Cardiff East Park and Ride, Llanrumney
Environmental Statement

Chapter 4: Air Quality

Tetra Tech Limited on behalf of Curtis Hall Limited (Ltd)

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4. AIR QUALITY

Introduction

4.1 This chapter of the ES has been prepared by Tetra Tech Limited and presents an assessment of the likely significant effects of the Proposed Development with respect to Air Quality. Mitigation measures are identified, where appropriate, to avoid, reduce or offset any significant adverse effects identified and/or enhance likely beneficial effects. Taking into account the mitigation measures, the nature and significance of the likely residual effects are reported.

4.2 This chapter is supported by the following technical appendices:

- **Appendix 4.1**: Traffic Air Quality Assessment; and
- **Appendix 4.2**: Air Quality Assessment of Generator Impacts from the Energy Centre and Data Centre Operations.

4.3 This chapter is supported by a list of figures comprising:

- **Figure 4.1**: Traffic Air Quality Assessment Area for Traffic Air Quality Assessment;
- **Figure 4.2**: Locations of Existing Sensitive Receptors for Traffic Air Quality Assessment;
- **Figure 4.3**: Generator Locations for the Assessment of Operations of the Energy Centre and the Data Centre
- **Figure 4.4:** Sensitive Receptor Locations for the Assessment of Operations of the Energy Centre and the Data Centre
- **Figure 4.5:** Ecological Receptor Locations for the Assessment of Operations of the Energy Centre and the Data Centre
- **Figure 4.6**: Meteorological Station Windroses for the Assessment of Operations of the Energy Centre and the Data Centre

Competence

4.4 For a summary of the competency of the authors of this chapter, please refer to **Appendix 4.1, and Appendix 4.2**

Legislation and Policy Context

Legislation Context

4.5 The following legislation is relevant to the Proposed Development:

- European air quality legislation Directive 208/50/EC (11th June 2008).
- The Air Quality Standards (Wales) Regulations, 2010;
- The Air Quality Standards Regulations (Amendments), 2019;
- The Environment Act (1995)[i];
- The Environment Act (2021)[ii].
- The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023; and,
- Well-being of Future Generations (Wales) Act, 2015.

National Planning Policy

4.6 The following national planning policy is relevant to the Proposed Development:

- National Planning Policy Framework (2025)[iii];
- Planning Policy Wales (2021)[iv]; and,
- Future Wales National Plan 2040 (2021)[v].

Local Planning Policy

4.7 The following local planning policies are relevant to the Proposed Development.

Cardiff Council Adopted Local Development Plan 2006-2026 (2016)[vi].

Guidance

4.8 The following guidance is relevant to the Proposed Development:

- WHO global air quality guidelines: particulate matter ($PM_{2.5}$ and PM_{10}), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide (2021);
- Guidance contained in 'air emissions risk assessment for your environmental permit' (Defra and Environment Agency, published 1 February 2016, last updated 21 July 2025).
- $PM_{2.5}$ Targets: Interim Planning Guidance (2024);
- Local Air Quality Management Technical Guidance LAQM.TG22, Defra, 2022;
- Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, 2017;
- COVID-19 Supplementary Guidance – Local Air Quality Reporting in 2021, 2021;
- Guidance on the Assessment of Dust from Demolition and Construction, IAQM, Version 2.2, January 2024;
- A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.1), IAQM, May 2020;
- Ecological Assessment of Air Quality Impacts, CIEEM, Version 2, October 2023;

- and,
- Cardiff Council 2018 Managing Transport Impacts Supplementary Planning Guidance.

Assessment Methodology and Significance Criteria

4.9 This section presents the methodology used to assess the potential effects of the Proposed Development in relation to Air Quality.

Consultation

4.10 No specific consultation with respect to air quality has been undertaken to date.

Study Area and Scope

Traffic Air Quality Assessment Study Area

4.11 The study area covers affected roads up to; 1.5km north, 3.3km south, 1.6km east and 0.7km west of the red line boundary. Emissions from development traffic flows have been assessed for the following roads: existing Park & Ride access road, A48, A4232, Newport Road, Llanrumney Avenue, Ball Road, Burnham Road, Mount Pleasant Avenue, Pentwyn Road, Bryn Celyn Road, and the New Link Road. **Figure 4.1** shows the extent of the air quality assessment area relative to the development boundary.

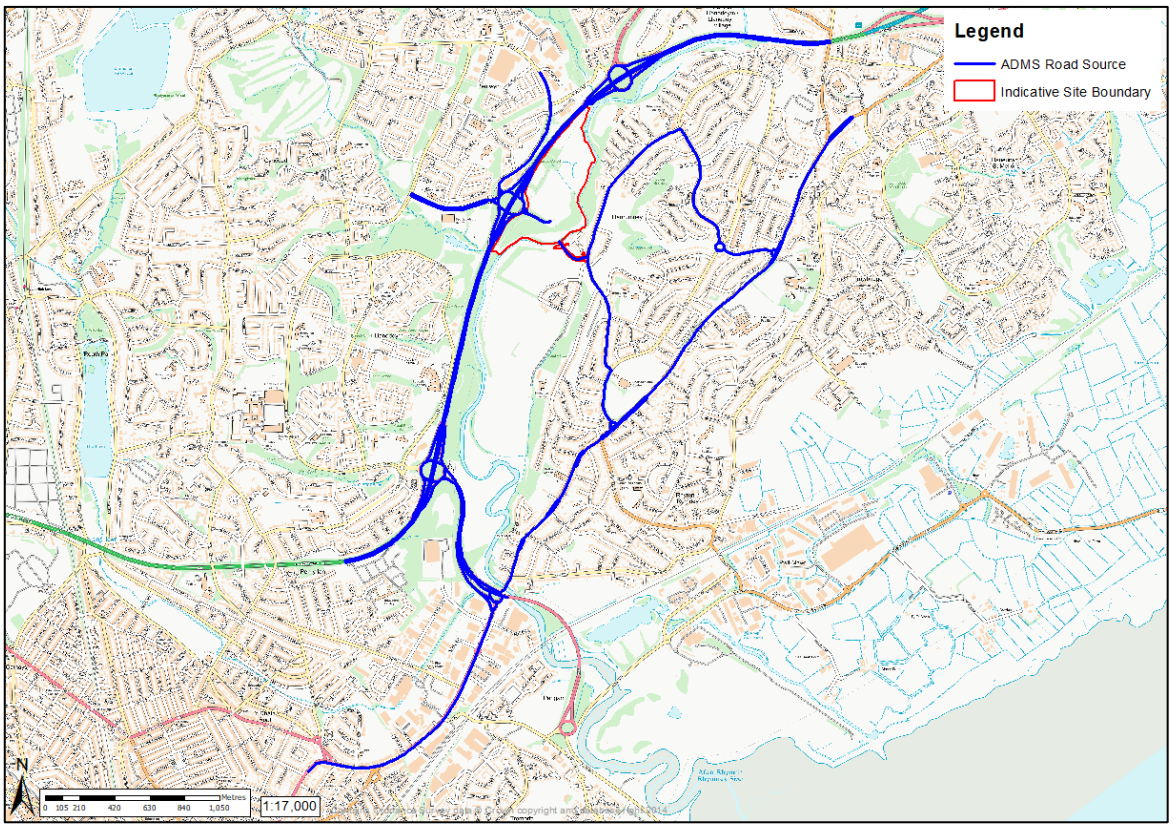
4.12 In the context of the Proposed Development, generators and road traffic are both identified as the dominant emission sources that is likely to cause potential risk of exposure of air pollutants at receptors.

4.13 The operational phase assessment therefore consists of the quantified predictions of the change in nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$) for the operational phase of the development due to changes in traffic movement. Predictions of air quality at the site have been undertaken for the operational phase of the development using ADMS Roads (Extra) v.5.1.0.

4.14 In accordance with the provided traffic data, the operational phase assessment has been undertaken with an assumed operational opening year of 2028. The assessment scenarios are therefore:

- 2023 Baseline = Existing Baseline Conditions (2023);
- 2028 'Do Minimum' = Baseline Conditions + Committed Development Flows (through local growth factor); and,
- 2028 'Do Something' = Baseline Conditions + Committed Development Flows (through local growth factor) + Proposed Development.

Figure 4.1. Air Quality Assessment Area for Traffic Air Quality Assessment



Assessment Methodology

Impact Areas

4.15 The impact description of the effects during the operational phase of the development is based on the latest guidance produced by EPUK and IAQM in January 2017. The guidance provides a basis for a consistent approach that could be used by all parties associated with the planning process to professionally judge the overall impact description of the air quality effects based on severity of air quality impacts.

4.16 The following rationale is used in determining the severity of the air quality effects at individual receptors:

- The change in concentration of air pollutants, air quality effects, are quantified and evaluated in the context of AQOs. The effects are provided as a percentage of the Air Quality Objective (AQO), which may be an AQO, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)';
- The absolute concentrations are also considered in terms of the AQO and are divided into categories for long term concentration. The categories are based on the sensitivity of the individual receptor in terms of harm potential. The degree of harm potential to change increases as absolute concentrations are close to or above the AQO;

- Severity of the effect is described as qualitative descriptors; negligible, slight, moderate or substantial, by taking into account in combination the harm potential and air quality effect. This means that a small increase at a receptor which is already close to or above the AQO will have higher severity compared to a relatively large change at a receptor which is significantly below the AQO;
- The effects can be **adverse** when pollutant concentrations increase or beneficial when concentrations decrease as a result of development;
- The judgement of overall impact description of the effects is then based on severity of effects on all the individual receptors considered; and,
- Where a development is not resulting in any change in emissions itself, the impact description of effect is based on the effect of surrounding sources on new residents or users of the development, i.e., will they be exposed to levels above the AQO.

Table 4-1 Impact Descriptors for Individual Receptors

Long term average concentration at receptor in assessment year	% Change in concentration relative to AQO			
	1	2-5	6-10	>10
≤75% of AQO	Negligible	Negligible	Slight	Moderate
76-94% of AQO	Negligible	Slight	Moderate	Moderate
95-102% of AQO	Slight	Moderate	Moderate	Substantial
103-109 of AQO	Moderate	Moderate	Substantial	Substantial
≥110 of AQO	Moderate	Substantial	Substantial	Substantial

4.17 In accordance with explanation note 2 of Table 6.3 of the EPUK & IAQM guidance, **Table 4-1** is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5%, will be described as Negligible.

Significance Criteria

4.18 The scale attributed to each effect has been determined based on the sensitivity of the receptor and magnitude of impact arising as a result of the Proposed Development. Professional judgement and experience have been drawn upon to assess the scale and significance.

4.19 The level of significance is determined by combining the likely significant impact risk with the sensitivity of the receptor during the operational phase. **Table 4-2** shows how the interaction of magnitude and sensitivity results in the significance of an environmental impact. If the scale of the impact magnitude is negative, then the resulting impact is **adverse**. If the scale of the impact magnitude is positive, then the resulting impact is beneficial. If the impact is Moderate to Substantial

then the change is considered to have a significant effect on the local air quality, whether positive or negative.

