figure 4-3 (those used for baseline characterisation are highlighted in yellow) and recent results are summarised in Table 4-3.

The monitoring results show that annual mean NO_2 concentrations in the area have been well below the annual mean AQAL (40µg/m^3) at all considered tubes.

Table 4-3: Diffusion Tube NO_2 Monitoring

Site	Monitoring Site Classification	Distance / Direction from the Site (km)	Annual Mean NO_2 (µg/m^3)				
			2019	2020	2021	2022	2023
60	Suburban	1.1 / East	7.7	6.8	7.4	5.8	6.0
59	Roadside	3.4 / South	11.2	8.4	9.7	8.4	9.6
41	Roadside	4.0 / Southwest	13.9	10.3	13.0	12.2	11.1
58	Suburban	3.6 / West	12.7	10.5	10.7	9.7	11.8
42	Roadside	3.5 / Northwest	20.6	17.1	19.6	18.3	17.4

From review of the NWACP 2024 APR, there were three automatic monitors within WCBC in 2023. The closest is the Victoria Road monitoring station, which is part of the UK's 'Automatic Urban and Rural Network' (AURN).

The Victoria Road monitoring station (UKA00440) is situated approximately 6km west of the Site, as presented in Figure 4-3. Although the station location is classified as an Urban Traffic[14] setting, contrasting with the Industrial[15] setting of the Site, it has been considered due to the absence of Industrial monitoring stations in proximity to the Site.

[13] North Wales Authorities Collaborative Project, 2024 Air Quality Progress Report, August 2024.

[14] Sites in an urban area at least 25 metres from the edge of major junctions and no more than 10 metres from the kerbside.

[15] Site in an urban residential area downwind of specific industrial source.

The UK Air Information Resource (AIR) has been used to obtain 2023 monitored NO_2, PM_{10} and $PM_{2.5}$ concentrations from the Victoria Road station, which are presented in Table 4-4 to Table 4-6.

Monitored background concentration for CO has been obtained from the Liverpool Speke AURN monitor. Given that CO monitoring at Liverpool Speke was ceased in August 2012. The 2011 concentration is presented in Table 4-7.

The recorded NO_2, PM_{10} and $PM_{2.5}$ and CO concentrations are below the relevant AQALs.

Table 4-4: Automatic NO_2 Monitoring Results

Monitoring Station	Monitoring Period	Site Classification	Annual Mean NO_2 Concentration ($\mu g/m^3$)	Data Capture (%)
Victoria Road	01/01/2023 - 31/12/2023	Urban Traffic	13.4	99.9

Table 4-5: Automatic PM_{10} Monitoring Results

Monitoring Station	Monitoring Period	Site Classification	Annual Mean PM_{10} Concentration ($\mu g/m^3$)	Data Capture (%)
Victoria Road	01/01/2023 - 31/12/2023	Urban Traffic	10.4	99.9

Table 4-6: Automatic $PM_{2.5}$ Monitoring Results

Monitoring Station	Monitoring Period	Site Classification	Annual Mean $PM_{2.5}$ Concentration ($\mu g/m^3$)	Data Capture (%)
Victoria Road	01/01/2023 - 31/12/2023	Urban Traffic	6.2	99.9

Table 4-7: Automatic CO Monitoring Results

Monitoring Station	Monitoring Period	Site Classification	Annual Mean CO Concentration ($\mu g/m^3$)	Data Capture (%)
Liverpool Speke	01/01/2011 - 31/12/2011	Urban Industrial	206.7	98.8%

4.2.3 Defra Modelled Background Concentrations

Background pollutant concentration data on a 1km x 1km spatial resolution is provided by Defra through the UK AIR website and is routinely used to support LAQM and Air Quality Assessments. Background pollutant concentrations for NO_2, PM_{10} and $PM_{2.5}$ are based upon a 2021 base year and projected to future years[16].

Table 4-8 presents the 2023 Defra background concentrations of NO_2, PM_{10} and $PM_{2.5}$ for the grid squares which cover the Site. 2023 has been selected as the base year, to match the latest full year where monitoring data is available (i.e. the 2024 ASR).

[16] Background mapping data for local authorities – http://uk-air.defra.gov.uk/data/laqm-background-home. Accessed September 2025.

Table 4-8: Defra Predicted Annual Mean Background Concentrations (2023)

Grid Square NGR (m)		NO_2 (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)
x	y			
338500	350500	10.9	11.0	6.3
338500	351500	6.7	9.8	5.6
339500	351500	6.2	9.7	5.5
339500	350500	6.6	9.9	5.6
338500	349500	8.5	10.8	5.9

4.2.4 Baseline Conditions at Human Receptors

The background concentrations applied at human receptors have been based on the most conservative values from the data available, these are presented within Table 4-9.

Table 4-9: Baseline Conditions at Human Receptors

Pollutant	Averaging Period	Concentration (µg/m^3)	Data Source
NO_2	Long-term	17.4	Concentration measured at Diffusion Tube '42' in 2023
	Short-term	34.8	2x above as per the method outlined within the AERA guidance
CO	Short-term	413.4	2x the concentration measured at the Liverpool Speke AURN in 2011 as per the method outlined within the AERA guidance
PM_{10}	Long-term	11.0	Modelled 2023 Defra background concentration, grid square x338500, y350500.
	Short-term	11.0	1x above as per the method outlined within LAQM.TG22
$PM_{2.5}$	Long-term	6.3	Modelled 2023 Defra background concentration, grid square x338500, y350500.

