



Air Quality Assessment	
Jersey Marine, Neath Port Talbot	
Job number:	J0385
Document number:	J0385/1/F1
Date:	30 January 2020
Client:	SGW Planning
Prepared by:	Mr Bob Thomas

Air Quality Assessments Ltd
Tel: 07940 478134
Email: bob@aqassessments.co.uk
Web: <http://aqassessments.co.uk>

Registered Office: c/o Ardwyn Channon, 12 Victoria Street, Burnham-on-Sea, Somerset, TA8 1AL
Companies House Registration: 8895617

Air Quality Assessments Ltd has completed this report based on the information provided by the client, and the agreed scope of work. Air Quality Assessments Ltd does not accept liability for any matters arising outside the agreed scope of work, or for changes that may be required due to omissions in the information provided.

Unless otherwise agreed, this document and all other Intellectual Property Rights remain the property of Air Quality Assessments Ltd. Air Quality Assessments Ltd does not accept responsibility for any unauthorised changes made by others to the issued report.

© Air Quality Assessments Ltd 2020

Contents

1	Introduction	1
1.1.	Proposed Development	1
1.2.	Scope of Assessment	1
2	Air Quality Legislation and Policy	2
2.1.	European Legislation	2
2.2.	National Legislation	2
2.3.	Clean Air Strategy	2
2.4.	Planning Policy	3
3	Methodology	6
3.1.	Existing Conditions	6
3.2.	Road Traffic Impacts	6
3.3.	Uncertainty	7
3.4.	Assessment Criteria and Significance	8
4	Baseline Conditions	10
4.1.	Background Concentrations and Fluxes	10
5	Road Traffic Impacts	11
5.1.	Screening	11
5.2.	Impact Assessment	12
6	Mitigation	14
7	Residual Impacts	15
8	Conclusions	16
9	References	17
10	Glossary	19
11	Appendices	20

Tables

Table 1: Critical Loads	9
Table 2: Critical Level	9
Table 3: Estimated Annual Mean Background Concentrations in 2018 and 2021 ($\mu\text{g}/\text{m}^3$)	10
Table 4: Estimated Annual Mean Background Nutrient and Acid Nitrogen Deposition ...	10
Table 5: Predicted Road Contribution of NO _x in 2021	11
Table 6: Predicted Road Contribution to Nutrient and Acid Nitrogen Deposition in 2021	12
Table 7: Predicted 2021 Nitrogen Oxides Impacts Assuming EFT Emissions	13
Table 8: Predicted 2021 Nitrogen Oxides Impacts Assuming CURED Emissions	13
Table A1: Location of Transect Receptors	21
Table A2: Summary of Traffic Data used in the Assessment	24
Table A3: Evaluation of Model Performance	28

Figures

Figure 1: Location of Receptors	7
Figure 2: Modelled Roads - Assessment	24
Figure 3: Modelled Roads and Diffusion Tube Monitoring Sites - Verification	25
Figure 4: Comparison of Measured Road NO _x to Unadjusted Modelled Road NO _x Concentrations	27
Figure 5: Comparison of Measured Total NO ₂ to Primary Adjusted Modelled Total NO ₂ Concentrations	27

1 Introduction

1.1. Proposed Development

- 1.1.1 Air Quality Assessments Ltd (AQA) has been commissioned by SGW Planning to undertake an air quality assessment for the proposed commercial development at land off of Ashleigh Terrace, Jersey Marine, Neath Port Talbot. The proposed development will provide approximately 1,050m² of B1 (Office) use and 4,250m² of B2 (General Industrial) use.
- 1.1.2 Emissions from additional traffic generated by the proposed development may have an impact on sensitive habitats within the Crymlyn Bog Special Area of Conservation (SAC) and Ramsar site.

1.2. Scope of Assessment

- 1.2.1 This report describes the existing air quality conditions at the Crymlyn Bog SAC and assesses the likely impact that emissions from traffic generated by the proposed development will have on the SAC. The main air pollutants of concern related to traffic emissions are nitrogen oxides (NO_x), nutrient nitrogen deposition, and acid nitrogen deposition.
- 1.2.2 The assessment has been prepared taking into account all relevant local and national guidance and regulations.
- 1.2.3 The references and a glossary of common air quality terminology used in this assessment are shown in **Section 10** and **Section 11** respectively.

2 Air Quality Legislation and Policy

2.1. European Legislation

EU Ambient Air Quality Directive

- 2.1.1 The European Union's Directive on ambient air quality and cleaner air for Europe (European Parliament, Council of the European Union, 2008) set legally binding critical levels for the protection of vegetation. The critical level for NO_x is an annual mean concentration of 30 µg/m³ not to be exceeded after 19th July 2001. The Air Quality Standards (Wales) Regulations 2010 (HMSO, 2010a) implement the EU Directive limit values in Welsh legislation. Achievement of the critical levels is a national obligation rather than a local one. The critical levels only apply at sites more than 20 km from agglomerations, or more than 5 km away from other built up areas, industrial installations or motorways or major roads with traffic counts of more than 50,000 vehicles a day.

EU Habitats Directive

- 2.1.2 European Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the "Habitats Directive") requires member states to introduce a range of measures for the protection habitats and species. The Conservation of Habitats and Species Regulations (2010b) transpose Directive 92/43/EEC into law in England and Wales. The Regulations place a duty on the Secretary of State to propose a list of sites which are important for either habitats or species, as listed in the Directive, to the European Commission. The Commission then identifies sites that must be designated as Special Areas of Conservation (SACs). The Regulations also require the compilation and maintenance of a register of European sites, to include SACs and Special Protection Areas (SPAs) classified under the Council Directive 79/409/EEC on the Conservation of Wild Birds (The European Parliament and the Council of the European Union, 2009). These sites form a network termed 'Natura 2000'.
- 2.1.3 The Regulations require local planning authorities to review planning applications that may affect a European site, and to restrict permission where the integrity of the site would be adversely affected. Where a planning application may have a likely significant effect on a site, an 'appropriate assessment' is required and consent only given where there is no adverse effect on the integrity of the site.
- 2.1.4 In addition to SACs and SPAs, some internationally important UK wetlands sites are designated under the Ramsar Convention and it is government policy to treat these sites as though they are designated as European sites.

2.2. National Legislation

2.3. Clean Air Strategy

- 2.3.1 Part IV of The Environment Act 1995 required the UK Government to prepare an Air Quality Strategy which includes standards and objectives for air quality and sets out measures which are to be taken by local authorities and the government in order to

achieve those objectives. The Clean Air Strategy provides an overview of the actions that the government will take to improve air quality and promises new legislation that will tackle air pollution (Defra, 2019).