4.20 The table has been developed by Tetra Tech, but the matrix combinations and terms used correlate with the significance matrix recommended by Land-Use Planning & Development Control: Planning for Air Quality (2017)[vii].

Table 4-2 Impact Significance Matrix

Sensitivity of Receptor	Magnitude of Impact				
	Large	Medium	Small	Imperceptible	Neutral
High	Substantial	Substantial	Moderate	Moderate	Negligible
Medium	Substantial	Moderate	Moderate	Slight	Negligible
Low	Moderate	Moderate	Slight	Negligible	Negligible
Negligible	Moderate	Slight	Negligible	Negligible	Negligible

Receptors and Receptor Sensitivity

4.21 The sensitivity of each receptor was evaluated as being high, medium, low or negligible based on a review of the baseline position of each receptor and its performance against benchmark areas. The receptors and the definition of sensitivity of a receptor (high, medium, low) is based on a scale set out in **Table 4-3**.

4.22 Receptors can demonstrate different sensitivities to changes in their environment. For the purpose of this assessment sensitivity is determined as, High, Medium, Low or No Impact as detailed in **Table 4-3** for both the construction and operational phase of the development.

Table 4-3 Receptor Sensitivity Descriptors

Value (Sensitivity)	Descriptor
High	'Do Minimum' pollutant concentration between 103 - 109% of the relevant AQO (Emissions). Receptors of high sensitivity to dust and odour, such as: schools, residential areas, food retailers, glasshouses and nurseries, horticultural land and offices (Dust). Densely populated areas – 10->100 dwellings within 20m of the development site (Construction).
Medium	'Do Minimum' pollutant concentration between 95 - 102% of the relevant AQO (Emissions). Receptors of medium sensitivity to dust and odour, such as: farms, outdoor storage, light and heavy industry (Dust). Suburban or edge of town areas (Construction).

Low	'Do Minimum' pollutant concentration between 75-90% of the relevant AQO (Emissions). All other dust-odour sensitive receptors not identified above (Dust). Rural/Industrial areas (Dust).
No Impact	Concentrations less than 75% of the relevant AQO (Emissions). Receptors more than 350m away (Dust).

Magnitude of Impact

4.23 The magnitude of impact to a receptor has been determined by considering the estimated deviation from baseline conditions both before, and, if required, after mitigation. The scale used for determining the magnitude of an impact has been based on **Table 4-4**.

4.24 The significance of the effects during the operational phase of the Proposed Development is based on the latest guidance produced by EPUK and IAQM in January 2017. The guidance lays a basis for a consistent approach that could be used by all parties associated with the planning process to professionally judge the overall significance of the air quality effects based on severity of air quality impacts.

Table 4-4 Magnitude of Impact Descriptors

Impact Magnitude	Descriptor
High	Impact resulting in a considerable change in baseline environmental conditions with severe undesirable/desirable consequences on the receiving environment. Air quality varies between the do minimum and do something by more than 10% of the air quality criterion (Emissions). Substantial risk that emissions will generate statutory nuisance complaints, resulting in formal action (Construction).
Medium	Impact resulting in a discernible change in baseline environmental conditions with undesirable/desirable conditions. Air quality varies between the do minimum and do something by 5-10% of the air quality criterion (Emissions). Moderate risk that emissions will generate statutory nuisance complaints, resulting in formal action (Construction).
Low	Impact resulting in a discernible or very low discernible change in baseline environmental conditions with undesirable/desirable conditions that can be tolerated. Air quality varies between the do minimum and do something by 1-5% of the air quality criterion (Emissions). Slight to little risk that emissions will generate statutory nuisance complaints, resulting in formal action (Construction).
No Impact	No change in baseline conditions. Air quality varies between the do minimum and do something by less than 0.5% of the air quality criterion.

Assessing Significance

4.25 **Table 4-5** provide a matrix for determining the significance of an effect based on the sensitivity of the receptor and the magnitude of impact.

Table 4-5 Significance of Effect Matrix

Receptor Sensitivity	Magnitude of Impact			
	High	Medium	Low	Very Low
High	Major Beneficial / Adverse	Major Beneficial / Adverse	Moderate Beneficial / Adverse	Minor Beneficial / Adverse
Medium	Major Beneficial / Adverse	Moderate Beneficial / Adverse	Minor Beneficial / Adverse	Negligible
Low	Moderate Beneficial / Adverse	Minor Beneficial / Adverse	Negligible	Negligible
Very Low	Minor Beneficial / Adverse	Negligible	Negligible	Negligible

4.26 Effects classified as major or moderate are considered 'significant'. Effects classified as minor or negligible in scale are considered 'not significant'.

Limitations and Assumptions

4.27 The air quality model was dependent on the availability of traffic data from the Transport Consultant and from the Department for Transport Road Traffic Statistics website (roadtraffic.dft.gov.uk). The model was verified using road traffic values for 2023, due to the decrease in daily traffic numbers across the UK during 2020-2021 as a result of Covid-19.

4.28 The Construction Phase assessment has been undertaken using Professional Judgement as per the IAQM Guidance, which states:

"Because the diverse range of projects that are likely to be subject to dust impact assessments mean that it is not possible to be prescriptive as to how to assess the impacts. Also, a wide range of factors affects the amount of dust that may arise, and these are not readily quantified."

4.29 The above guidance ensures that a full range of potential impacts are considered. Additionally, the impacts associated with the assessment are considered to be minimal compared to the operational phase assessment.

Baseline Conditions

Establishing Baseline Conditions

4.30 Baseline air quality in the vicinity of the Proposed Development site has been defined from a number of sources, as described in the following sections.

Air Quality Review and Assessment

4.31 As required under section 82 of the Environment Act 1995 Cardiff Council (CC) has conducted an ongoing exercise to review and assess air quality within its area of jurisdiction. CC has four designated Air Quality Management Areas.

4.32 The closest AQMA to the development is the Stephenson Court AQMA, declared in 2010 for NO_2. This AQMA is located 4 km south-west of the site boundary.

4.33 Background concentrations as used within the prediction calculations were referenced from the UK National Air Quality Information Archive database based on the National Grid Co-ordinates of 1 x 1 km grid squares nearest to the development site. In November 2024 Defra issued revised 2021 based background maps for NO_X, NO_2, PM_{10} and $PM_{2.5}$ which incorporate updates to the input data used for modelling. 2021 background maps have been utilised for the model verification and baseline operational phase assessment.

Air Quality Monitoring

4.34 Monitoring of air quality within CC has been undertaken through both automatic and non-automatic monitoring methods in 2023. These have been reviewed in order to provide an indication of existing air quality in the area surrounding the application site.

4.35 CC undertook automatic pollution monitoring during 2023 at 3 different locations. The closest monitoring location is Cardiff Newport Road AURN, approximately 3.3 km south-south-west of the application site. The most recently available data is from 2023 which is presented in **Table 4-6** below.

Table 4-6 Monitored Annual Mean NO_2 Concentrations at Automatic Monitoring Locations

Site ID	Site Type	Distance from Kerb of Nearest Road (m)	2023 NO_2 Annual Mean Concentration ($\mu g/m^3$)	2023 PM_{10} Annual Mean Concentration ($\mu g/m^3$)	2023 $PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$)
Cardiff City Centre AURN	Urban Background	200	16	16	10
Cardiff Newport Road AURN	Roadside/Urban Traffic	4.5	19	16	-
Cardiff Castle Street	Roadside/Urban Traffic	2	33	18	8

4.36 CC operates a network of passive diffusion tubes. The closest diffusion tube is diffusion tube TRO-037, which is located at Glan Y Afon Primary School, approximately 277 m north-east of the application site. The most recently available diffusion tube data is from 2023 which is presented in **Table 4-7** below.

Table 4-7 Monitored Annual Mean NO_2 Concentrations at Closest Diffusion Tubes

Site ID	Location	Site Type	Distance from Kerb (m)	Inlet Height (m)	Monitored 2023 Annual Mean NO_2 Concentration ($\mu g/m^3$)
211	19 Well Wood Close, Penylan	Roadside	28.0	17.1	211
245	47 Willows Ave	Urban Background	0.0	14.8	245
TRO-034	Bryn Hafod Primary School	Roadside	1.0	9.9	TRO-034
TRO-035	8 Blagdon Close	Kerbside	1.0	11.2	TRO-035
TRO-036	Uphill Road	Kerbside	1.0	10.8	TRO-036
TRO-037	Glan Y Afon Primary School	Roadside	1.0	-	TRO-037
TRO-038	Browning Close	Kerbside	1.0	12.0	TRO-038
TRO-039	Thackeray Crescent	Kerbside	1.0	12.8	TRO-039
TRO-061	St Mellons Primary School	Kerbside	3.0	13.4	TRO-061
TRO-062	Bridge Road	Kerbside	4.0	11.8	TRO-062
TRO-063	Church Road	Kerbside	4.0	13.5	TRO-063

Traffic Emission Sources

4.37 Desktop assessment has identified that traffic movements are likely to be the most significant local source of pollutants affecting the Site and its surroundings. The principal traffic derived pollutant likely to impact local receptors is nitrogen dioxide (NO_2).

Meteorology

4.38 Meteorological conditions have significant influence over air pollutant concentrations and dispersion. Pollutant levels can vary significantly from hour to hour as well as day to day, thus any air quality predictions need to be based on detailed meteorological data. The ADMS model calculates the dispersion of pollutants on an hourly basis using a year of local meteorological data. The meteorological data used in the assessment is derived from Cardiff Met Station, which is considered

representative of the development site conditions, with all the complete parameters necessary for the ADMS model.

Baseline Conditions

4.39 This section will include a description of the environment as it currently stands. The baseline position will be taken as the current conditions on the application site, taking account of the planning designations and assuming that all existing land uses in the surrounding area beyond the site remain.

Receptors

4.40 A list of existing and future receptors is included in **Table 4-8**.

4.41 Receptors that are considered as part of the air quality assessment are primarily those existing receptors that are situated along routes predicted to experience significant changes in traffic flow as a result of the Proposed Development. These have been identified in the following sections.

4.42 The Design Manual for Roads and Bridges (DMRB)[viii] considers any receptor within 200m of a road source to be potentially affected by that operation. The AQOs only apply at locations where the public may be exposed to pollution for a sufficient period for there to be any measurable health impact. The averaging period and AQO involved will determine which locations are considered to be sensitive receptors. For annual mean NO_2 and particulate matter with mean hydraulic diameter of less than 10µm) AQOs, LAQM.TG (22) considers typical locations for sensitive receptors to include:

- Residential properties;
- Hospitals;
- Schools; and,
- Care homes.