Figure 4-3: Local Monitoring Sites

4.3 Baseline Conditions at Ecological Receptors

The baseline conditions and appropriate C_{Lo} have been established using the APIS website[17] (a support tool for assessment of potential effects of air pollutants on habitats and species developed in partnership by the UK conservation and regulatory agencies and the Centre for Ecology and Hydrology). The concentrations, deposition rates, and C_{Lo} for nutrient nitrogen and acid deposition are set out in Table 4-10 and Table 4-11.

Table 4-10: Baseline Concentrations, Critical Loads and Current Loads

Ref.	Habitat (most sensitive Critical Load Class)	NO_x Annual Mean (µg/m^3)	Critical Load Applied in Assessment (kg/ha/yr)	Current Load (kg/ha/yr)
ER1	Valley mires, poor fens and transition mires	8.3	5	20.9
ER2	Broadleaved deciduous woodland	10.9	10	32.9
ER3	Permanent oligotrophic lakes, ponds and pools (including softwater lakes)	7.4	10	22.6
ER4[(a)]	Broadleaved, Mixed and Yew Woodland	8.4	10	36.4
ER5[(a)]	Broadleaved, Mixed and Yew Woodland	13.5	10	37.2
ER6[(a)]	Broadleaved, Mixed and Yew Woodland	13.5	10	37.2
ER7[(a)]	Broadleaved, Mixed and Yew Woodland	12.7	10	37.1
ER8[(a)]	Broadleaved, Mixed and Yew Woodland	8.0	10	37.8
ER9[(a)]	Broadleaved, Mixed and Yew Woodland	13.5	10	37.2
ER10[(a)]	Broadleaved, Mixed and Yew Woodland	8.9	10	37.5
Table notes: a) Based on site specific grid reference.				

[17] http://www.apis.ac.uk/ - Accessed September 2025

Table 4-11: Relevant Acid Critical Loads and Baseline Deposition

Ref.	Habitat (most sensitive Critical Load Class)	Critical Level (k_{eq}/ha/yr)			Current Load (k_{eq}/ha/yr)
		CLmaxS	CLminN	CLmaxN	N
ER1	Bogs	0.2	0.3	0.5	1.4
ER2	Other: Broadleaved plantation	1.5	0.1	1.7	2.4
ER3	Unmanaged Broadleafed/Coniferous Woodland	0.7	0.1	1.1	2.8
ER4(a)	Broadleaved, Mixed and Yew Woodland	1.0	0.1	0.1	2.6
ER5(a)	Broadleaved, Mixed and Yew Woodland	1.4	0.4	1.7	2.7
ER6(a)	Broadleaved, Mixed and Yew Woodland	1.4	0.4	1.7	2.7
ER7(a)	Broadleaved, Mixed and Yew Woodland	1.4	0.4	1.8	2.7
ER8(a)	Broadleaved, Mixed and Yew Woodland	1.4	0.4	1.7	2.7
ER9(a)	Broadleaved, Mixed and Yew Woodland	1.4	0.4	1.7	2.7
ER10(a)	Broadleaved, Mixed and Yew Woodland	1.4	0.4	1.7	2.7

Table notes:
a) Based on site specific grid reference.

4.4 Meteorological Conditions

A windrose, showing the frequency of wind speed and direction used in the assessment is provided in Figure 4-4 below. The windrose shows that winds from the southeast are most frequent with winds from the northeast least frequent.