- 2.3.2 Standards are the concentrations of pollutants in the atmosphere, below which there is a minimum risk of health effects or ecosystem damage; they are set with regard to scientific and medical evidence. Objectives are the policy targets set by the Government, taking account of economic efficiency, practicability, technical feasibility and timescale, where the standards are expected to be achieved by a certain date.
- 2.3.3 The national objective for NO_x is an annual mean of 30 µg/m³ and is the same as the EU critical level; however, the compliance date by which the objective must be achieved, and maintained thereafter, is 31st December 2000.
- 2.3.4 Objectives for ecosystems only strictly apply where the ecosystem is more than 20km from an agglomeration (i.e. an area with a population of more than 250,000); or more than 5km away from industrial sources regulated under Part A1 of the Environmental Permitting Regulations), motorways and built up areas of more than 5,000 people. However, the regulatory agencies have agreed with the nature conservation agencies that non-statutory critical levels for the protection of ecosystems should be applied to all nature conservation sites regardless of their location.

2.4. Planning Policy

National Policies

- 2.4.1 Land-use planning policy in Wales is established within the policy document Planning Policy Wales Edition 10 (PPW), which provides the strategic policy framework for the effective preparation of local planning authority development plans (Welsh Government, 2018).
- 2.4.2 The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales.
- 2.4.3 PPW states that:

“The planning system should maximise its contribution to achieving the well-being goals, and in particular a healthier Wales, by aiming to reduce average population exposure to air and noise pollution alongside action to tackle high pollution hotspots. In doing so, it should consider the long-term effects of current and predicted levels of air and noise pollution on individuals, society and the environment and identify and pursue any opportunities to reduce, or at least, minimise population exposure to air and noise pollution, and improve soundscapes, where it is practical and feasible to do so.

In taking forward these broad objectives the key planning policy principle is to consider the effects which proposed developments may have on air or soundscape quality and the effects which existing air or soundscape quality may have on proposed developments. Air Quality and soundscape influence choice of location and distribution of development and it will be important to consider the relationship of proposed development to existing development and its surrounding area and its

potential to exacerbate or create poor air quality or inappropriate soundscapes. The agent of change principle says that a business or person responsible for introducing a change is responsible for managing that change. In practice, for example, this means a developer would have to ensure that solutions to address air quality or noise from nearby pre-existing infrastructure, businesses or venues can be found and implemented as part of ensuring development is acceptable.”

2.4.4 PPW sets out what must be done:

“In proposing new development, planning authorities and developers must, therefore:

- address any implication arising as a result of its association with, or location within, air quality management areas, noise action planning priority areas or areas where there are sensitive receptors;*
- not create areas of poor air quality or inappropriate soundscape; and*
- seek to incorporate measures which reduce overall exposure to air and noise pollution and create appropriate soundscapes.”*

To assist decision making it will be important that the most appropriate level of information is provided and it may be necessary for a technical air quality and noise assessment to be undertaken by a suitably qualified and competent person on behalf of the developer.”

2.4.5 PPW goes on to discuss design and mitigation:

“Good design, for example setting back buildings from roads to avoid canyon effects and using best practice in terms of acoustic design to ensure the appropriate and intended acoustic environment of completed developments should be incorporated at an early consideration in the design and planning process. Other mitigation measures must be capable of being effectively implemented for their intended purpose, and could include those related to:

- traffic management and road safety;*
- ensuring progress towards a shift to low or zero emissions means of road transport, such as electrical charging points;*
- supporting low or zero emissions public transport;*
- providing active travel infrastructure; and*
- incorporating green infrastructure, where it can improve air quality by removing air pollution and aiding its dispersal, reduce real or perceived noise levels by absorbing and scattering noise and introducing natural sounds to soften man-made noise, provide areas of relative tranquillity, and reduce exposure by putting a buffer between sources of pollution and receptors.”*

2.4.6 PPW also states:

“Proposed development should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur. In circumstances where impacts are unacceptable, for example where adequate mitigation is unlikely to be sufficient to safeguard local amenity in terms of air quality and the acoustic environment it will be appropriate to refuse permission.”

Local Policies

2.4.7 The Neath Port Talbot Local Development Plan (2011-2016) includes the following relevant air quality policies (Neath Port Talbot County Borough Council, 2016).

2.4.8 Policy SP 16 Environmental Protection

“Air, water and ground quality and the environment generally will be protected and where feasible improved through the following measures:

- 1. Ensuring that proposals have no significant adverse effects on water, ground or air quality and do not significantly increase pollution levels;*
- 2. Giving preference to the development of brownfield sites over greenfield sites where appropriate and deliverable;*
- 3. Ensuring that developments do not increase the number of people exposed to significant levels of pollution.”*

2.4.9 Policy EN 8 Pollution and Land Stability

“Proposals which would be likely to have an unacceptable adverse effect on health, biodiversity and/or local amenity or would expose people to unacceptable risk due to the following will not be permitted:

- *Air pollution;*
- *Noise pollution;*
- *Light pollution;*
- *Contamination;*
- *Land instability;*
- *Water (including groundwater) pollution.*

Proposals which would create new problems or exacerbate existing problems detailed above will not be acceptable unless mitigation measures are included to reduce the risk of harm to public health, biodiversity and/or local amenity to an acceptable level.”

3 Methodology

3.1. Existing Conditions

3.1.1 Information on existing air quality within the study area has been collated from the following sources:

- Background pollutant concentration maps published by Defra (Defra, 2020); and
- Background nitrogen deposition fluxes published by the Air Pollution Information System (APIS, 2020).

3.2. Road Traffic Impacts

Modelling Methodology

3.2.1 Pollutant concentrations have been predicted at sensitive receptors using the ADMS Roads (v4.1.1.0) dispersion model. The model requires the input of a range of data, details of which are provided in **Appendix A1**, along with details of the model verification calculations.

Sensitive Locations

3.2.2 Receptors have been located along transects that run perpendicular to roads affected by the proposed development and within 200m of the Crymlyn Bog SAC. The transect locations are shown in **Figure 1**. Receptors have been placed at the SAC boundary and then every 1m into the SAC. The grid references of the transect receptors points are provided in **Appendix A1**.