4.43 The existing receptor locations are summarised in **Error! Reference source not found.** The sensitivity of all of the fourteen existing sensitive receptors is ‘high’.

Table 4-8 Existing and Future Sensitive Receptors

Receptor Existing Receptors	Sensitivity
R1 – Glan-Yr-Afon Primary School	High
R2 – 247 Bryn Celyn Road	High
R3 – St Cadoc's RC Primary School	High
R4 – 263 Ball Road	High
R5 – 6 Ball Lane	High
R6 – Bryn Hafod Primary School	High
R7 – St Teilo's Church in Wales High School	High
R8 – 20 King Wood Close	High
R9 – 2 Seaview Cottages Newport Road	High
R10 – Quarry Hill Care Home	High
R11 – 850 Newport Road	High
R12 – Medical Care	High
R13 – 611 Newport Road	High
R14 – 11 Pant Glass	High

Ecological Receptors

4.44 Air quality impacts associated with the proposed re-development have the potential to impact on receptors of ecological sensitivity within the vicinity of the site. The IAQM guidance on 'Air Quality Impacts on Designated Nature Conservation Sites' (2020) document outlines the types of designated nature sites within 2 km of the Proposed Development which require air quality assessment. These are inclusive of:

- Sites of Special Scientific Interest (SSSIs);
- Special Areas of Conservation (SACs);
- Special Protection Areas (SPAs);
- Ramsar Sites;
- Sites of Special Scientific Interest (SSSIs);
- National Nature Reserves (NNRs);
- Local Nature Reserves (LNRs);
- Local Wildlife Sites (LWSs); and,
- Areas of Ancient Woodland (AW).

4.45 The Conservation of Habitats and Species Regulations (2019)[ix] additionally requires competent authorities to review planning applications and consents that have the potential to impact on European designated sites (e.g. SSPAs).

4.46 A study was undertaken to identify any statutory designated sites of ecological or nature conservation importance within the extents of the dispersion modelling assessment. This was completed using the Multi-Agency Geographic Information for the Countryside (MAGIC) web-based interactive mapping service, which draws together information on key environmental schemes and designations. Following a search within a 2 km radius of the site boundary, the following ecological receptors shown in Table 4-9 were identified.

Table 4-9 Ecological Sensitive Receptor Locations

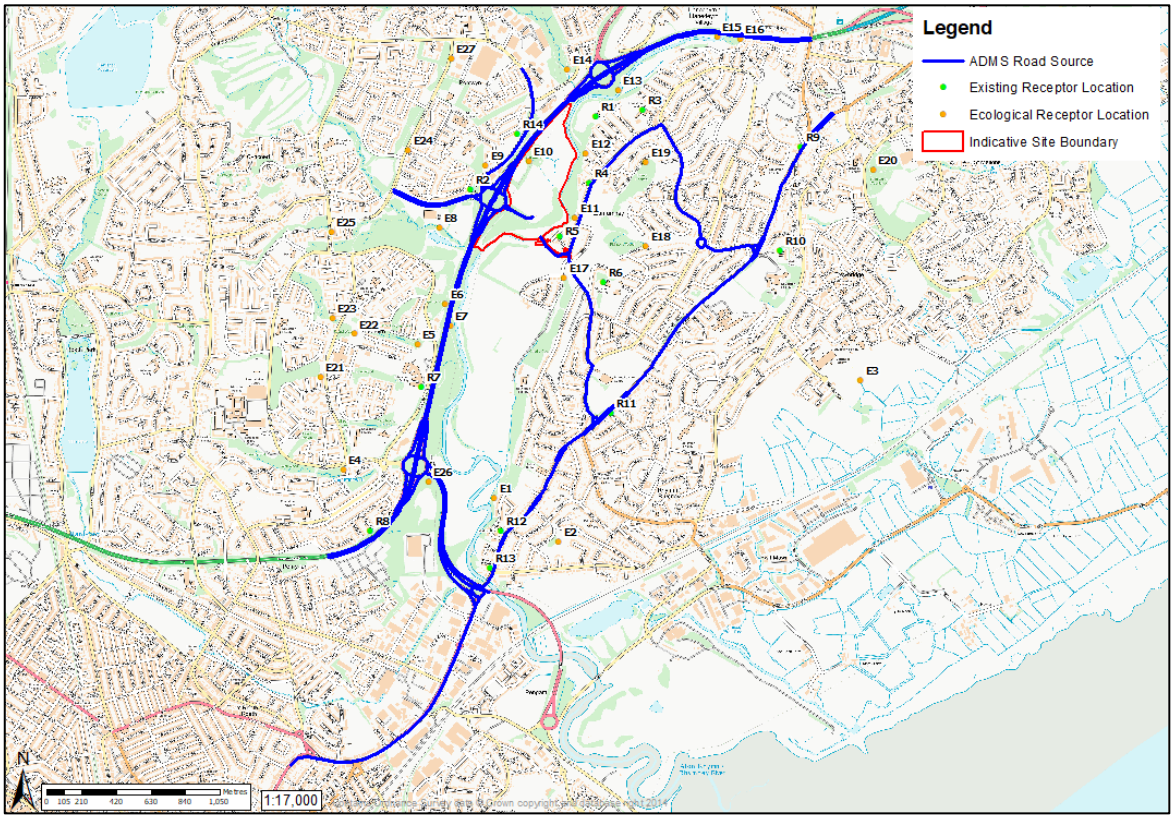
Site ID	Site	Designation	UK NGR (m)		Distance from Site (km)	Distance from Nearest Affected Road (m)
			X	Y		
E1	Rhymney River Section	SSSI	321051	179132	1.8	100
E2	Rumney Quarry	SSSI	321438	178870	1.5	270
E3	Gwent Levels – Rumney and Peterstone	SSSI	323260	179838	1.9	1,040
E4	Circle Way	AW	321051	179132	1.6	380
E5	St Teilo's	AW	320140	179302	0.7	132
E6	Eastern Avenue	AW	320587	180056	0.3	40
E7	Eastern Avenue	AW	320754	180299	0.5	50
E8	Pentwyn Lesiure Centre	AW	320782	180168	0.2	90
E9	Bryn Celyn Primary School	AW	320717	180765	0.4	70
E10	Eastern Avenue (within Red Line Boundary)	AW	320997	181137	0	40
E11	Ball Lane	AW	321258	181165	0.03	10
E12	Glan-Yr-Afron Primary School	AW	321537	180820	0.03	78
E13	Glan-Yr-Afron Primary School	AW	321602	181212	0.03	33
E14	Maes y Bryn	AW	321798	181594	0.2	130
E15	Eastern Avenue	AW	321491	181715	0.9	19
E16	Eastern Avenue	AW	322394	181910	1.1	12
E17	Hartland Road	AW	322534	181901	0.1	20
E18	Fishpond Road	AW	321472	180457	0.5	240
E19	Chesterton Road	AW	321966	180653	0.5	120
E20	Willowbrook Drive	AW	321966	181156	1.9	470
E21	Pemsylvania	AW	323335	181109	1.2	654
E22	Brynfedw	AW	320000	179861	1.0	650

E23	Wern Goch West	AW	320205	180122	0.9	500
E24	Pentwyn Drive	AW	320074	180215	0.7	312

4.47 It should be noted that the IAQM Guidance only requires the assessment of ecological receptors which are located within 200 m of the affected road network. Therefore, Rumney Quarry SSSI (E2), Gwent Levels – Rumney and Peterstone SSSI (E3), Circle Way AW (E4), Fishpond Road AW (E18), Willowbrook Drive AW (E20), Pemsylvania AW (E21), Brynfedw AW (E22), Wern Goch West AW (E23 and E25), Pentwyn Drive AW (E24), and Ty Enfys (E27) have all been scoped out of the air quality assessment.

4.48 The spatial locations of all of the receptors are illustrated in Figure 4-2.

Figure 4-2. Locations of Existing Sensitive Receptors for Traffic Air Quality Assessment



Future Baseline

4.49 The future baseline is predicted to increase as a result of the committed developments. This is accounted for in the modelled 'Do Minimum' scenarios which takes into account the future baseline in 2028 without the Proposed Development.

4.50 It should be noted that over time, the number of petrol/diesel cars are predicted to reduce as a result of initiatives to combat air pollution and so emissions associated with vehicles will reduce over time. This will be as a result of greater numbers of electric vehicles making up the fleet and there being fewer older more polluting vehicles on the road. This change has been calculated using Defra's Emissions Factor Toolkit. The change is shown between the 'Baseline' results and the 'Do Minimum' results.

Assessment of Effects during the Construction and Operational Traffic Air Quality Assessment

Effects During Construction

4.51 The main emissions during construction are likely to be dust and particulate matter generated during earth moving (particularly during dry months), or from construction materials. In respect of fires on Site it should be noted that suitable management strategies will be in place to prevent burning of any material during the construction phase. The main potential impacts of particulates/dust are:

- Visual – dust plume, reduced visibility, coating and soiling of surfaces leading to annoyance, loss of amenity, the need to clean surfaces;
- Physical and/or chemical contamination and corrosion of artefacts;
- Coating of vegetation and soil contamination; and,
- Health impacts due to inhalation e.g. asthma or irritation of the eyes.

4.52 A number of other factors such as the amount of precipitation and other meteorological conditions will also influence the amount of particulate matter generated.

4.53 Construction activities can give rise to short term elevated dust/PM_{10} concentrations in neighbouring areas. This may arise from vehicle movements, soiling of the public highway, demolition or windblown stockpiles.

Particulate Matter

4.54 The UK Air Quality Standards seek to control the health implications of respirable particulate matter PM_{10} and $PM_{2.5}$ (less than 10 µm and 2.5 µm in diameter respectively). However, the majority of particles released from construction will be greater than this in size.

4.55 Construction works on site have the potential to elevate localised PM_{10} concentrations in the area. On this basis, mitigation measures should still be taken to minimise these emissions as part of good site practice.

Dust

4.56 Particles greater than 10µm are likely to settle out relatively quickly and may cause annoyance due to their soiling capability. Although there is no formal standards or criteria for nuisance caused by deposited particles, the IAQM 'Guidance on Monitoring in the Vicinity of Demolition and Construction Sites'[x] (October 2018) and the Environment Agency Technical Guidance Note (TGN) M17 states that dust is usually compared with a 'complaints likely' guideline of 200mg/m2/day. Therefore, a deposition rate of 200mg/m2/day is often presented as a threshold for serious nuisance though this is usually only applied to long term exposure as people are generally more tolerant of dust for a short or defined period. Significant nuisance is likely when the dust coverage of surfaces is visible in contrast with adjacent clean areas, especially when it happens regularly. Severe dust nuisance occurs when the dust is perceptible without a clean reference surface.

4.57 Construction activities have the potential to suspend dust, which could result in annoyance of residents surrounding the site. Measures should be taken to minimise the emissions of dust as part of good site practice. Recommended mitigation measures proportionate to the risk associated with the development and based on best practice guidance are discussed in earlier in this chapter.