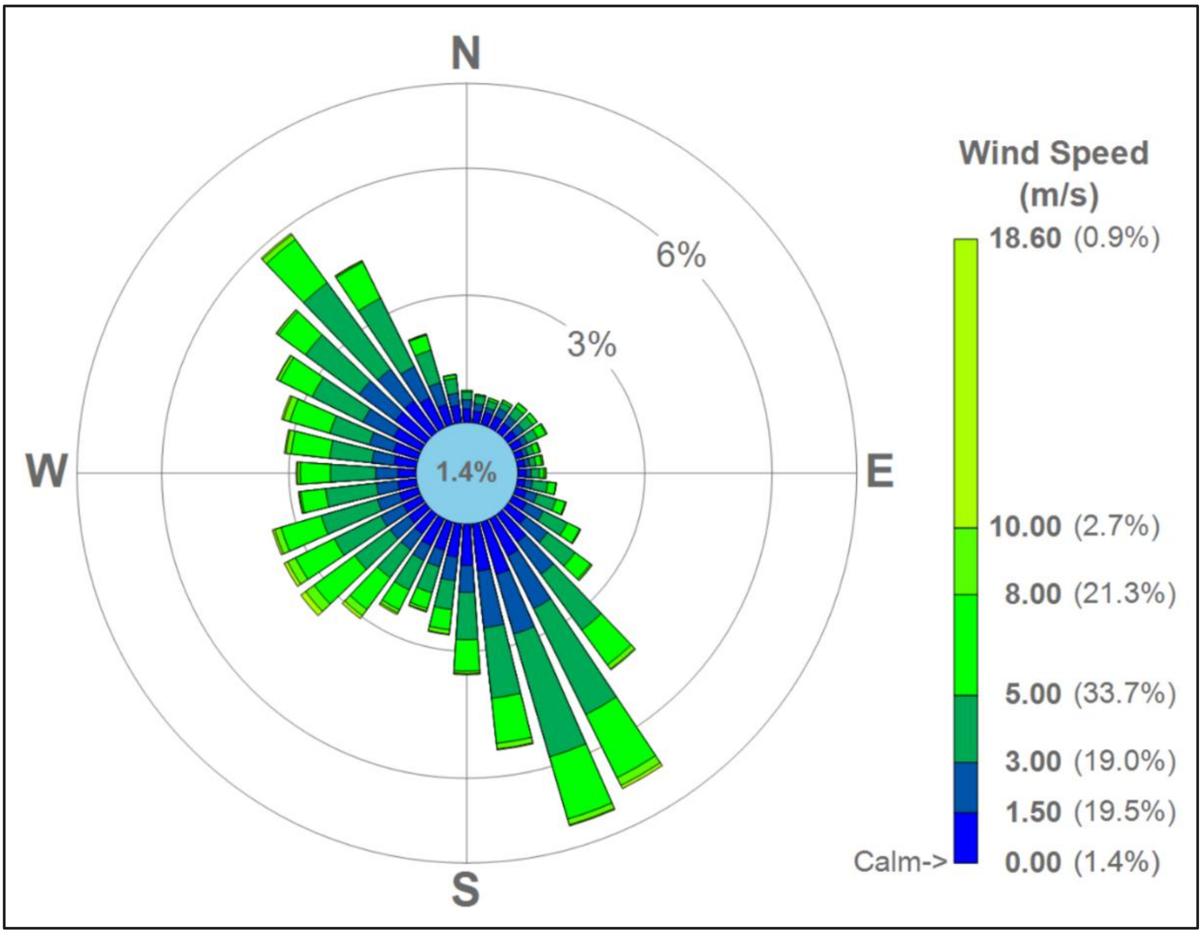

Figure 4-4: Windrose – Hawarden Recording Station (2017-2021)

4.5 Topography

The Sites lies at approximately 38m Above Ordnance Datum (AOD). The immediate surroundings within 1km are relatively flat with more prominent topographical features rising to approximately 75m AOD approximately 4km to the west. The surrounding topography is illustrated in Figure 4-5 below.

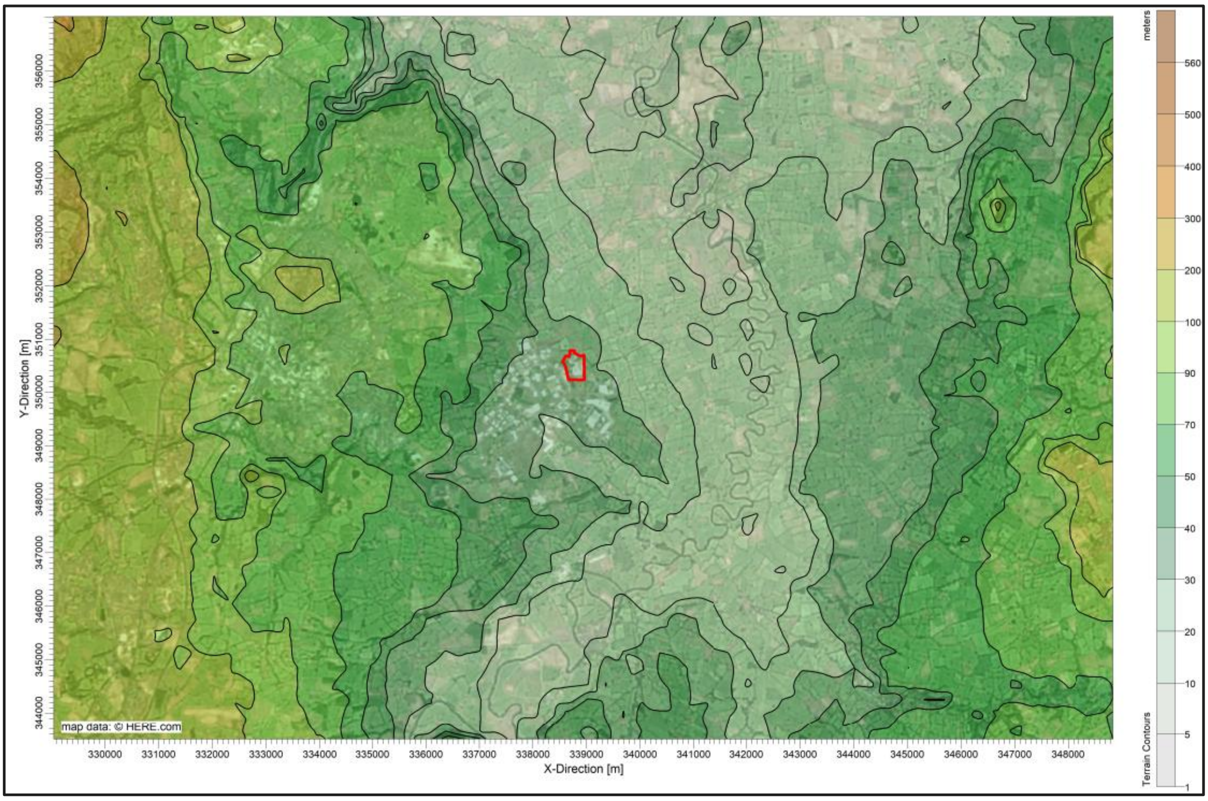

Figure 4-5: Surrounding Topography

5.0 Assessment Results

Within the following sections, the PC from the proposed temporary generators in addition the proposed dust sources associated with the plant upgrades (where appropriate) have been presented.

Where the PEC is calculated, it is considered that the background concentrations applied in the PEC include contributions from existing onsite sources and are therefore regarded as being already represented within baseline air quality datasets. Their exclusion from the modelling avoids double counting and a duplication of impacts.

5.1 Impacts on Human Receptors

5.1.1 NO_2 Impacts

The maximum predicted annual mean NO_2 impacts at the modelled receptor locations are summarised in Table 5-1 (an isopleth plot is presented in Appendix B). The AQAL is not exceeded at any of the receptor locations.