Assessment Scenarios

- 3.2.3 Concentrations of NO_x have been predicted at the receptors, both without and with the proposed development, assuming an opening year of 2021.
- 3.2.4 In addition to predictions using emissions data published by Defra, a sensitivity analysis has been undertaken that assumes higher NO_x emissions from some diesel vehicles. This sensitivity analysis provides a worst-case assessment of future impacts (see section on uncertainty below).
- 3.2.5 Concentrations have also been predicted at diffusion tube monitoring sites operated by Neath Port Talbot County Borough Council in 2018 in order to verify the model (see **Appendix A1**).

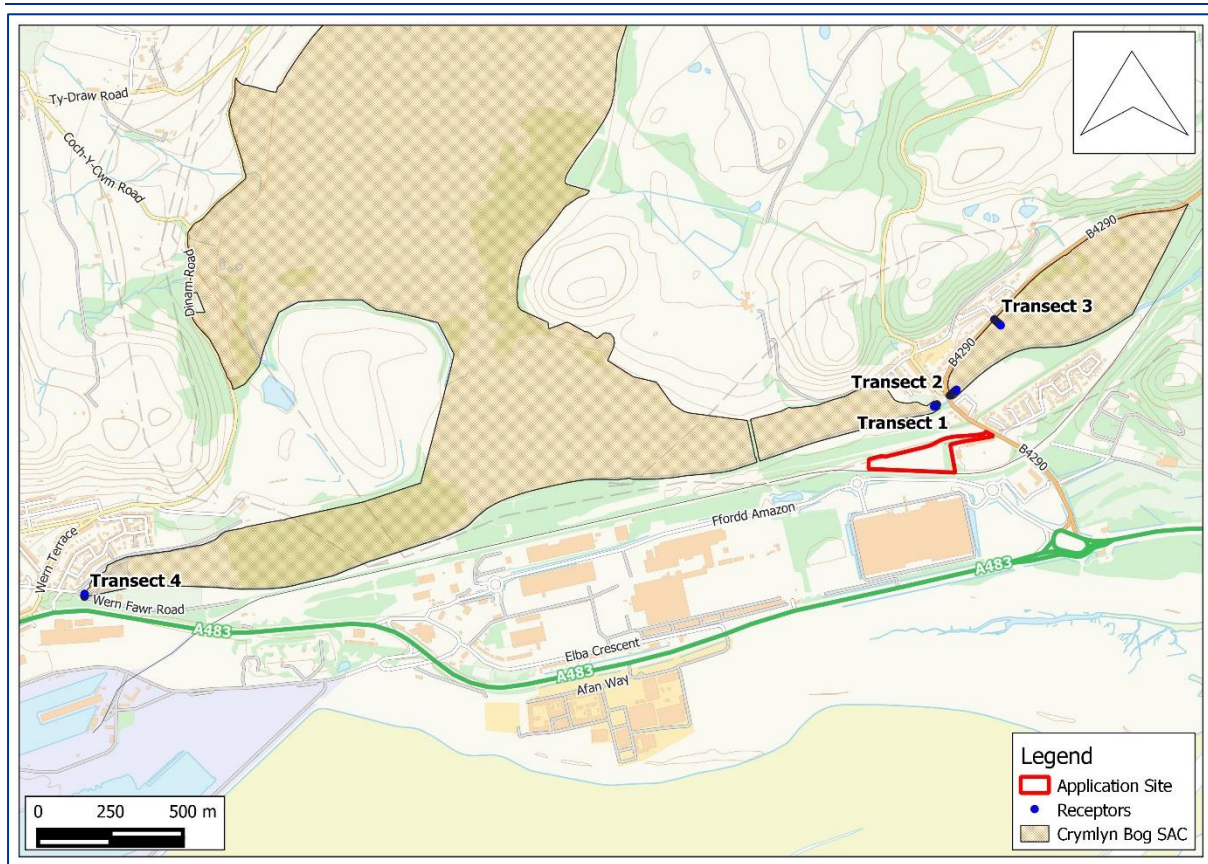


Figure 1: Location of Receptors

Contains Ordnance Survey data © Crown copyright and database right 2020

3.3. Uncertainty

- 3.3.1 There are many factors that contribute to uncertainty when predicting pollutant concentrations. The emission factors utilised in the air quality model are dependent on traffic data, which have inherent uncertainties associated with them. There are also uncertainties associated with the model itself, which simplifies real world conditions into a series of algorithms. The model verification process, as described in **Appendix A1**, minimises the uncertainties; however, future year predictions use projected traffic data, emissions data, and background concentrations. The most recent emission factors and background data have been used in this assessment; however, there are still uncertainties associated with this data.
- 3.3.2 Past analysis has shown a disparity between historical monitoring data and the projected background concentrations published by Defra (Carslaw, et al., 2011). Overall, there has been little evidence of the consistent downward trend in NO₂ and NO_x concentrations suggested by previous emission inventory estimates.
- 3.3.3 This disparity is believed to have arisen due to the actual on-road performance of diesel vehicles when compared with emissions calculations based on the Euro standards and published in the Emissions Factor Toolkit (EFT) used for modelling.
- 3.3.4 Air Quality Consultants Ltd (AQC) have produced the Calculator Using Realistic Emissions for Diesels (CURED) tool that applies adjustments to diesel emission factors

from the EFT for use by consultants when undertaking sensitivity analysis of future air quality impacts (AQC, 2018a). A report comparing CURED v3A with the most recent EFT v9.0 concludes that, for most modelling studies verified against annual mean measurements made in 2017 or 2018, CURED V3A will predict higher concentrations than EFT V9.0 from 2021 onwards (AQC, 2019). As this study predicts concentrations in 2021 a sensitivity analysis used CURED has been undertaken.