4.58 The construction phase assessment utilises the IAQM Guidance on the Assessment of Dust from Demolition and Construction document published in January 2024. The scale of the anticipated works has determined the potential dust emission magnitude for each process as presented in **Table 4-10** below.

Table 4-10 Dust Emission Magnitude

Construction Process	Site Criteria	Dust Emission Magnitude
Demolition	Assumed Total Demolition/site clearance Volume: <18,000 m^3	Small
Earthworks	Total Site Area: >110,000 m^2	Large
Construction	Total Building Volume >75,000 m^3	Large
Trackout	Assumed 20 - 50 HDV outward movements in any one day	Medium

Sensitivity of the Area to Different Construction Activities

4.59 The sensitivity of the surrounding area to each construction process has been determined following stage 2B of the IAQM guidance. The assessment has determined the area sensitivities as shown in the **Table 4-11**.

Table 4-11 Impact Description of Construction Activities without Mitigation

Source	Summary Risk of Impacts Prior to Mitigation		
	Dust Soiling	Health Effects of PM_{10}	Ecological
Demolition	Medium	Negligible	N/A
Earthworks	High	Low	N/A
Construction	High	Low	N/A
Trackout	Medium	Low	N/A

4.60 Based on the methodology detailed in the AQA Technical Report, the potential impact significance of dust emissions associated with the construction phase of the Proposed Development presented is considered to be 'high risk' at the worst affected receptors. However, following the implementation of the mitigation measures detailed in Table 7-1 in the AQA Technical Report, the impact description of the construction phase is not considered to be significant

4.61 The effects during the construction phase are predicted with regard to the potential for dust nuisance complaints and surface soiling events due to deposition, as opposed to the risk of exceeding any AQOs. All dust impacts are considered to be direct, temporary, short-term and reversible in nature. The impacts are determined to be direct as they occur as a result of activities associated with the development, temporary as they will only potentially occur during the construction phase, short-term because these will only arise at particular times when certain activities and meteorological conditions for creating the level of magnitude predicted combine, and reversible as conditions will return to baseline upon cessation of construction phase activities. With the construction mitigation measures in place detailed below, dust soiling and PM_{10} during construction are considered not significant in EIA terms.

4.62 An assessment of emissions from construction traffic has been scoped out of this chapter as the anticipated traffic flows associated with the Development during these works will be below the threshold for assessment outlined within IAQM guidance. As such, construction vehicle and heavy goods vehicle (HGV) movements associated with the construction phase will have a negligible impact on surrounding air quality and can be scoped out of the assessment.

Effects Once the Proposed Development is Operational

4.63 Additional vehicle movements associated with the Proposed Development will generate additional exhaust emissions, such as NO_2, PM_{10} and $PM_{2.5}$, on the local and regional road networks. In order to quantify potential impacts of these emissions in the vicinity of the site, a detailed dispersion modelling assessment has been undertaken using the ADMS-Roads software package. This model is routinely used in the UK for environmental assessment work.

4.64 The likely significant impacts of road vehicle exhaust emissions have been undertaken for the following assessment years:

- 2023 Baseline = Existing Baseline Conditions;
- 2028 'Do Minimum' = Baseline Conditions + Committed Development Flows; and,
- 2028 Do Something' = Baseline Conditions + Committed Development + Proposed Development Flows.

2028 Opening Year

Nitrogen Dioxide

4.65 Predicted annual mean NO_2 concentrations were assessed against the AQO of 40 µg/m^3. Reference should be made to the AQA Technical Report and **Table 4-12** below, for detailed results tables of predicted annual mean NO_2 concentrations at each receptor.

4.66 The effects without additional mitigation are predicted to have a negligible at all sensitive receptors.

4.67 The maximum predicted concentration at any ground floor proposed receptor is not predicted to exceed the AQO for NO_2 and therefore, no further mitigation is required.

Table 4-12 Significance at the Identified Sensitive Receptors (NO_2)

Receptor	NO_2 (µg/m^3)						
	Do Minimum 2028	Do Something 2028	Sensitivity	Dev. Contrib.	% Change of AQO	Impact Magnitude	Significance of Effect
R1	12.74	12.76	Negligible	0.02	0%	Neutral	Negligible
R2	14.09	14.14	Negligible	0.05	0%	Neutral	Negligible
R3	12.26	12.28	Negligible	0.02	0%	Neutral	Negligible
R4	12.40	12.43	Negligible	0.03	0%	Neutral	Negligible
R5	12.82	12.86	Negligible	0.04	0%	Neutral	Negligible
R6	12.54	12.55	Negligible	0.01	0%	Neutral	Negligible
R7	15.60	15.63	Negligible	0.03	0%	Neutral	Negligible
R8	15.57	15.59	Negligible	0.02	0%	Neutral	Negligible
R9	13.15	13.17	Negligible	0.02	0%	Neutral	Negligible
R10	12.07	12.08	Negligible	0.01	0%	Neutral	Negligible
R11	13.60	13.61	Negligible	0.01	0%	Neutral	Negligible
R12	15.93	15.94	Negligible	0.01	0%	Neutral	Negligible
R13	17.09	17.11	Negligible	0.02	0%	Neutral	Negligible
R14	14.31	14.34	Negligible	0.03	0%	Neutral	Negligible
Annual Mean AQO			40 µg/m^3				

4.68 All impacts are considered to be direct, permanent, long-term and irreversible in nature. The impacts are determined to be direct as they occur as a result of vehicles travelling to and from the Proposed Development, permanent as they will occur throughout the operational phase, long-term because these occur during the entire operational phase, and irreversible as conditions will not return to baseline conditions.

4.69 Confidence in these predictions is high given that a detailed dispersion modelling assessment has been undertaken using traffic data provided by SLR Consulting Limited and modelling results have been verified by comparing the modelled and monitored NO_2 concentrations which were shown to be within the margin for error as required by the Technical Guidance, which is considered to be a robust approach.

4.70 The effect of increased vehicle emissions is considered negligible and therefore not significant with regards to increased NO_2 concentrations for all receptors listed above.

Particulate Matter (PM_{10} & $PM_{2.5}$)

4.71 Predicted annual mean ground level PM_{10} concentrations were assessed against the AQO of 40µg/m^3. Reference should be made to the AQA Technical Report and **Table 4-13**, below, for detailed results tables of predicted annual mean PM_{10} concentrations.

4.72 The likely significant impact on annual mean PM_{10} concentration from the development traffic flows is predicted to be of a negligible at all identified receptors.

4.73 The maximum predicted concentration at any ground floor proposed receptor is not predicted to exceed the AQO for PM_{10} and therefore, no additional mitigation is required, and the effect is considered **negligible** and therefore not significant.

Table 4-13 Significance at the Identified Sensitive Receptors (PM_{10})

Receptor	PM_{10} (µg/m^3)						
	Do Minimum 2028	Do Something 2028	Sensitivity	Dev. Contrib.	% Change of AQO	Impact Magnitude	Significance of Effect
R1	13.55	13.56	Negligible	0.01	0%	Neutral	Negligible
R2	14.67	14.68	Negligible	0.01	0%	Neutral	Negligible
R3	13.38	13.39	Negligible	0.01	0%	Neutral	Negligible
R4	13.51	13.52	Negligible	0.01	0%	Neutral	Negligible
R5	14.20	14.20	Negligible	<0.01	0%	Neutral	Negligible
R6	13.39	13.39	Negligible	<0.01	0%	Neutral	Negligible
R7	15.28	15.29	Negligible	0.01	0%	Neutral	Negligible
R8	14.92	14.93	Negligible	0.01	0%	Neutral	Negligible
R9	14.17	14.17	Negligible	<0.01	0%	Neutral	Negligible
R10	13.68	13.68	Negligible	<0.01	0%	Neutral	Negligible
R11	13.91	13.91	Negligible	<0.01	0%	Neutral	Negligible
R12	15.87	15.88	Negligible	0.01	0%	Neutral	Negligible
R13	16.39	16.40	Negligible	0.01	0%	Neutral	Negligible
R14	14.75	14.76	Negligible	0.01	0%	Neutral	Negligible
Annual Mean AQO			40 µg/m^3				

4.74 Predicted annual mean ground level $PM_{2.5}$ concentrations were assessed against the future and current AQO's of 20 µg/m^3 and 10 µg/m^3 respectively, as shown in **Table 4-14** below.

Table 4-14 Significance at the Identified Sensitive Receptors ($PM_{2.5}$)

Receptor	$PM_{2.5}$ (µg/m^3)						
	Do Minimum 2028	Do Something 2028	Sensitivity	Dev. Contrib.	% Change of AQO	Impact Magnitude	Significance of Effect
R1	8.68	8.66	Negligible	<0.01	0%	Neutral	Negligible
R2	9.11	9.07	Negligible	0.01	0%	Neutral	Negligible
R3	8.58	8.56	Negligible	<0.01	0%	Neutral	Negligible
R4	8.64	8.62	Negligible	0.01	0%	Neutral	Negligible
R5	8.83	8.82	Negligible	<0.01	0%	Neutral	Negligible
R6	8.65	8.64	Negligible	<0.01	0%	Neutral	Negligible
R7	9.20	9.15	Negligible	0.01	0%	Neutral	Negligible
R8	9.57	9.53	Negligible	<0.01	0%	Neutral	Negligible
R9	9.14	9.11	Negligible	0.01	0%	Neutral	Negligible
R10	8.86	8.85	Negligible	<0.01	0%	Neutral	Negligible
R11	8.94	8.91	Negligible	<0.01	0%	Neutral	Negligible
R12	9.34	9.30	Negligible	<0.01	0%	Neutral	Negligible
R13	9.64	9.58	Negligible	<0.01	0%	Neutral	Negligible
R14	9.16	9.12	Negligible	0.01	0%	Neutral	Negligible
Annual Mean AQO			Current AQO = 20 µg/m^3, Future AQO = 10 µg/m^3				

4.75 As indicated in the AQA Technical Report, the likely significant impact on annual mean $PM_{2.5}$ concentration from the development traffic flows is predicted to be of a negligible at all identified receptors.

4.76 The maximum predicted concentration at any ground floor proposed receptor is not predicted to exceed the current or future AQO for $PM_{2.5}$ and therefore, no additional mitigation is required, and the effect is considered not significant.

Nitrogen Oxide at Ecological Receptors

4.77 Background concentrations at each of the ecologically sensitive sites were determined through a review of the NO_X pollutants published on the APIS website. The below assessment has been undertaken in accordance with A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites (IAQM, 2020).

4.78 The maximum predicted increase in the annual average exposure to NO_X at any ecological receptor, due to changes in traffic movements associated with the development, is 0.17 µg/m^3 at Eastern Avenue (AW) (E7).