Table 5-1: Predicted Annual Mean NO_2 Impacts

Receptor	PC (µg/m³)	PC as % of AQAL	PEC (µg/m³)	PEC as % of AQAL
HR1	1.8	4.4%	19.2	47.9%
HR2	1.7	4.3%	19.1	47.8%
HR3	1.7	4.2%	19.1	47.7%
HR4	1.6	4.0%	19.0	47.5%
HR5	0.4	1.0%	17.8	44.5%
HR6	0.4	1.0%	17.8	44.5%
HR7	0.8	2.0%	18.2	45.5%
HR8	0.4	1.0%	n/c	n/c
HR9	0.4	1.0%	n/c	n/c
HR10	0.3	0.7%	n/c	n/c
HR11	0.3	0.7%	n/c	n/c
HR12	0.5	1.1%	17.9	44.6%
HR13	0.4	1.0%	n/c	n/c
HR14	0.4	0.9%	n/c	n/c
HR15	0.3	0.8%	n/c	n/c
HR16	0.3	0.8%	n/c	n/c
HR17	0.5	1.2%	17.9	44.7%
HR18	0.4	1.1%	17.8	44.6%
Table Note: n/c = not calculated as PC is insignificant				

The maximum predicted short-term NO_2 impacts at the modelled receptor locations are summarised in Table 5-2 (an isopleth plot is presented in Appendix B). The AQAL is not exceeded at any of the receptor locations.

Table 5-2: Predicted 1-hour Mean (99.79%ile) NO_2 Impacts

Receptor	PC (µg/m^3)	PC as % of AQAL	PEC (µg/m^3)	PEC as % of AQAL
HR1	29.4	14.7%	64.2	32.1%
HR2	26.8	13.4%	61.6	30.8%
HR3	25.1	12.6%	59.9	30.0%
HR4	19.8	9.9%	n/c	n/c
HR5	11.4	5.7%	n/c	n/c
HR6	11.2	5.6%	n/c	n/c
HR7	14.8	7.4%	n/c	n/c
HR8	11.7	5.9%	n/c	n/c
HR9	11.6	5.8%	n/c	n/c
HR10	8.7	4.3%	n/c	n/c
HR11	9.5	4.8%	n/c	n/c
HR12	10.7	5.4%	n/c	n/c
HR13	9.1	4.5%	n/c	n/c
HR14	7.1	3.5%	n/c	n/c
HR15	5.5	2.7%	n/c	n/c
HR16	5.3	2.7%	n/c	n/c
HR17	23.5	11.7%	58.3	29.1%
HR18	23.2	11.6%	58.0	29.0%
Table Note: n/c = not calculated as PC is insignificant				

5.1.2 CO Impacts

The maximum predicted 8-hour mean CO impacts at the modelled receptor locations are summarised in Table 5-3. The PC is insignificant at all of the receptor locations.

Table 5-3: Predicted 8-hour Mean CO Impacts

Receptor	PC (µg/m^3)	PC as % of AQAL	PEC (µg/m^3)	PEC as % of AQAL
HR1	1.84	0.02%	n/c	n/c
HR2	1.80	0.02%	n/c	n/c
HR3	1.76	0.02%	n/c	n/c
HR4	1.61	0.02%	n/c	n/c
HR5	0.56	0.01%	n/c	n/c
HR6	0.59	0.01%	n/c	n/c
HR7	0.99	0.01%	n/c	n/c
HR8	0.71	0.01%	n/c	n/c
HR9	0.85	0.01%	n/c	n/c
HR10	0.57	0.01%	n/c	n/c

Receptor	PC (µg/m³)	PC as % of AQAL	PEC (µg/m³)	PEC as % of AQAL
HR11	0.44	<0.01%	n/c	n/c
HR12	0.64	0.01%	n/c	n/c
HR13	0.54	0.01%	n/c	n/c
HR14	0.53	0.01%	n/c	n/c
HR15	0.46	<0.01%	n/c	n/c
HR16	0.49	<0.01%	n/c	n/c
HR17	1.45	0.01%	n/c	n/c
HR18	1.56	0.02%	n/c	n/c
Table Note: n/c = not calculated as PC is insignificant				

The maximum predicted 1-hour mean CO impacts at the modelled receptor locations are summarised in Table 5-4. The PC is insignificant at all of the receptor locations.

Table 5-4: Predicted 1-hour Mean CO Impacts

Receptor	PC (µg/m³)	PC as % of AQAL	PEC (µg/m³)	PEC as % of AQAL
HR1	4.97	0.02%	n/c	n/c
HR2	4.75	0.02%	n/c	n/c
HR3	4.39	0.01%	n/c	n/c
HR4	3.72	0.01%	n/c	n/c
HR5	2.45	0.01%	n/c	n/c
HR6	2.36	0.01%	n/c	n/c
HR7	2.90	0.01%	n/c	n/c
HR8	2.52	0.01%	n/c	n/c
HR9	2.47	0.01%	n/c	n/c
HR10	1.90	0.01%	n/c	n/c
HR11	2.01	0.01%	n/c	n/c
HR12	2.27	0.01%	n/c	n/c
HR13	1.92	0.01%	n/c	n/c
HR14	1.72	0.01%	n/c	n/c
HR15	1.22	<0.01%	n/c	n/c
HR16	1.31	<0.01%	n/c	n/c
HR17	6.48	0.02%	n/c	n/c
HR18	6.53	0.02%	n/c	n/c
Table Note: n/c = not calculated as PC is insignificant				

5.1.3 PM_{10} Impacts

The maximum predicted annual mean PM_{10} impacts at the modelled receptor locations are summarised in Table 5-5 (an isopleth plot is presented in Appendix B). The AQAL is not exceeded at any of the receptor locations.