3.4. Assessment Criteria and Significance

- 3.4.1 Critical loads for nitrogen deposition onto sensitive ecosystems have been specified by the United Nations Economic Commission for Europe (UNECE). They are defined as a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur, according to present knowledge. The critical load relates to the quantity of pollutant deposited from air to ground, whereas the critical level is the gaseous concentration of a pollutant in the air. It must be emphasised that exceedance of the critical load does not provide a quantitative estimate of damage to an ecosystem, but only the *potential* for damage to occur. The critical loads for the sensitive features under consideration in this assessment, as defined in APIS, are shown in **Table 1**.
- 3.4.2 The critical loads from the features most sensitive to nutrient or acid nitrogen deposition have been used, along with the NO_x objective for the protection of vegetation and ecosystems, to determine the assessment criteria, as shown in **Table 2**. There is also a non-statutory critical level for 24-hour NO_x, derived from the World Health Organisation (WHO) Air Quality Guidelines for Europe (WHO, 2000). However, as recommended in Institute of Air Quality Management (IAQM)¹ guidance A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites, only the annual mean NO_x concentration is considered in this assessment (IAQM, 2019).
- 3.4.3 There is no official guidance in the UK on how to describe air quality impacts, nor how to assess their significance. Online guidance published by Defra and the Environment Agency (EA) has been used in the first instance to screen out impacts that will have an insignificant effect (Defra & EA, 2016). The guidance explains that regardless of the baseline environmental conditions, a process, i.e. the increase in traffic, can be considered as insignificant if:
- The long-term (annual mean) process contribution is less than 1% of the long-term environmental standard (critical level/load).
- 3.4.4 It should be recognised that this criterion determines when an impact can be screened out as not significant. It does not imply that there will be damage to a habitat above this threshold, or that impacts will necessarily be significant above these criteria, merely that there is a potential for significant impacts to occur that should be considered using a detailed assessment methodology, such as a detailed dispersion modelling study (as has been carried out for this assessment in any event) in association with a qualified ecologist to consider the likelihood of an adverse effect on the integrity of the habitat. It is the IAQM's opinion that the 1% screening criterion

¹ The IAQM is the professional body for air quality practitioners.

should not be used rigidly and not to a numerical precision greater than the expression of the criterion itself (IAQM, 2019). A position statement published by the IAQM suggests that only impacts clearly above 1% should be treated as potentially significant, rather than impacts that are about 1%, or slightly higher (IAQM, 2016).

- 3.4.5 For the purposes of this assessment, where concentrations and/or deposition rates are predicted to increase by 1% or less of the assessment criterion, the potential for significant impacts can be discounted, and no further assessment is necessary. If the initial screening shows the potential for significant impacts, i.e. concentrations and/or deposition rates are predicted to increase by more than 1% of the assessment criterion, the total concentrations and deposition rates (road contribution + background) will be compared with the critical level/loads. The overall effect of the air quality impacts should be judged as either significant or not significant following evaluation by a qualified ecologist with full consideration of the habitat's circumstances.

Table 1: Critical Loads

Site	Qualifying Feature	Critical Load	
		Nutrient N Deposition (kg/ha/yr)	Acid N Deposition (Nmax) (keq/ha/yr)
Crymlyn Bog	Transition mires and quaking bogs (H7140)	5	0.661
	Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davalliana</i> (H7210)	13	Not sensitive
	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Anion incanae, <i>Salicion albae</i>) (H91E0)	Not sensitive	Not sensitive

Table 2: Critical Level

Site	Annual Mean NO _x (µg/m ³)	Nutrient N (kg/ha/yr)	Acid N (keq/ha/yr)
Crymlyn Bog	30	5	0.661

4 Baseline Conditions

4.1. Background Concentrations and Fluxes

National Background Pollution Maps

- 4.1.1 Estimated background concentrations of NO_x and NO₂ at the application site are shown in **Table 3**. The background concentrations have been derived from data in the national maps published by Defra. The background concentrations are well below the critical level.

Table 3: Estimated Annual Mean Background Concentrations in 2018 and 2021 (µg/m³)

Year	NO _x	NO ₂
2018	11.7	8.8
2021 - EFT	10.2	7.7
2021 - CURED	10.4	7.9
Critical Level	30	-

Nutrient Nitrogen and Acid Nitrogen Deposition

- 4.1.2 Background nitrogen deposition fluxes across the Crymlyn Bog SAC have been obtained using data from the APIS website, and are shown in **Table 4**. It is assumed that 2021 background deposition fluxes will be approximately the same as the 2015-17 3 year average obtained from APIS. The background deposition fluxes of nutrient and acid nitrogen are above the critical loads.

Table 4: Estimated Annual Mean Background Nutrient and Acid Nitrogen Deposition

Year	Nutrient Nitrogen (kg/ha/yr)			Acid Nitrogen (keq/ha/yr)		
	Min.	Max.	Ave.	Min.	Max.	Ave.
2015-17	11.3	16.1	13.4	0.8	1.2	1
Critical Load	5			0.661		

5 Road Traffic Impacts

5.1. Screening

NO_x

- 5.1.1 The effects on annual mean NO_x concentrations along the first 2m of the transects are set out in **Table 5**. Concentrations further along the transect will be lower. There are no exceedances of the annual mean screening criterion on Transects 1, 2 or 4, and the impacts would not be significant. Exceedances of the NO_x screening criterion are predicted up to 1m into the SAC from the SAC boundary on Transect 3. As the effect due to road traffic emissions decreases with distance from source, there would not be significant impacts further along the transect.

Table 5: Predicted Road Contribution of NO_x in 2021

Receptor	Predicted Road Contribution of Annual Mean NO _x (µg/m ³)		% of Screening Criterion ^a	
	EFT	CURED	EFT	CURED
T1_0	0.1	0.1	0	0
T1_1	0.1	0.1	0	0
T1_2	0.1	0.1	0	0
T2_0	0.3	0.3	1	1
T2_1	0.3	0.3	1	1
T2_2	0.3	0.3	1	1
T3_0	0.5	0.6	2	2
T3_1	0.5	0.5	2	2
T3_2	0.4	0.4	1	1
T4_0	0.0	0.0	0	0
T4_1	0.0	0.0	0	0
T4_2	0.0	0.0	0	0
Screening Criterion			1	

a Exceedences of 1% of the assessment criterion are shown in bold.

Nitrogen Deposition

- 5.1.2 The predicted contributions to nutrient and acid nitrogen deposition fluxes along the first 2m of the transects are set out in **Table 6**. The predicted contributions are below the screening criteria for both nutrient and acid nitrogen deposition; therefore, the impacts on nutrient and acid nitrogen deposition would not be significant. As the

effect due to road traffic emissions decreases with distance from source, there would not be significant impacts further along the transect.