Table 4-15 Predicted Annual Average Concentrations of NO_X at Ecological Receptor Locations

Ecological Receptor		Predicted Maximum Annual Mean Concentration (µg/m^3)				
		Do Minimum 2023 NO_X	Do Something 2023 NO_X	Process Contribution (PC)	PC as %age of AQO	Background NOx from APIS
E1	Rhymney River Section (SSSI)	23.05	23.08	0.03	0.09	20.90
E5	St Teilo's (AW)	20.42	20.44	0.03	0.10	17.90
E6	Eastern Avenue (AW)	27.55	27.65	0.10	0.33	17.90
E7	Eastern Avenue (AW)	35.28	35.45	0.17	0.56	17.90
E8	Pentwyn Lesiure Centre (AW)	20.04	20.08	0.04	0.15	17.90
E9	Bryn Celyn Primary School (AW)	23.03	23.10	0.07	0.23	19.20
E10	Eastern Avenue (AW) (within Red Line Boundary)	26.71	26.83	0.11	0.37	19.20
E11	Ball Lane (AW)	18.58	18.65	0.07	0.22	16.50
E12	Glan-Yr-Afron Primary School (AW)	21.25	21.28	0.04	0.13	19.20
E13	Glan-Yr-Afron Primary School (AW)	23.71	23.83	0.12	0.39	19.20
E14	Maes y Bryn (AW)	21.82	21.88	0.06	0.19	19.20
E15	Eastern Avenue (AW)	35.58	35.69	0.10	0.35	18.60
E16	Eastern Avenue (AW)	40.30	40.43	0.13	0.43	18.60
E17	Hartland Road (AW)	17.87	17.90	0.03	0.11	16.50
E19	Chesterton Road (AW)	20.48	20.51	0.03	0.08	19.20
E26	Howardian (LNR)	27.43	27.56	0.13	0.44	19.60
Annual Mean AQO/Critical Level (CL)		**30 µg/m^3**				

4.79 Section 5.5.4.1 of A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites', IAQM 2020 states:

"Where the assessment indicates that changes in annual mean NOx concentrations within a designated site cannot be dismissed as imperceptible (i.e. an increase of over 0.3 µg/m³) and the NOx critical level is exceeded, then changes in nutrient nitrogen deposition should be calculated as supporting information to further assist in the evaluation of significance."

4.80 The maximum predicted increase in the annual average exposure to NOX at the identified ecological receptor, due to changes in traffic movements associated with the development, is 0.17 µg/m^3 at Eastern Avenue (AW) (E7) which is below the 0.30 µg/m^3 development contribution stated within the guidance of 'A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation

Sites', IAQM 2020. As indicated in the AQA Technical Report, no further assessment is required and the impact at all modelled ecological receptors are considered to be negligible.

Mitigation Measures

Mitigation During Construction

4.81 The assessment has determined that the potential impact description of dust emissions associated with the construction phase of the Proposed Development is 'high risk' at the worst affected receptors.

4.82 Appropriate site-specific mitigation measures associated with the determined level of risk can be found in Section 8.2 of the 'IAQM Guidance on the Assessment of Dust from Demolition and Construction' version 2.2.

4.83 The mitigation measures have been divided into general measures applicable to all sites and measures applicable specifically to demolition, earthworks, construction and trackout.

4.84 The following good practice mitigation measures presented in **Table 4-16** will be adopted and should become part of the approved Construction Environmental Management Plan (CEMP) for the Proposed Development.

Table 4-16 IAQM Guidance on the Assessment of Dust from Demolition and Construction

Mitigation measure	Low Risk	Medium Risk	High Risk
Communications			
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	N	H	H
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.	H	H	H
Display the head or regional office contact information.	H	H	H
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.	D	H	H
Site Management			
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	H	H	H
Make the complaints log available to the local authority when asked.	H	H	H
Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.	H	H	H

Hold regular liaison meetings with other high risk construction sites within 250 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.	N	N	H
Monitoring			
Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary.	D	D	H
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.	H	H	H
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	H	H	H
Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.	H	H	H
Preparing and maintaining the site			
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	H	H	H
Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	H	H	H
Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period.	D	H	H
Avoid site runoff of water or mud.	H	H	H
Keep site fencing, barriers and scaffolding clean using wet methods.	D	H	H
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.	D	H	H
Cover, seed or fence stockpiles to prevent wind whipping.	D	H	H
Operating vehicle/machinery and sustainable travel			
Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable.	H	H	H
Ensure all vehicles switch off engines when stationary - no idling vehicles.	H	H	H
Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	H	H	H
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).	D	D	H
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	N	N	H
Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	N	D	H
Operations			

Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	H	H	H
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/ mitigation, using non-potable water where possible and appropriate	H	H	H
Use enclosed chutes and conveyors and covered skips.	H	H	H
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	H	H	H
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	D	H	H
Waste Management			
Avoid bonfires and burning of waste materials.	H	H	H
Demolition			
Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	D	D	H
Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	H	H	H
Avoid explosive blasting, using appropriate manual or mechanical alternatives.	H	H	H
Bag and remove any biological debris or damp down such material before demolition.	H	H	H
Earthworks			
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	N	D	H
Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	N	D	H
Only remove the cover in small areas during work and not all at once.	N	D	H
Construction			
Avoid scabbling (roughening of concrete surfaces) if possible.	D	D	H
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	D	H	H
Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	N	D	H
For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.	N	D	D
Trackout			
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	D	H	H
Avoid dry sweeping of large areas.	D	H	H
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	D	H	H
Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	N	H	H
Record all inspections of haul routes and any subsequent action in a site log book.	D	H	H

Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	N	H	H
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	D	H	H
Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	N	H	H
Access gates to be located at least 10 m from receptors where possible.	N	H	H
H = Highly Recommended D = Desirable N = Not Required			

4.85 Following the implementation of the mitigation measures detailed in the tables above, the impact description of the construction phase is not considered to be significant.

Mitigation Once the Proposed Development is Operational

4.86 Other than Travel Plan measures, no additional mitigation is required.

Residual Effects and Monitoring

4.87 The residual effects arising from the Proposed Development are summarised in **Table 4-17** below.

Table 4-17 Summary of Residual Effects

Effect	Receptor (Sensitivity)	Nature of Effect and Geographic Scale	Magnitude of Impact*	Classification of Effect (Statement of Significance BEFORE mitigation)	Mitigation and Monitoring	Residual Effect
Construction Effects						
Demolition	High	Local	Medium	Moderate Adverse	See 'Mitigation Measures'	Negligible
Earthworks	High	Local	High	Moderate Adverse	See 'Mitigation Measures'	Negligible
Construction	High	Local	High	Moderate Adverse	See 'Mitigation Measures'	Negligible
Trackout	High	Local	Medium	Minor Adverse	See 'Mitigation Measures'	Negligible
Operational Effects						
Impact of NO_2 emissions generated by road vehicles movements during operational phase on human sensitive receptors	High	Local	No Impact	Negligible	Travel Plan Measures	Negligible

Impact of PM_{10} emissions generated by road vehicle movements during operational phase on human sensitive receptors	High	Local	No Impact	Negligible	Travel Plan Measures	Negligible
Impact of $PM_{2.5}$ emissions generated by road vehicle movements during operational phase on human sensitive receptors	High	Local	No Impact	Negligible	Travel Plan Measures	Negligible
Impact of NO_x emissions generated by road vehicles movements during operational phase on ecoogical sensitive receptors	High	Local	No Impact	Negligible	Travel Plan Measures	Negligible

Notes: * incorporating environmental design and management, ** incorporating mitigation and monitoring measures

Likely Significant Environmental Effects

4.88 During the construction and operational phases of the Proposed Development, following the implementation of mitigation measures outlined above, residual likely significant impacts are anticipated to be **negligible**, which is considered not significant.

Emissions from the Temporary Energy Centre and Data Centre

4.89 The assessment considers the impact on air quality from the operations of (1) gas and steam turbines at the temporary ancillary Energy Centre and (2) standby generators in generator zones of the Data Centre.

- Temporary Ancillary Energy Centre

  Temporary ancillary energy centre with gas turbines will have maximum generating capacity of 49.9 MW. The energy centre consists of 7 gas turbines, 1 steam generator and 2 diesel backup generators.

  The gas turbine is PGM70 (Taurus 70) turbines (8.18 MW each) and the steam turbine has the same emissions profile as the PGM70 gas turbine.

  The two diesel backup generators will be used during a widespread power outage to provide the initial power needed to safely and gradually restart the gas/steam turbines and restore the grid.

  As the energy century has maximum generating capacity of 49.9 MW, only 6 number of PGM70 (Taurus 70) gas turbines will be in operation at one time.

  The temporary Energy Centre is proposed to start in operation in July 2028 and last approximately for 5 years until the site has a full electricity connection (until July 2033).

- Data Centre

  There will be a total of 40 standby generators (or backup generators), The standby generators will be used after July 2033. The 40 standby generators are located in 3 generator zones within the Data Centre.

  The Data Centres will require continuous power and therefore will need to have standby generators in case there is a power cut or interruption to the electricity supply.

  The standby generators will be tested according to a regular testing schedule.

  - For 30 minutes every week between 10:00 and 16:00 Monday to Friday.
  - For 2 hours every six months for black start of the site. This is where they simulate an electricity supply failure to part of the Data Centre and check that the generators can maintain supply to the Data Centre.

In terms of emergency use of the generators it is usually assumed that the worst case will be that the generators will operate for 72 hours. The Environmental Permitting Regulations (EPR) specify infrequent use as less than 72 hours per year.

The air quality assessment has been undertaken to study the generator emission impact of (1) continuously operating 6 gas turbines in the ancillary Energy Centre until July 2033 and (2) emergency use of the generators of 40 backup generators at the Data Centre after July 2033.