Table 5-5: Predicted Annual Mean PM_{10} Impacts

Receptor	PC (µg/m³)	PC as % of AQAL	PEC (µg/m³)	PEC as % of AQAL
HR1	5.4	13.5%	16.4	41.0%
HR2	5.1	12.8%	16.1	40.3%
HR3	5.0	12.5%	16.0	40.0%
HR4	1.7	4.2%	12.7	31.7%
HR5	0.5	1.2%	11.5	28.7%
HR6	0.5	1.3%	11.5	28.8%
HR7	1.3	3.2%	12.3	30.7%
HR8	1.0	2.4%	12.0	29.9%
HR9	1.0	2.4%	12.0	29.9%
HR10	0.7	1.9%	11.7	29.4%
HR11	0.8	2.0%	11.8	29.5%
HR12	1.0	2.6%	12.0	30.1%
HR13	0.8	2.1%	11.8	29.6%
HR14	0.7	1.9%	11.7	29.4%
HR15	0.8	1.9%	11.8	29.4%
HR16	0.7	1.8%	11.7	29.3%
HR17	0.4	1.1%	11.4	28.6%
HR18	0.4	1.0%	11.4	28.5%

The maximum predicted 24-mean PM_{10} impacts at the modelled receptor locations are summarised in Table 5-6 (an isopleth plot is presented in Appendix B). The AQAL is not exceeded at any of the receptor locations.

Table 5-6: Predicted 24-hour Mean (90.41%ile) PM_{10} Impacts

Receptor	PC (µg/m³)	PC as % of AQAL	PEC (µg/m³)	PEC as % of AQAL
HR1	12.7	25.5%	23.7	47.5%
HR2	12.0	24.0%	23.0	46.0%
HR3	12.4	24.9%	23.4	46.9%
HR4	4.3	8.6%	n/c	n/c
HR5	1.6	3.1%	n/c	n/c
HR6	1.7	3.3%	n/c	n/c
HR7	3.3	6.7%	n/c	n/c
HR8	2.7	5.4%	n/c	n/c

Receptor	PC (µg/m^3)	PC as % of AQAL	PEC (µg/m^3)	PEC as % of AQAL
HR9	2.8	5.7%	n/c	n/c
HR10	2.3	4.6%	n/c	n/c
HR11	2.4	4.8%	n/c	n/c
HR12	2.9	5.8%	n/c	n/c
HR13	2.4	4.7%	n/c	n/c
HR14	2.3	4.5%	n/c	n/c
HR15	2.4	4.8%	n/c	n/c
HR16	2.3	4.6%	n/c	n/c
HR17	1.7	3.3%	n/c	n/c
HR18	1.7	3.4%	n/c	n/c
Table Note: n/c = not calculated as PC is insignificant				

5.1.4 $PM_{2.5}$ Impacts

The maximum predicted annual mean $PM_{2.5}$ impacts at the modelled receptor locations are summarised in Table 5-7 (an isopleth plot is presented in Appendix B). The AQAL is not exceeded at any of the receptor locations.

Table 5-7: Predicted $PM_{2.5}$ Annual Mean Impacts

Receptor	PC (µg/m^3)	PC as % of AQAL	PEC (µg/m^3)	PEC as % of AQAL
HR1	5.4	27.0%	11.7	58.5%
HR2	5.1	25.6%	11.4	57.1%
HR3	5.0	25.0%	11.3	56.5%
HR4	1.7	8.5%	8.0	40.0%
HR5	0.5	2.4%	6.8	33.9%
HR6	0.5	2.6%	6.8	34.1%
HR7	1.3	6.3%	7.6	37.8%
HR8	1.0	4.8%	7.3	36.3%
HR9	1.0	4.9%	7.3	36.4%
HR10	0.7	3.7%	7.0	35.2%
HR11	0.8	4.0%	7.1	35.5%
HR12	1.0	5.1%	7.3	36.6%
HR13	0.8	4.1%	7.1	35.6%
HR14	0.7	3.7%	7.0	35.2%
HR15	0.8	3.8%	7.1	35.3%
HR16	0.7	3.6%	7.0	35.1%
HR17	0.4	2.2%	6.7	33.7%
HR18	0.4	2.1%	6.7	33.6%

5.2 Impacts on Ecological Receptors

5.2.1 Critical Levels

The results of the assessment of impacts on the C_{Le} are presented in Table 5-8 and Table 5-9 below. The findings present the maximum impact per designation and can be summarised as follows:

- The annual mean PC (NO_X) is insignificant at less than 1% of the C_{Le} for all considered SACs and Ramsar site and less than 100% of the C_{Le} for considered Ancient Woodland sites; and
- The daily mean PC (NOx) is insignificant at less than 10% of the C_{Le} for all considered SACs and Ramsar site and less than 100% of the C_{Le} for considered Ancient Woodland sites.

Therefore, the impact can be considered to cause '*no likely significant effect*' to the SACs and Ramsar site, and '*no significant pollution*' to the Ancient Woodland sites.