Table 6: Predicted Road Contribution to Nutrient and Acid Nitrogen Deposition in 2021

Receptor	Predicted Road Contribution of Nutrient N (kg/ha/yr)		% of Nutrient N Screening Criterion ^a		Predicted Road Contribution of Acid N (keq/ha/yr)		% of Acid N Screening Criterion ^a	
	EFT	CURED	EFT	CURED	EFT	CURED	EFT	CURED
T1_0	0.00	0.00	0	0	0.000	0.000	0	0
T1_1	0.00	0.01	0	0	0.000	0.000	0	0
T1_2	0.00	0.01	0	0	0.000	0.000	0	0
T2_0	0.02	0.02	0	0	0.002	0.002	0	0
T2_1	0.02	0.02	0	0	0.002	0.002	0	0
T2_2	0.02	0.02	0	0	0.001	0.002	0	0
T3_0	0.04	0.04	1	1	0.003	0.003	0	0
T3_1	0.04	0.04	1	1	0.003	0.003	0	0
T3_2	0.03	0.03	1	1	0.002	0.002	0	0
T4_0	0.00	0.00	0	0	0.000	0.000	0	0
T4_1	0.00	0.00	0	0	0.000	0.000	0	0
T4_2	0.00	0.00	0	0	0.000	0.000	0	0
Screening Criterion			1		-		1	

5.2. Impact Assessment

NO_x

- 5.2.1 Predicted total annual mean NO_x concentrations at receptors where the screening criterion has been exceeded assuming EFT and CURED emissions are set out in **Table 7** and **Table 8** respectively. Predicted total NO_x concentrations are well below the 30µg/m³ assessment criterion both without and with the proposed development. Total NO_x concentrations with the development are predicted to be 77-80% of the assessment criterion at the SAC boundary and 72-74% of the assessment criterion 1m into the SAC. Given that total annual mean NO_x concentrations remain well below the assessment criterion, the impacts are considered to be negligible.

Table 7: Predicted 2021 Nitrogen Oxides Impacts Assuming EFT Emissions

Receptor	Predicted Total NOx ($\mu\text{g}/\text{m}^3$)		Impact		
	Without Development	With Development	Increase ($\mu\text{g}/\text{m}^3$)	Increase as Percentage of Assessment Criterion (%)	With Development Concentration as Percentage of Assessment Criterion (%)
T3_0	22.7	23.2	0.5	2	77
T3_1	21.0	21.5	0.5	2	72
Assessment Criterion	30		-		

a Exceedences of the assessment criterion are shown in bold.

Table 8: Predicted 2021 Nitrogen Oxides Impacts Assuming CURED Emissions

Receptor	Predicted Total NOx ($\mu\text{g}/\text{m}^3$)		Impact		
	Without Development	With Development	Increase ($\mu\text{g}/\text{m}^3$)	Increase as Percentage of Assessment Criterion (%)	With Development Concentration as Percentage of Assessment Criterion (%)
T3_0	23.3	23.9	0.6	2	80
T3_1	21.6	22.1	0.5	2	74
Assessment Criterion	30		-		

a Exceedences of the assessment criterion are shown in bold.

6 Mitigation

- 6.1.1 The assessment has demonstrated that the scheme will have a negligible impact on the Crymlyn Bog SAC. Mitigation measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation. It is not considered appropriate to propose further mitigation measures for this scheme.

7 Residual Impacts

7.1.1 The residual impacts will be the same as those identified in **Section 5**.

8 Conclusions

- 8.1.1 The proposed development has been found to have an insignificant effect on nutrient and acid nitrogen deposition at the Crymlyn Bog SAC. The effect on annual mean NO_x concentrations has been found to be insignificant across almost all of the Crymlyn Bog SAC; however, there may be an effect within 1m of the SAC boundary adjacent to the B4290 to the north of the application site, where the SAC boundary is immediately adjacent to the B4290.
- 8.1.2 The area adjacent to the road is likely to have already been affected during road construction and due to ongoing management and traffic effects. Also, it is highly unlikely that any qualifying features from the SAC are present within this area.
- 8.1.3 The impact of the proposed development on the Crymlyn Bog SAC is judged to be insignificant. This conclusion is based on:
- The contribution to nutrient and acid nitrogen deposition due to the development traffic being below the screening criteria for potentially significant effects;
 - The contribution to annual mean NO_x concentrations due to the development traffic being below the screening criteria for potentially significant effects across almost all of the SAC;
 - Where there is a risk of potential effects on annual mean NO_x concentrations, within 1m of the SAC boundary immediately adjacent to the B4290, total NO_x concentrations remain below the assessment criterion; and
 - There are unlikely to be any qualifying features within the 1m strip adjacent to the B4290.
- 8.1.4 The conclusion of an insignificant impact should be confirmed by a qualified ecologist with full knowledge of the condition of the Crymlyn Bog SAC within the 1m strip adjacent to the B4290.
- 8.1.5 There should be no constraints to the proposed development with regard to the impact on the Crymlyn Bog SAC due to traffic emissions as the proposed development is consistent with the relevant parts of:
- PPW 10; and
 - Policies SP16 and EN8 of the Neath Port Talbot Local Development Plan.

9 References

- APIS, 2020. *APIS*. [Online]
Available at: www.apis.ac.uk
- AQC, 2018a. Development of the CURED V3A Emissions Model. January.
- AQC, 2018b. *Deriving Background Concentrations of NO_x and NO₂ for Use with 'CURED V3A'*. s.l.:s.n.
- AQC, 2019. *Initial Comparison of EFT v9 with EFT v8 and CURED v3A*. s.l.:s.n.
- Carslaw, D. et al., 2011. *Trends in NO_x and NO₂ Emissions and Ambient Measurements in the UK*. s.l.:Defra.
- Defra & EA, 2016. *Air Emissions Risk Assessment for your Environmental Permit*. [Online]
Available at: <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit>
- Defra, 2019. *Clean Air Strategy 2019*. s.l.:s.n.
- Defra, 2020. *Local Air Quality Management (LAQM) Support*. [Online]
Available at: <http://laqm.defra.gov.uk/>
- DfT, 2019a. *Traffic Counts*. [Online]
Available at: <http://www.dft.gov.uk/traffic-counts/>
- DfT, 2019b. *Road Traffic Statistics*. [Online]
Available at: <https://www.gov.uk/government/collections/road-traffic-statistics>
- Environment Agency, 2011. *AQTAG06 Technical Guidance on Detailed Modelling Approach for an Appropriate Assessment for Emissions to Air*. s.l.:s.n.
- European Parliament, Council of the European Union, 2008. *Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe*. s.l.:s.n.
- HMSO, 2010a. *The Air Quality Standards (Wales) Regulations (No. 1433)*. s.l.:s.n.
- HMSO, 2010b. *The Conservation of Habitats and Species Regulations 2010 (No. 490)*. s.l.:s.n.
- IAQM, 2016. *Position Statement - Effect of Air Quality Impacts on Sensitive Habitats*. s.l.:s.n.
- IAQM, 2019. *A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites*. s.l.:s.n.
- Neath Port Talbot County Borough Council, 2016. *Local Development Plan (2011-2026)*. s.l.:s.n.