4.90 The emissions data included within AERMOD and stack gas parameters are presented in **Table 4-18.**

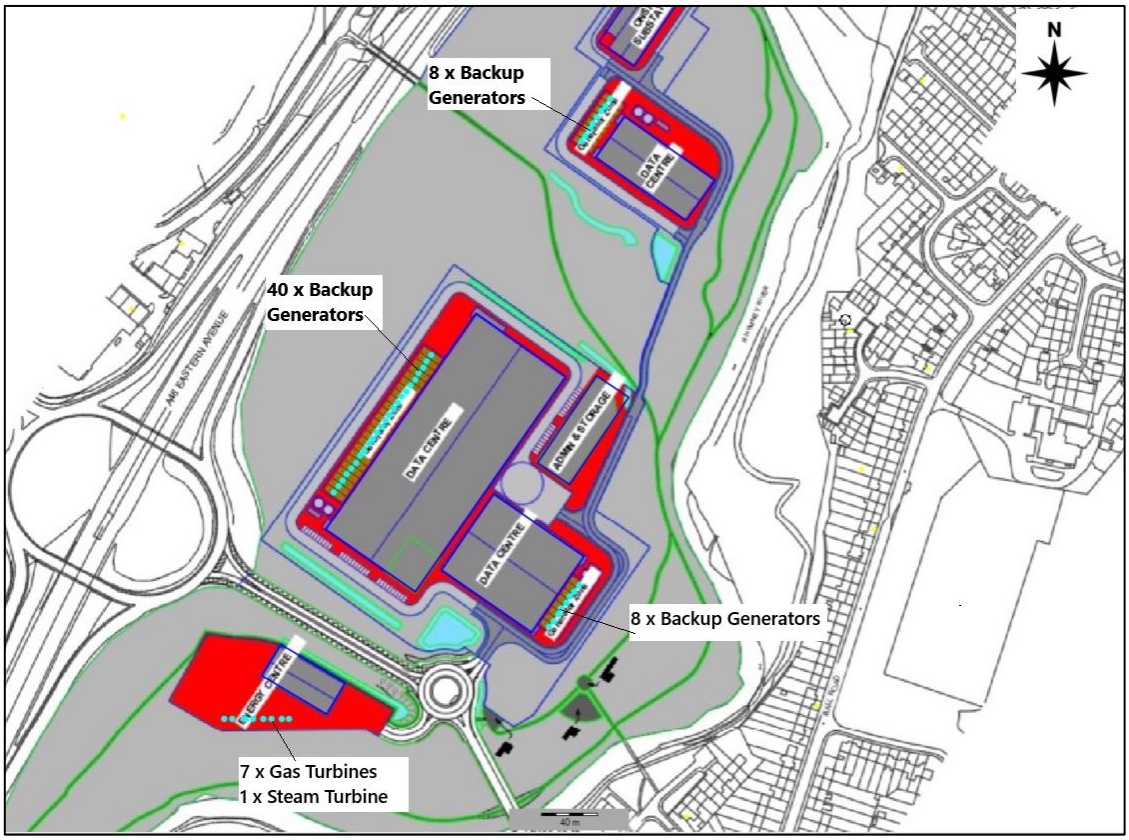
Table 4-18. Stack Emissions for the Assessment and Stack Parameters

Parameter	Emission Rate (Each Generator)	Unit	Note
As the energy century has maximum generating capacity of 49.9 MW, only 6 number of PGM70 (Taurus 70) gas turbines will be in operation at one time			
Gas Turbine Output Power	8.18	MWe	Generator Data sheet
Stack Volumetric Flow Rate (Stack Condition)	96,675	Am^3/hr	Generator Data sheet
	59.68	Am^3/s	Calculated
Stack Exhaust Gas Temperature	520	^oC	Generator Data sheet
Stack Flue gas Oxygen Content	14	%v/v	Estimated
Stack Flue gas Moisture Content	10.4	%v/v	Estimated
Volumetric Flow Rate at reference (STP, dry, 0 ^oC and 15% O_2)	21.53	Nm^3/s	Calculated
NO_x emission rate	15	ppm	Generator Data sheet
NO_x emission rate at dry, 0 ^oC and 15% O_2	30.75	mg/Nm^3	Calculated
CO emission rate at dry, 0 ^oC and 15% O_2	0.662	g/s	Calculated
NO_x mass emission rate	0.662	g/s	Calculated
CO mass emission rate	0.662	g/s	Calculated
Stack Height	21	m	Above the ground level
Stack Diameter	1.5	m	Estimated
Flue Gas Exit Velocity	33.77	m/s	Calculated
Steam Turbine will have the same emission rate and stack parameters as the PGM70 gas turbines. The Stem turbine can be considered as a backup turbine for PGM70 turbines			

Standby/Backup Generators			
Parameter	Emission Rate (Each Backup Generator of Cat 3516 B Diesel Generator)	Unit	Note
Diesel Backup Generator Power rating	1,820	ekW	Generator Data sheet
Diesel Backup Generator Power rating	2,275	kVa	Generator Data sheet
Diesel Backup Generator Power rating	2,537	hp	Calculated
Stack Volumetric Flow Rate (Stack Condition)	395	Am^3/min	Generator Data sheet
	6.58	Am^3/s	Generator Data sheet
Stack Exhaust Gas Temperature	489	^oC	Generator Data sheet
Stack Flue gas Oxygen Content	14	%v/v	Generator Data sheet
Stack Flue gas Moisture Content	10.4	%v/v	Estimated
NO_x emission rate	6.28	g/hp-h	Generator Data sheet
CO emission rate	0.43	g/hp-h	Generator Data sheet
PM emission rate	0.04	g/hp-h	Generator Data sheet
NO_x mass emission rate	4.426	g/s	Calculated
CO mass emission rate	0.303	g/s	Calculated
PM mass emission rate	0.028	g/s	Calculated
Stack Height	21	m	Above the ground level
Stack Diameter	0.25	m	Generator information
Flue Gas Exit Velocity	33.53	m/s	Calculated

The locations of gas turbine, steam turbine and backup generator stacks are shown in Figure 4-3.

Figure 4-3. Generator Locations for the Assessment of Operations of the Energy Centre and the Data Centre



Sensitive Receptors for the Assessment of Operations of the Energy Centre and the Data Centre

4.91 Receptors that are considered as part of the air quality assessment are primarily those existing receptors that are situated along routes predicted to experience significant changes in traffic flow as a result of the Proposed Development.

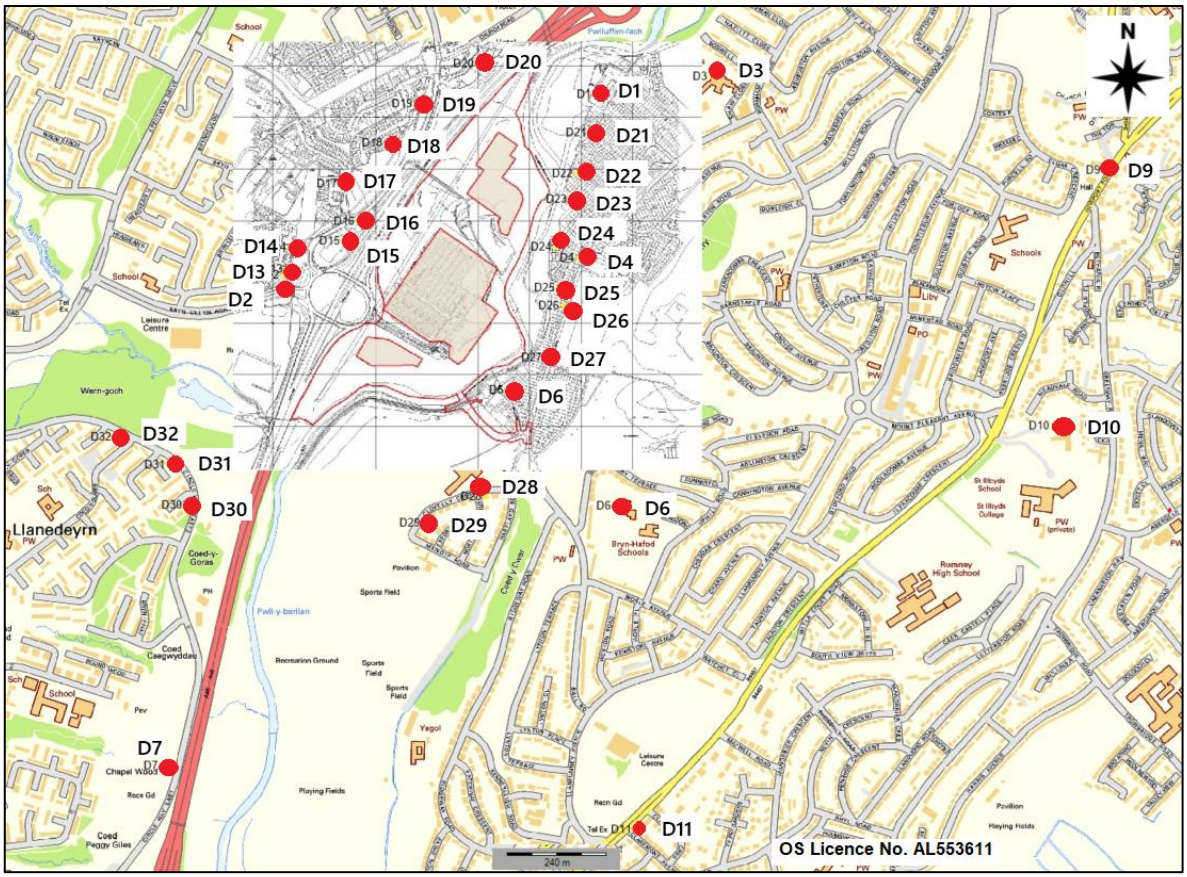
4.92 The existing receptor locations are summarised in Table 4-19 and the spatial locations of all of the receptors are illustrated in Figure 4-4.

Table 4-19 Modelled Sensitive Receptor Locations for the Assessment of Operations of the Energy Centre and the Data Centre

Existing Sensitive Receptor		X	Y	Receptor Height (m)
D1	Glan-Yr-Afon Primary School	321659	181431	1.5
D2	247 Bryn Celyn Road	320902	180992	1.5
D3	St Cadoc's RC Primary School	321940	181474	1.5
D4	263 Ball Road	321619	181033	1.5
D5	6 Ball Lane	321446	180712	1.5

D6	Bryn Hafod Primary School	321706	180431	1.5
D7	St Teilo's Church in Wales High School	320608	179799	1.5
D8	20 King Wood Close	320299	178935	1.5
D9	2 Seaview Cottages Newport Road	322895	181246	1.5
D10	Quarry Hill Care Home	322772	180625	1.5
D11	850 Newport Road	321754	179644	1.5
D12	Medical Care	321088	178932	1.5
D13	244 Bryn Celyn	320910	181006	1.5
D14	236 Bryn Celyn	320918	181059	1.5
D15	Fintans Fish & Chip Co	321048	181075	1.5
D16	Texaco	321084	181122	1.5
D17	43 Glyn Collen	321042	181213	1.5
D18	18 Pant glas	321152	181312	1.5
D19	10 Pant Glas	321224	181407	1.5
D20	Premier Inn	321374	181505	1.5
D21	28 Kipling Close	321646	181337	1.5
D22	17 Dryden Close	321615	181239	1.5
D23	3 Sheridan Close	321599	181176	1.5
D24	11 Ball Close	321563	181060	1.5
D25	241 Ball Road	321571	180961	1.5
D26	223 Ball Road	321580	180918	1.5
D27	205 Ball Road	321539	180791	1.5
D28	11 Clovelly Cres	321392	180454	1.5
D29	41 Clovelly Cres	321243	180389	1.5
D30	427 Coed-Y-Gores	320666	180433	1.5
D31	397 Coed-Y-Gores	320624	180530	1.5
D32	132 Coed-Y-Gores	320493	180598	1.5

Figure 4-4. Sensitive Receptor Locations for the Assessment of Operations of the Energy Centre and the Data Centre



Ecological Receptors for the Assessment of Operations of the Energy Centre and the Data Centre

4.93 Guidance contained in 'air emissions risk assessment for your environmental permit' (Defra and Environment Agency, published 1 February 2016, last updated 21 July 2025) states that assessments should consider the impact on the conservation areas:

- Examining if there are any of the following within 10km of the site:
  - special protection areas (SPAs).
  - special areas of conservation (SACs); and
  - Ramsar sites (protected wetlands).
- Examining if there are any of the following within 2km of the site:
  - sites of special scientific interest (SSSIs); and
  - local nature sites (ancient woods, local wildlife sites and national and local nature reserves)

4.94 A review has identified the ecological sites which are presented in Table 4-20 and shown in Figure 4-5. These have been included in the habitat assessment as ecological receptors.