Table 5-8: Impact on Critical Levels – Annual Mean NO_X

Ref	NO_X PC	PC as % of CLe	NO_X PEC	PEC as % of CLe
ER1	0.2	0.7%	n/c	n/c
ER2	<0.1	<0.1%	n/c	n/c
ER3	0.2	0.7%	n/c	n/c
ER4	0.1	0.4%	n/c	n/c
ER5	0.1	0.4%	n/c	n/c
ER6	0.1	0.3%	n/c	n/c
ER7	0.1	0.2%	n/c	n/c
ER8	0.4	1.5%	n/c	n/c
ER9	0.1	0.4%	n/c	n/c
ER10	0.1	0.5%	n/c	n/c
Table Note: n/c = not calculated as PC is insignificant				

Table 5-9: Impact on Critical Levels – Daily Mean NO_X

Ref	NO_X PC	PC as % of CLe	NO_X PEC	PEC as % of CLe
ER1	3.3	4.4%	n/c	n/c
ER2	0.2	0.3%	n/c	n/c
ER3	3.7	5.0%	n/c	n/c
ER4	2.9	3.9%	n/c	n/c
ER5	3.1	4.2%	n/c	n/c
ER6	2.1	2.7%	n/c	n/c
ER7	2.8	3.8%	n/c	n/c
ER8	4.3	5.7%	n/c	n/c
ER9	2.9	3.9%	n/c	n/c
ER10	2.9	3.9%	n/c	n/c

Ref	NO_X PC	PC as % of CLe	NO_X PEC	PEC as % of CLe
Table Note: n/c = not calculated as PC is insignificant				

5.2.2 Impacts on Critical Loads

The results of the assessment on C_{Lo} are presented in Table 5-10 and Table 5-11 below. The findings are that the PCs do not exceed 1% of the C_{Lo} for all considered SACs and Ramsar site and do not exceed 100% of the C_{Lo} for considered Ancient Woodland sites.

Therefore, the impact can be considered to cause '*no likely significant effect*' to the SACs and Ramsar sites, and '*no significant pollution*' to the Ancient Woodland sites..

Table 5-10: Impact on Nitrogen Critical Load

Site	Applied CLo (kg N/ha/yr)	PC (kg N/ha/yr)	PC as % of CLo
ER1	5	0.02	0.4%
ER2	10	<0.01	<0.1%
ER3	10	0.02	0.2%
ER4	10	0.02	0.2%
ER5	10	0.02	0.2%
ER6	10	0.02	0.2%
ER7	10	0.02	0.2%
ER8	10	0.10	1.0%
ER9	10	0.02	0.2%
ER10	10	0.03	0.3%

Table 5-11: Impact on Acid Critical Load Function

Site	Critical Load Function for Assessment	Applied C_{Lo} (kg_{eq}/ha/yr)	PC (kg_{eq}/ha/yr)	PC as % of C_{Lo}
ER1	CLmaxN	0.5	0.002	0.3%
ER2		1.7	<0.001	<0.1%
ER3		1.1	0.004	0.4%
ER4		0.1	0.002	1.9%
ER5		1.7	0.003	0.2%
ER6		1.7	0.003	0.2%
ER7		1.8	0.002	0.1%
ER8		1.7	0.013	0.8%
ER9		1.7	0.004	0.2%
ER10		1.7	0.005	0.3%

6.0 Summary and Conclusions

This AERA has quantified and assessed the potential air quality impacts associated with the proposed additional sources using NRW approved techniques against published standards for the protection of human health and designated ecological sites.

The conclusions of the AERA are as follows:

- The NO_X, CO, PM_{10} and $PM_{2.5}$ process contributions from the proposed additional sources do not lead to any exceedances of the standards (long-term or short-term) for the protection of human health at any location outside of the Site.
- The emissions from the proposed additional sources are considered to cause ‘no likely significant effect’ to the SACs and Ramsar site, and ‘no significant pollution’ to the Ancient Woodlands.

Appendix A Modelling Checklist

Project Aurora

Air Emissions Risk Assessment

Kellogg Company of Great Britain Limited

SLR Project No.: 416.065647.00001

24 September 2025

Table A-1: Modelling Checklist

Item	Yes/No	Details / reason for omission
Location map	Yes	Figure 4-1
Site plan	Yes	Figure 3-1
Pollutants modelled and relevant standards	Yes	Section 2.3
Details of modelled scenarios	Yes	Section 3.1
Details of relevant ambient concentrations	Yes	Section 4.0
Model description and justification	Yes	Section 3.3
Special model treatment used	Yes	Section 3.4.1
Table of emission parameters used	Yes	Table 3-1
Details of modelled domain and receptors	Yes	Section 3.3.1
Details of meteorological data used	Yes	Section 3.3.4
Details of terrain treatment	Yes	Section 3.3.3
Details of building treatment	Yes	Section 3.3.2
Model uncertainty and sensitivity	Yes	Section 3.3.5
Assessment of impacts	Yes	Section 5.0
Contour plots	Yes	Appendix B
Model input files	Yes	Appendix C