The European Parliament and the Council of the European Union, 2009. *Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds.* s.l.:s.n.

Welsh Government, 2018. *Planning Policy Wales Edition 10.* s.l.:s.n.

WHO, 2000. *Air Quality Guidelines for Europe Second Edition.* s.l.:s.n.

10 Glossary

AADT	Annual Average Daily Traffic
ADMS-Roads	Atmospheric Dispersion Modelling System
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EFT	Emissions Factor Toolkit
EPUK	Environmental Protection UK
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LDV	Light Duty Vehicles (<3.5 tonnes)
µg/m³	Microgrammes per cubic metre
NAEI	National Atmospheric Emissions Inventory
NO	Nitric oxide
NO₂	Nitrogen dioxide
NO_x	Nitrogen oxides (taken to be NO ₂ + NO)
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal

11 Appendices

A1 Modelling Methodology	21
A2 Professional Experience.....	29

A1 Modelling Methodology

A1.1. Model Inputs

Receptors

A1.1.1 The coordinates of the receptors on each transect are shown in **Table A1**.

Table A1: Location of Transect Receptors

Receptor	OS Grid Coordinates		
	x	y	z
T1_0	271145.41	193860.7	0
T1_1	271144.62	193860.08	0
T1_2	271143.81	193859.47	0
T1_3	271143.03	193858.84	0
T1_4	271142.25	193858.23	0
T1_5	271141.47	193857.62	0
T1_6	271140.69	193857	0
T1_7	271139.88	193856.39	0
T1_8	271139.09	193855.77	0
T1_9	271138.31	193855.16	0
T1_10	271137.53	193854.53	0
T1_11	271136.75	193853.92	0
T1_12	271135.94	193853.3	0
T2_0	271190.5	193891.91	0
T2_1	271191.25	193892.56	0
T2_2	271192.03	193893.22	0
T2_3	271192.78	193893.88	0
T2_4	271193.53	193894.53	0
T2_5	271194.28	193895.19	0
T2_6	271195.03	193895.84	0
T2_7	271195.78	193896.5	0
T2_8	271196.56	193897.16	0
T2_9	271197.31	193897.81	0
T2_10	271198.06	193898.47	0
T2_11	271198.81	193899.11	0
T2_12	271199.56	193899.77	0
T2_13	271200.31	193900.42	0
T2_14	271201.09	193901.08	0
T2_15	271201.84	193901.73	0
T2_16	271202.59	193902.39	0
T2_17	271203.34	193903.05	0
T2_18	271204.09	193903.7	0

Receptor	OS Grid Coordinates		
	x	y	z
T2_19	271204.84	193904.36	0
T2_20	271205.62	193905.02	0
T2_21	271206.38	193905.67	0
T2_22	271207.12	193906.33	0
T2_23	271207.88	193906.98	0
T2_24	271208.62	193907.64	0
T2_25	271209.41	193908.3	0
T2_26	271210.16	193908.94	0
T2_27	271210.91	193909.59	0
T2_28	271211.66	193910.25	0
T2_29	271212.41	193910.91	0
T2_30	271213.16	193911.56	0
T3_0	271343.62	194154.11	0
T3_1	271344.34	194153.44	0
T3_2	271345.09	194152.75	0
T3_3	271345.81	194152.06	0
T3_4	271346.56	194151.39	0
T3_5	271347.28	194150.7	0
T3_6	271348	194150.02	0
T3_7	271348.75	194149.34	0
T3_8	271349.47	194148.66	0
T3_9	271350.22	194147.97	0
T3_10	271350.94	194147.3	0
T3_11	271351.66	194146.61	0
T3_12	271352.41	194145.92	0
T3_13	271353.12	194145.25	0
T3_14	271353.88	194144.56	0
T3_15	271354.59	194143.89	0
T3_16	271355.31	194143.2	0
T3_17	271356.06	194142.52	0
T3_18	271356.78	194141.84	0
T3_19	271357.53	194141.16	0
T3_20	271358.25	194140.47	0
T3_21	271358.97	194139.8	0
T3_22	271359.72	194139.11	0
T3_23	271360.44	194138.42	0
T3_24	271361.19	194137.75	0
T3_25	271361.91	194137.06	0
T3_26	271362.62	194136.38	0

Receptor	OS Grid Coordinates		
	x	y	z
T3_27	271363.38	194135.7	0
T3_28	271364.09	194135.02	0
T3_29	271364.84	194134.33	0
T3_30	271365.56	194133.66	0
T4_0	268201.5	193197.25	0
T4_1	268201.53	193198.25	0
T4_2	268201.56	193199.25	0
T4_3	268201.59	193200.25	0
T4_4	268201.62	193201.25	0
T4_5	268201.66	193202.25	0
T4_6	268201.72	193203.25	0
T4_7	268201.75	193204.25	0
T4_8	268201.78	193205.25	0
T4_9	268201.81	193206.25	0
T4_10	268201.84	193207.25	0

Traffic Data

- A1.1.2 The AADT flows and vehicle fleet composition data for the roads affected by the proposed development have been provided by Local Transport Projects, the transport consultants for the scheme. The AADT flows and the vehicle fleet composition data for the model verification have been determined using data from the interactive web-based map provided by the Department for Transport (DfT) (DfT, 2019a). Traffic speeds have been estimated based on the speed limits, reduced to 20km/h within 25m of a junction stop line. The traffic data are shown in **Table A2**. The modelled road network for the assessment is shown in **Figure 2** and the modelled road network for the model verification is shown in **Figure 3**. Diurnal flow profiles for the traffic have been derived from the national diurnal profiles published by the DfT (DfT, 2019b).
- A1.1.3 The A474 for the verification model has been included as a street canyon using the ADMS Roads advanced street canyon option. The canyon has been modelled with a width of 23.5m and a height of 6m.

Emissions

- A1.1.4 Emissions have been calculated using the most recent version of the Emissions Factor Toolkit (EFT) v9.0 (Defra, 2020). The traffic data were entered into the EFT in order to calculate a combined emission rate for each of the road links in the modelled network.

Meteorological Data

A1.1.5 The model has been run using the full year of meteorological data that corresponds with the most recent set of published NO₂ monitoring data (2018). The meteorological data have been taken from the monitoring station located at Cardiff Airport, which is considered suitable for the area.