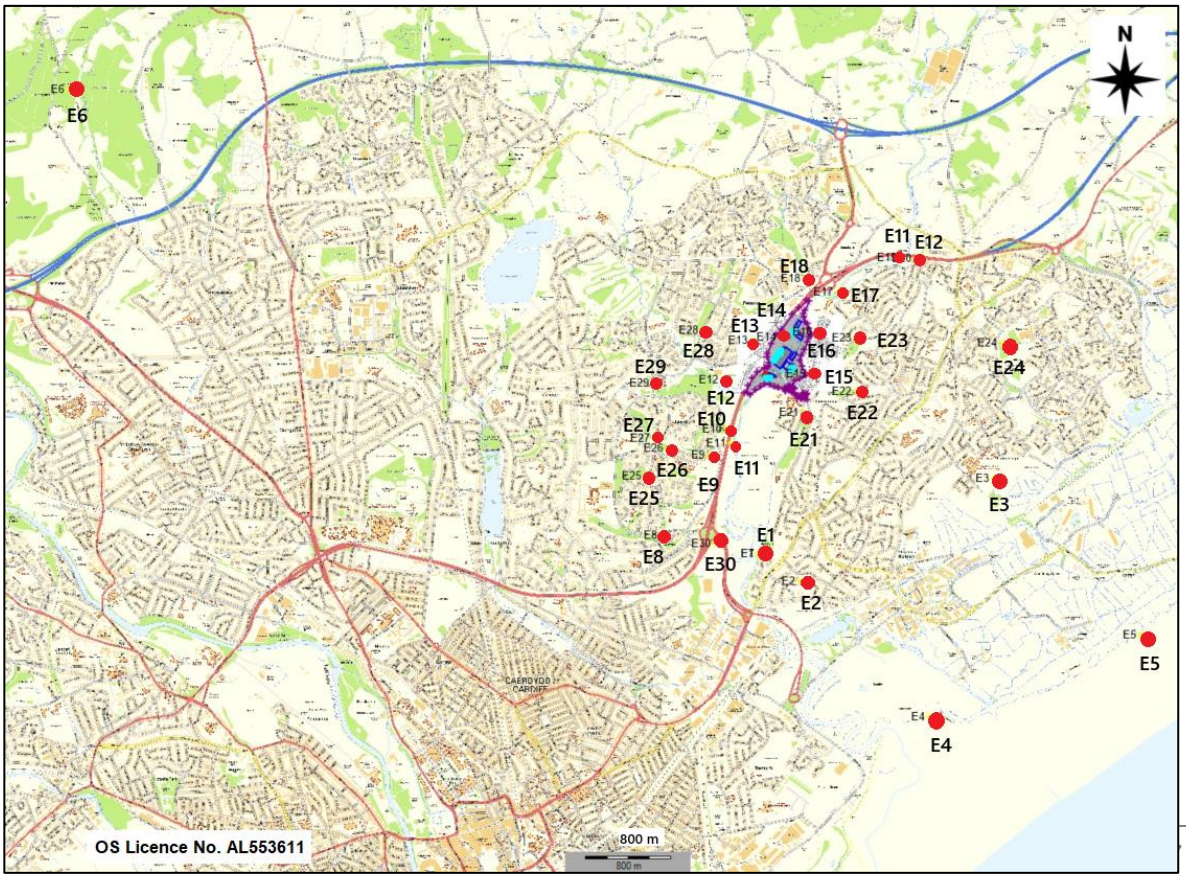
Table 4-20. Ecological Sensitive Receptor Locations

Site ID	Site	Designation	UK NGR (m)		Approximately Distance from the Site (km)
			X	Y	
E1	Rhymney River Section (E1)	SSSI	321051	179132	1.6 (south of the Energy Centre)
E2	Rumney Quarry (E2)	SSSI	321438	178870	1.9 (south of the Energy Centre)
E3	Gwent Levels – Rumney and Peterstone (E3)	SSSI	323260	179838	2.1 (southeast of the Energy Centre)
E4	Severn Estuary (Wales) 1 (E4)	Ramsar, SSSI, SAC, SPA	322650	177600	3.4 (south-southeast of the Energy Centre)
E5	Severn Estuary (Wales) 2 (E5)	Ramsar, SSSI, SAC, SPA	324639	178366	4.1 (southeast of the Energy Centre)
E6	Cardiff Beech Woods (E6)	SAC	314566	183495	7.1 (northwest of the Energy Centre)
E7	Circle Way (E7)	AW	321051	179132	1.6 (south of the Energy Centre)
E8	St Teilo's (E8)	AW	320140	179302	1.8 (southwest of the Energy Centre)
E9	Eastern Avenue (E9)	AW	320587	180056	0.9 (southwest of the Energy Centre)
E10	Eastern Avenue (E10)	AW	320754	180299	0.6 (southwest of the Energy Centre)
E11	Pentwyn Leisure Centre (E11)	AW	320782	180168	0.65 (southwest of the Energy Centre)
E12	Bryn Celyn Primary School (E12)	AW	320717	180765	0.4 (west of the Energy Centre)
E13	Eastern Avenue (within Red Line Boundary) (E13)	AW	320997	181137	0.4 (northwest of the Energy Centre)
E14	Ball Lane (E14)	AW	321258	181165	0.4 (northwest of the Energy Centre)
E15	Glan-Yr-Afron Primary School (E15)	AW	321537	180820	0.38 (east of the Energy Centre)
E16	Glan-Yr-Afron Primary School (E16)	AW	321602	181212	0.6 (northeast of the Energy Centre)
E17	Maes y Bryn (E17)	AW	321798	181594	1.1 (northeast of the Energy Centre)
E18	Eastern Avenue (E18)	AW	321491	181715	1.0 (northeast of the Energy Centre)

E19	Eastern Avenue (E19)	AW	322394	181910	1.7 (northeast of the Energy Centre)
E20	Hartland Road (E20)	AW	322534	181901	1.7 (northeast of the Energy Centre)
E21	Fishpond Road (E21)	AW	321472	180457	0.5 (southeast of the Energy Centre)
E22	Chesterton Road (E22)	AW	321966	180653	0.8 (east of the Energy Centre)
E23	Willowbrook Drive (E23)	AW	321966	181156	0.9 (northeast of the Energy Centre)
E24	Pemsylvania (E24)	AW	323335	181109	2.2 (east of the Energy Centre)
E25	Brynfedw (E25)	AW	320000	179861	1.5 (southwest of the Energy Centre)
E26	Wern Goch West (E26)	LNR	320205	180122	1.2 (southwest of the Energy Centre)
E27	Pentwyn Drive (E27)	AW	320074	180215	1.2 (southwest of the Energy Centre)
E28	Wern Goch West (E28)	AW	320531	181230	0.75 north(west of the Energy Centre)
E29	Howardian (E29)	AW	320065	180737	1.05 (west of the Energy Centre)
E30	Ty Enfys (E30)	AW	320652	179227	1.6 (south of the Energy Centre)

Notes: The ancient woodland site names are referred by the nearby landmarks in the table.

Figure 4-5. Ecological Receptor Locations for the Assessment of Operations of the Energy Centre and the Data Centre



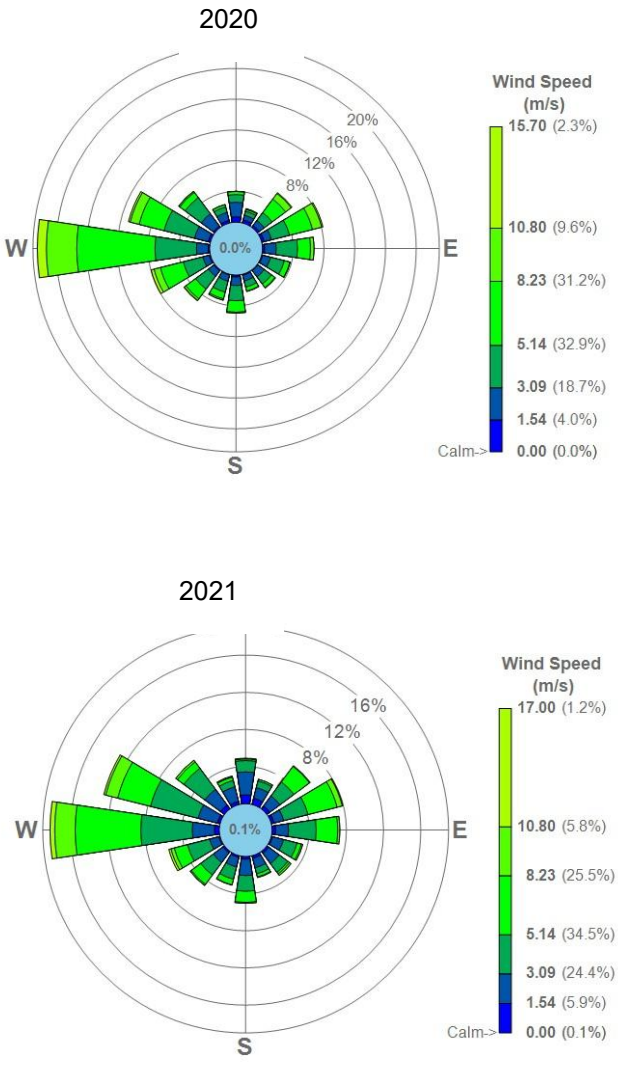
Meteorological Data

4.95 The 5-year meteorological data used in the assessment are derived from Cardiff Airport weather station, which is considered representative of conditions within the vicinity of the site. Cardiff Airport has the complete data from 2020 to 2024.

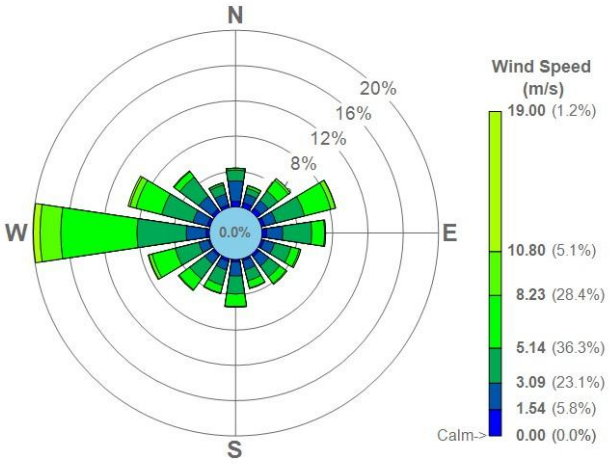
4.96 Worst impact year has been presented.