Appendix B Contour Plots

Project Aurora

Air Emissions Risk Assessment

Kellogg Company of Great Britain Limited

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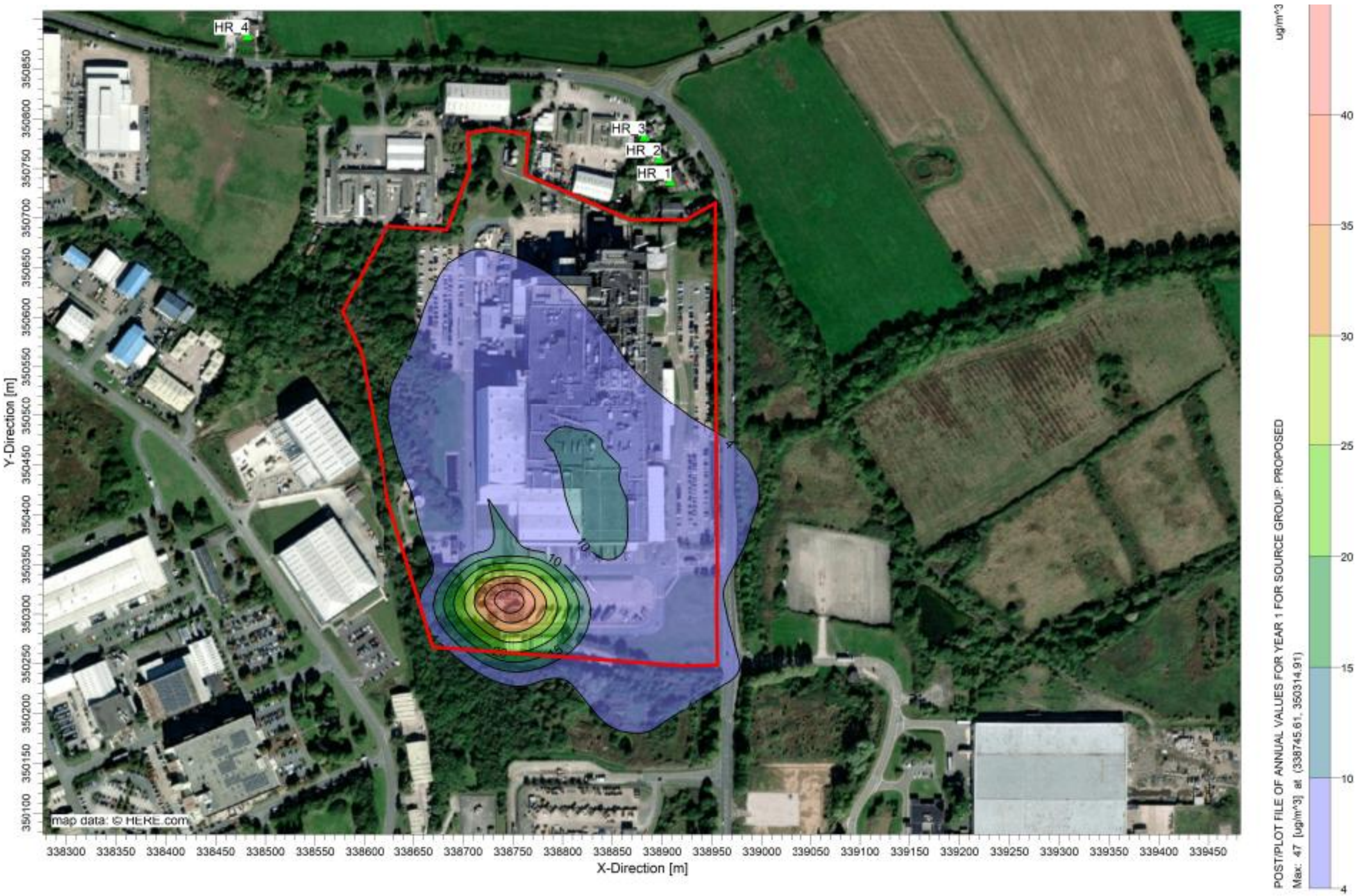