Table A2: Summary of Traffic Data used in the Assessment

Road Link	AADT			% HDV ^a		
	2018	2021 without dev.	2021 with dev.	2018	2021 without dev.	2021 with dev.
B4290 N	6,648	6,814	7,107	3.2%	3.2%	3.1%
B4290 S	6,648	6,814	7,145	3.2%	3.2%	3.6%
A483	41,455	42,493	42,684	3.4%	3.4%	3.4%
A474	13,407	n/a	na	1.7	n/a	n/a

a HDV = heavy duty vehicle. (>3.5t, i.e. buses + HGV)

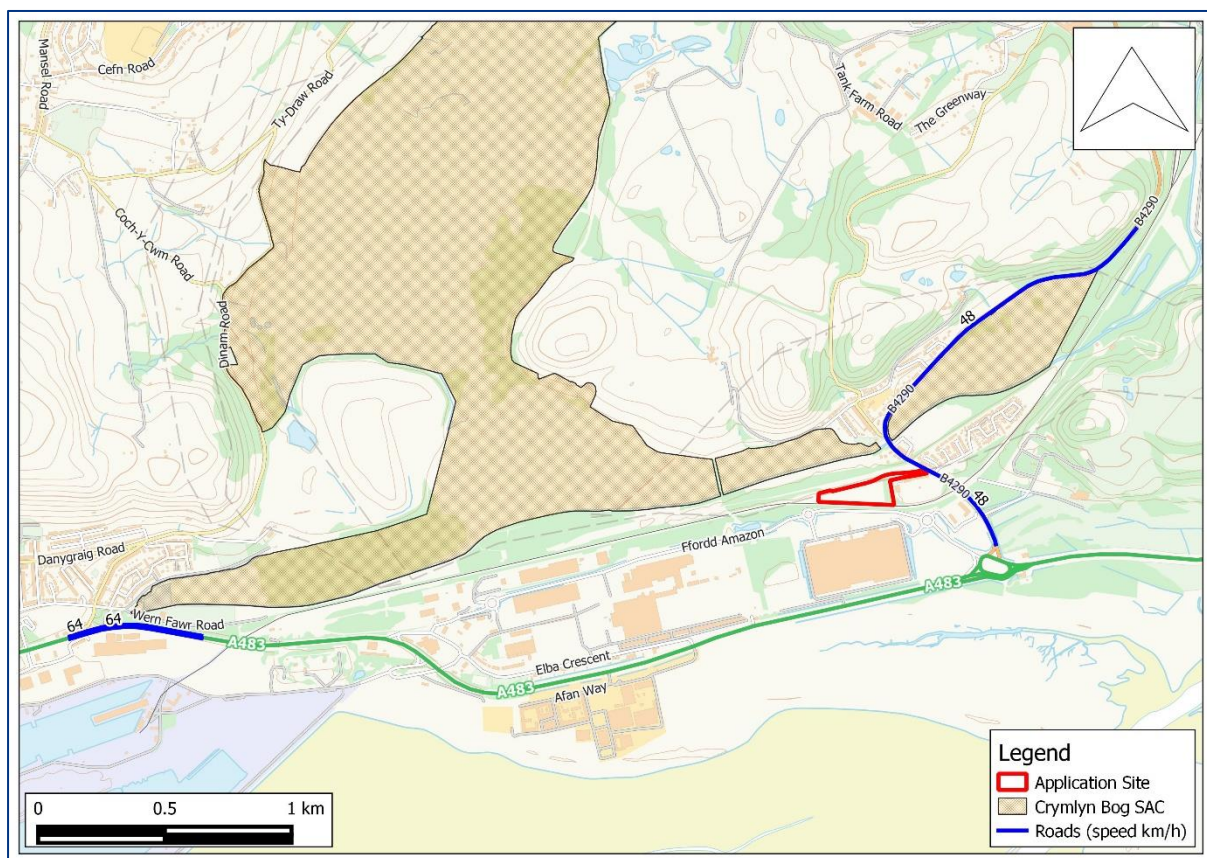


Figure 2: Modelled Roads - Assessment

Contains Ordnance Survey data © Crown copyright and database right 2020



A1.2.1 Background concentrations have been derived from those published by Defra (Defra, 2020). These cover the whole country on a 1 km by 1 km grid and are published for each year from 2017 to 2030. The current maps have been verified against measurements undertaken during 2017. The background concentrations for the sensitivity analysis have been adjusted using the CURED methodology (AQC, 2018b).

A1.3.1 The verification process seeks to minimise uncertainties associated with the air quality model by comparing the model output with locally measured concentrations. The verification methodology is described below.

A1.3.2 Most NO₂ is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions of nitrogen oxides (NO_x = NO + NO₂). The model has been run to predict the 2018 annual mean NO_x concentrations at diffusion tube monitoring sites 7, 8, 9, 10, and 11 located in Briton Ferry, approximately 3km to the east of the application site (as shown in **Figure 3**).

- A1.3.3 The model output of road-NO_x has been compared with the 'measured' road-NO_x, calculated from the measured annual mean NO₂ concentrations and the background concentrations using the NO_x from NO₂ calculator v7.1 published by Defra (Defra, 2020).
- A1.3.4 The slope of the best-fit line between the 'measured' road-NO_x contribution and the model derived road-NO_x contribution, forced through zero, has been used to determine the adjustment factor (**Figure 4**). The adjustment factor of 2.1 has been applied to the modelled road-NO_x concentration for each receptor to provide adjusted modelled road-NO_x concentrations. The NO_x to NO₂ calculator has then been used to determine total NO₂ concentrations from the adjusted modelled road-NO_x concentrations and the background NO₂ concentrations.
- A1.3.5 A comparison of the final adjusted modelled total NO₂ at each monitoring site to the measured total NO₂ shows close agreement (**Figure 5**).
- A1.3.6 The results imply that the model has under-predicted the road-NO_x contribution. This is a common experience with this and most other models. An evaluation of the model performance using statistical methods is shown in **Table A3**.

A1.4. Model Post-processing

NO₂

- A1.4.1 The NO_x to NO₂ calculator v7.1 published by Defra has been used to convert the modelled, verified road-NO_x output for each receptor to road-NO₂.