4.97 Reference should be made to Figure 4-6 for an illustration of the prevalent wind conditions at the Cardiff Airport weather station.

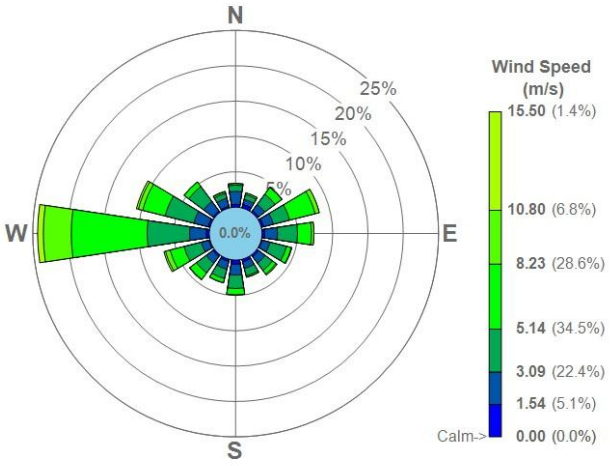
Figure 4-6. Meteorological Station Windroses for the Assessment of Operations of the Energy Centre and the Data Centre



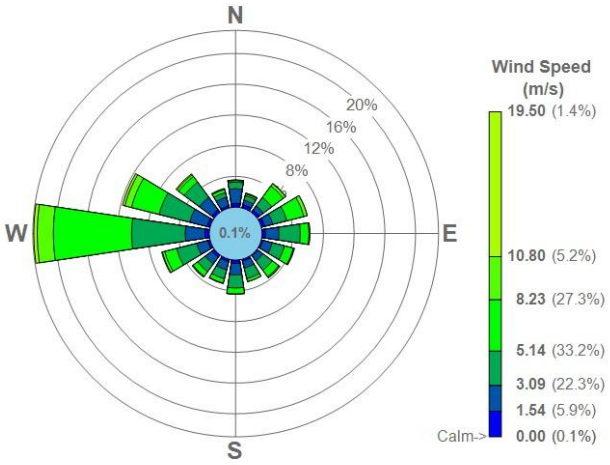
2022



2023



2024



Long-Term NO_2 Impact for the Assessment of Operations of the Energy Centre

4.98 The Predicted Environmental Concentration (PEC) as a result of the Energy Centre operations at all receptor locations, with respect to NO_2 exposure, are determined to be less than the relevant long-term AQO. The impact is determined to be 'not significant'. The effect of the Energy Centre operations on the local area is considered to be insignificant.

4.99 Therefore, the predicted long-term NO_2 concentrations from the Energy Centre operations are considered acceptable for the protection of human health.

Short-Term NO_2 Impact for the Assessment of Operations of the Energy Centre

4.100 There are no exceedances of the short-term NO_2 AQO at any of the identified sensitive receptors. The predicted impacts are significantly below the AQO of 200 µg/m^3.

4.101 Therefore, the predicted short-term NO_2 concentrations from the Energy Centre operations are considered acceptable for the protection of human health

Carbon Monoxide Impact for the Assessment of Operations of the Energy Centre

4.102 There are no exceedances of the short-term CO AQO at any of the identified sensitive receptors. The predicted PECs of CO are significantly below the AQO of 10,000 µg/m^3.

4.103 The percentage change in process concentrations relative to the short-term AQO at all receptor locations are significantly less than 10% of the relevant AQO and the short-term impact is determined to be 'insignificant'.

4.104 Therefore, the predicted short-term CO concentrations from the stack emissions are considered acceptable for the protection of human health.

Habitat Assessment for the Assessment of Operations of the Energy Centre

4.105 The annual mean NO_x (as NO_2) PEC at the ecological receptor locations are above the annual mean critical level of 30 µg/m^3 for the protection of vegetation and Ecosystems due to the high background level.

4.106 The NO_x daily (24 hour average) predicted environmental concentrations at all ecological receptor locations are below the daily mean critical level of 75 µg/m^3 for the protection of vegetation and ecosystems.

4.107 The percentage change in long-term process concentrations relative to the AQAL as a result of the proposed development at all ecological receptor locations, with respect to NO_x (as NO_2) exposure, are determined to be 1.5% or less. The effect is 'not significant' for all ecological receptor locations

Detailed Modelling assessment Results – The Backup Generators at the Data Centre

4.108 The maximum NO_2 PEC is 194.28 µg/m^3, which is below the relevant short-term AQO of 200 µg/m^3 for the protection of human health. The percentage changes in process contribution of NO_2 relative to the AQO as a result of the Data Centre operations at all receptor locations, with respect to NO_2 exposure, are determined to be 83.80% or less.

4.109 The predicted short-term NO_2 concentrations from the Data Centre operations are considered acceptable for the protection of human health during the backup generator testing for 30 minutes every week between 10:00 and 16:00 Monday to Friday.

4.110 The predicted NO_2 PEC at a number of receptor locations are above the relevant short-term AQO of 200 µg/m^3 for the protection of human health. The effect of the backup generator emissions for 2 hours every six months for a black start of the site is determined to be 'significant'.

4.111 A study of the receptor locations, where the predicted NO_2 PECs are above the relevant short-term AQO, indicated that those receptors are located close to the backup generators to the east and west of the site. The predicted NO_2 PECs at other receptor locations that are located further away from the site are below the relevant short-term AQO, for example, receptors D30 to D32.

4.112 It is noted that there are a few receptors being located to the southwest of the site and those receptors being further away from the backup generators (the closest one being approximately 680 m to the nearest backup generator stack). Therefore, it is recommended that the scheduled test for 2 hours every six months for a black start of the site should be taking place when wind direction is northeast (north easterly winds).

Use of the Emergency Backup Generators for more than 30 Minutes

4.113 It is likely that the short-term impact of NO_2 emissions from the backup emergency generators, when operated more than 30 minutes, would result in the exceedance of the short-term NO_2 AQO for the protection of human health. Therefore, in case of the emergency use of the backup generators at the

Data Centre, it is recommended that the operators take the additional precautions to limit exposure, such as informing the neighbouring residents to stay inside and keep windows closed.

Cumulative Impacts – Road traffic and Generator Emissions

4.114 It should be noted that the background concentrations used in the assessment of the operations of the energy centre include the contributions from the traffic emissions, which produce a cumulative impact assessment by assessing both road traffic emissions and generator emissions.

Summary and Conclusions

Construction Phase

4.115 Prior to the implementation of appropriate mitigation measures, the potential impact description of dust emissions associated with the construction phase of the Proposed Development is 'high risk' at the worst affected receptors without mitigation. However, appropriate site-specific mitigation measures have been proposed based on Section 8.2 of the IAQM Guidance on the Assessment of Dust from Demolition, Earthworks, Construction and Trackout. It is anticipated that with these appropriate mitigation measures in place, the risk of adverse effects due to dust emissions from the construction phase will not be significant.

Operational Assessment

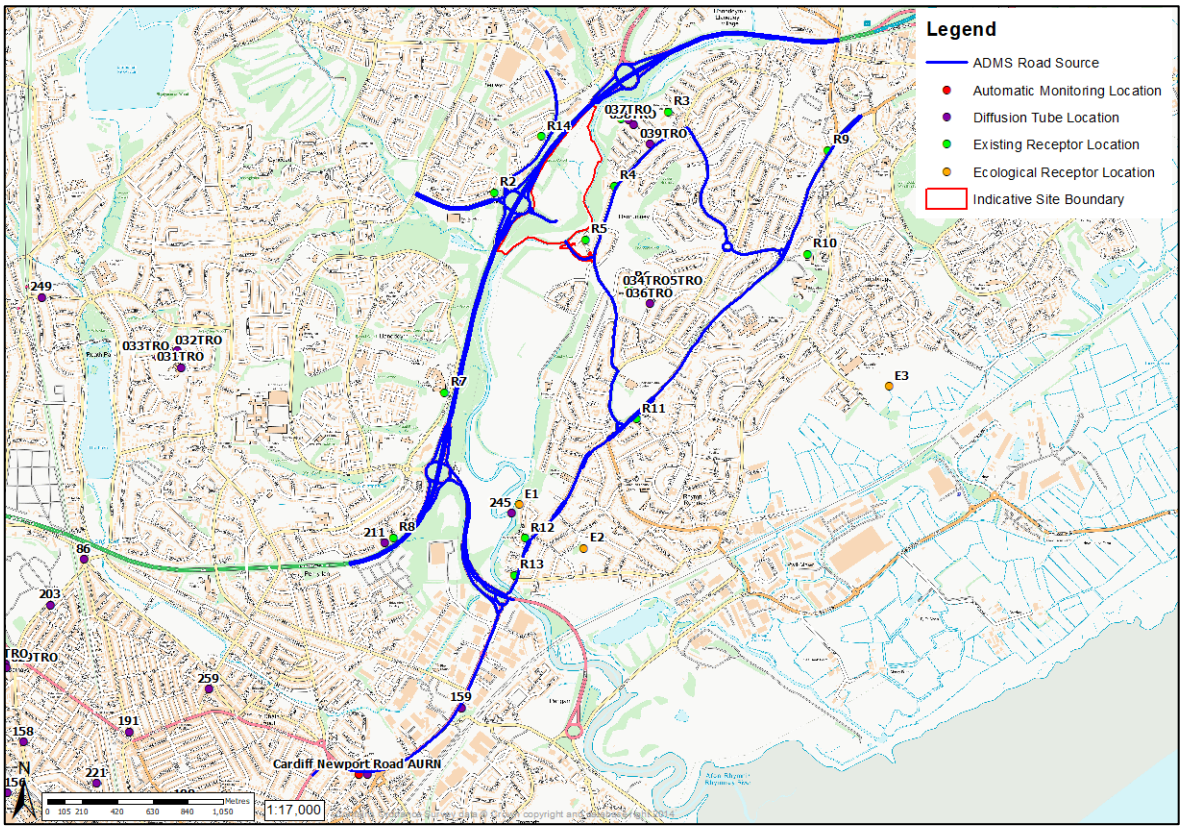
4.116 The impact description of the effects of changes in traffic flow as a result of the Proposed Development, with respect to NO_2, PM_{10}, $PM_{2.5}$ and NOx exposure, is determined to be 'negligible' at all existing human and ecological receptors.

4.117 Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'. In conclusion, the development is not considered to be contrary to any of the national and local planning policies regarding air quality.

4.118 Following amendments to the Proposed Development masterplan, there are no changes to the conclusions of the air quality assessment.

Additional Figures

Figure A-1: The spatial extent of the study area



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