Figure B-1: Annual Mean NO_2 Process Contribution

Figure B-2: 1-hour Mean (99.79%ile) NO_2 Process Contribution

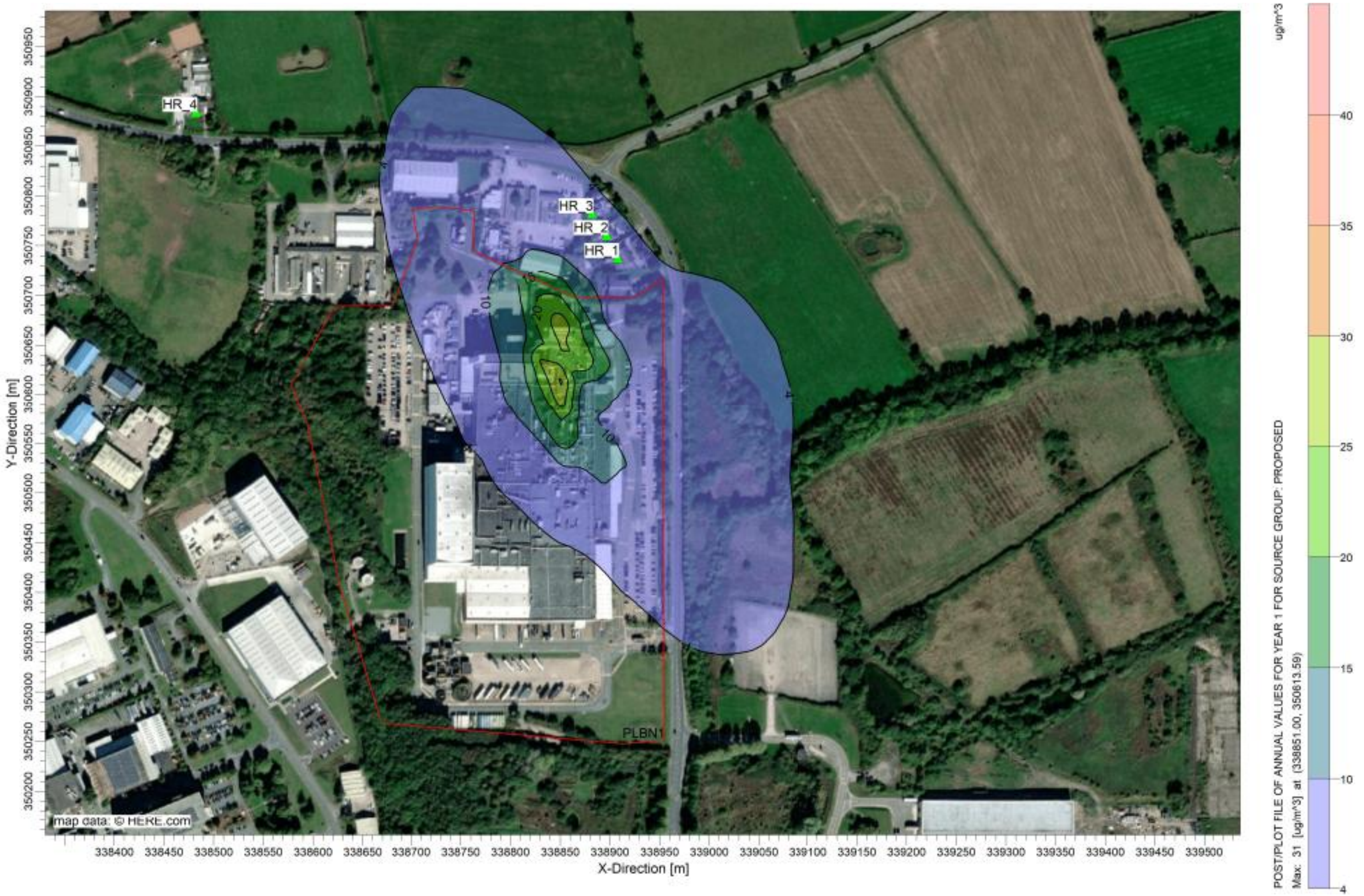

Figure B-3: Annual Mean PM_{10} Process Contribution

Figure B-4: 24-hour Mean (90.41%ile) PM_{10} Process Contribution

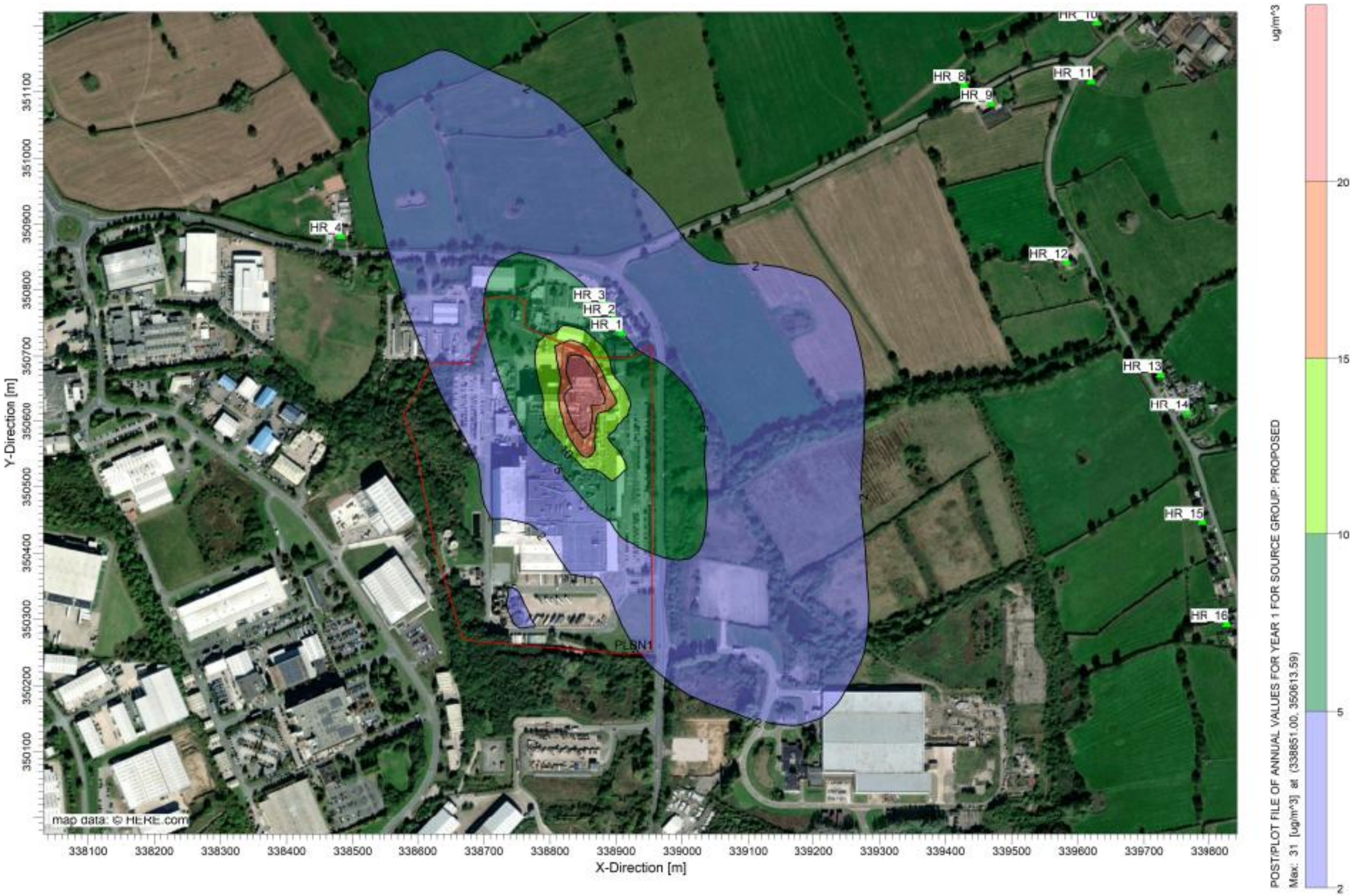

Figure B-5: Annual Mean $PM_{2.5}$ Process Contribution

Appendix C Model Input Files

Project Aurora

Air Emissions Risk Assessment

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Provided electronically as compressed (.zip) files

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