Deposition Fluxes

- A1.4.2 Deposition has been calculated from the predicted ambient NO₂ concentration using the deposition velocity for grassland of 0.0015 m/s published by the Environment Agency (Environment Agency, 2011).
- A1.4.3 The deposition velocity multiplied by the predicted concentration (µg/m³) gives the deposition flux (µg/m²/s). A factor of 96 was then used to calculate the nutrient nitrogen deposition due to NO₂ in units of kg/ha/yr (Environment Agency, 2011).
- A1.4.4 The acid nitrogen deposition has been calculated from the nutrient nitrogen deposition using a factor of 0.071428 (Environment Agency, 2011).
- A1.4.5 Wet deposition has not been assessed as it is not considered to be significant within the distances covered by the study area (Environment Agency, 2011).

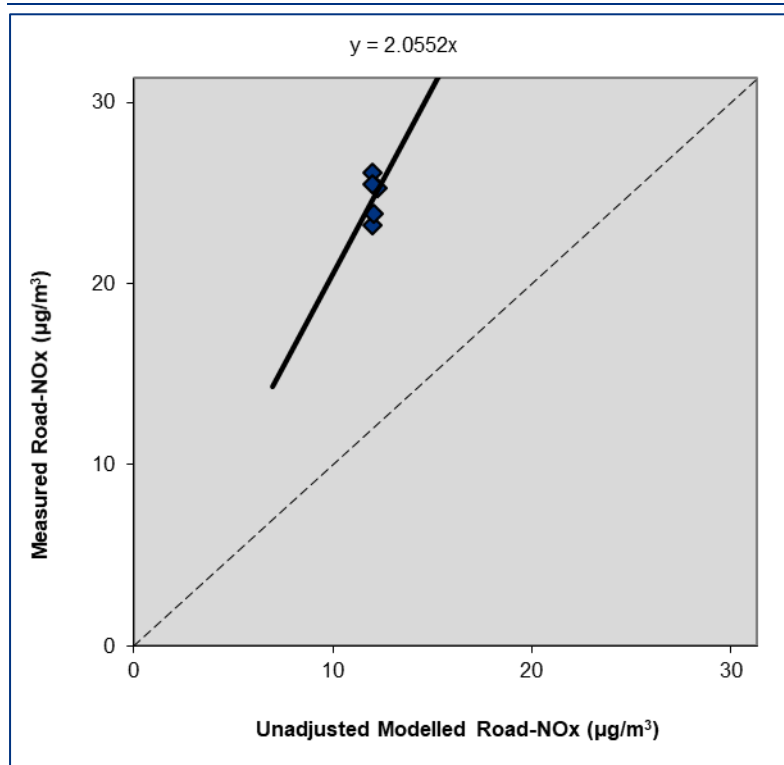


Figure 4: Comparison of Measured Road NO_x to Unadjusted Modelled Road NO_x Concentrations.

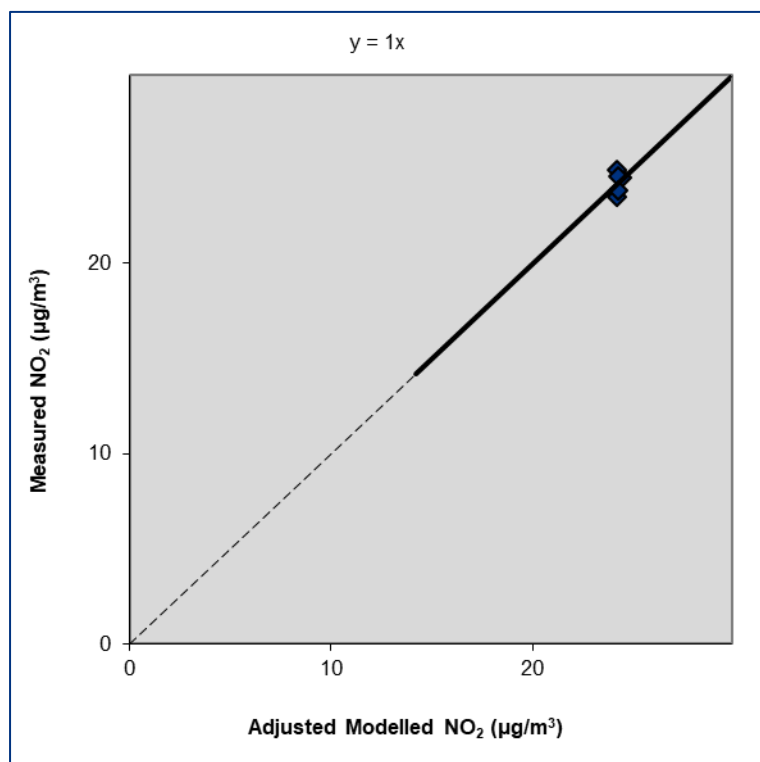


Figure 5: Comparison of Measured Total NO₂ to Primary Adjusted Modelled Total NO₂ Concentrations.

Table A3: Evaluation of Model Performance

Statistical Parameter	Description	Values		
		Before Verification (Figure 4)	After Verification (Figure 5)	Ideal
Correlation coefficient	Linear relationship between predicted and observed data. Less useful for small datasets as single high/low values can have a large effect.	0.2	0.2	1.00
Fractional bias	Identifies systematic tendency to over/under predict (negative = over-predict, positive = under-predict).	0.69	0.00	0.00
Root mean square error (RMSE)	Average error of the model ($\mu\text{g}/\text{m}^3$). Ideally within 10% of the annual mean NO_2 objective, i.e. $4 \mu\text{g}/\text{m}^3$; however, within 25% acceptable, i.e. $10 \mu\text{g}/\text{m}^3$.	12.77	0.51	0.00

A2 Professional Experience

Bob Thomas, BSc (Hons) PgDip MSc MEnvSc MIAQM CSci

Bob Thomas is a Director at AQA, with over twelve years' experience in the field of air quality management and assessment. He has carried out air quality assessments for a wide range of developments, including residential, commercial, industrial, minerals and waste developments. He has been responsible for air quality projects that include ambient air quality monitoring of nitrogen dioxide, dust and PM₁₀, the assessment of nuisance odours and dust, and the preparation of Review and Assessment reports for local authorities. He has extensive dispersion modelling experience for road traffic, energy centre and industrial sources, and has completed many stand-alone reports and chapters for inclusion within an Environmental Statement. Bob has worked with a variety of clients to provide expert air quality services and advice, including local authorities, planners, developers, architects and process operators, and has provided expert witness services at public inquiry. He is a Chartered Scientist, a Member of the Institute of Air Quality Management and a Member of the Institution of Environmental Sciences.

A full CV for Bob Thomas is available at <http://aqassessments.co.uk/about>