MILLER GOODALL
ACOUSTICS AND AIR QUALITY

ANC | ACOUSTICS & NOISE CONSULTANTS

AIR QUALITY ASSESSMENT

on behalf of

COPELAND BOROUGH COUNCIL

for

LECONFIELD INDUSTRIAL ESTATE

REPORT DATE: 28TH FEBRUARY 2022

REPORT NUMBER: 102682-2

Miller Goodall Ltd
Ground Floor
Ashworth House
Deakins Business Park
Blackburn Road
Egerton
Bolton
Lancashire
BL7 9RP

Tel: 01204 596166

www.millergoodall.co.uk

Company registration number 5201673

Summary

This air quality report has been prepared to accompany a planning application for a proposed commercial development at Leconfield Industrial Estate. It assesses the potential changes in air quality due to the construction and operation of the proposed development and whether these potential changes would significantly alter air quality.

The assessment of dust soiling and human health impacts during the construction phase of the development results in the proposal of dust mitigation measures. The implementation of these will ensure that residual dust impacts during the construction phase are not significant.

Concentrations of NO_2 and PM_{10} are likely to be below their respective long and short-term objectives at the proposed development site which is therefore considered suitable for commercial use with regards to air quality. Concentrations of $PM_{2.5}$ are expected to be below the annual mean target.

The proposed development is not expected to have a significant impact on local air quality.

There is, therefore, no reason for this application to be refused on the grounds of air quality.

Prepared By	Philip Walton	Reviewed By	Unam Ejaz
Signed		Signed	
Date	28th February 2022	Date	28th February 2022

Record of changes

Version	Date	Change	Initials
1	28th February 2022	First issue	PW
2	2nd March 2022	Text revision of car parking numbers at paragraph 3.4	PW

Contents

1 Introduction........ 1
2 Site Description........ 1
3 Proposed Development........ 2
4 Policy Context........ 2
4.1 Air Quality Objectives........ 2
5 Methodology........ 3
5.1 Data Sources........ 3
5.2 Consultation........ 4
5.3 IAQM Construction Dust Assessment........ 5
5.4 Road Traffic Emissions Assessment........ 5
5.5 Ecological Assessment........ 9
6 Baseline Air Quality........ 10
6.1 Local Air Quality........ 10
6.2 Air Quality Monitoring........ 10
6.3 Background Concentrations........ 11
7 Construction Dust Impact Assessment........ 12
7.1 Step 1 – Requirement for a Detailed Assessment........ 12
7.2 Step 2 – Assess the Risk of Dust Impacts........ 12
7.3 Step 3 – Site-Specific Mitigation........ 14
7.4 Step 4 – Determine Significant Effects........ 14
8 Road Traffic Assessment........ 14
8.1 Baseline Assessment........ 14
8.2 Impact Assessment........ 15
9 Mitigation........ 19
10 Summary of Impacts and Conclusion........ 19
APPENDICES........ 21
Glossary of Terms........ 44

1 Introduction

1.1 Miller Goodall Ltd has been instructed to prepare an air quality assessment to accompany a planning application for a proposed light industrial-led mixed-use development on the existing Leconfield Industrial Estate and adjacent land parcels to the north and east. The site lies within the administrative boundary of Copeland Borough Council (CBC).

1.2 The report provides a review of the existing air quality in proximity to the proposed development site and assesses the potential impact of the proposed development on local air quality following Local Air Quality Management Technical Guidance[1] and EPUK and IAQM guidance[2].

1.3 The report provides an assessment of the potential air quality impacts associated with the construction and operational phases of the proposed development. The potential air quality changes at existing sensitive receptors adjacent to the site and roads subject to increased vehicle generation from the development are assessed. The suitability of the site for the intended use is also assessed.

1.4 The main pollutants of health concern from road traffic exhaust releases are nitrogen dioxide (NO_2) and fine particulates, normally assessed as the fraction of airborne particles of mean aerodynamic diameter less than ten micrometres (PM_{10}) and 2.5 micrometres ($PM_{2.5}$) since these pollutants are most likely to approach their respective air quality objectives in proximity to major roads and congested areas. This assessment has therefore focused on the impact of the proposed development on concentrations of NO_2, PM_{10} and $PM_{2.5}$.

2 Site Description

2.1 The site is located in Cleator Moor, a small town in the western part of the Lake District. The site is located approximately 5 km to the south east of Whitehaven.

2.2 The development site is divided into three areas of development:

- Area 1 'Leconfield Industrial Estate' – located in the central and western area of the site.
- Area 2 'Land to the east towards Heather Bank and Cleator Moor Medical Centre' or 'Northern Growth Area'.
- Area 3 'Land to the north, located between Bowthorn Road and Birks Road'.

2.3 Area 1 is occupied by existing building of Leconfield Industrial Estate. Areas 2 and 3 are currently open land.

2.4 In relation to Area 1. Existing residential dwellings and Area 3 border Area 1 to the north. Area 2 borders Area 1 to the east. Leconfield Street, residential dwellings and commercial uses border Area 1 to the south. Residential dwellings and Bowthorn Road border Area 1 to the west.

---

[1] Department for the Environment Food and Rural Affairs (2018) '*Local Air Quality Management Technical Guidance Document LAQM.TG (16)*', London: Defra.

[2] EPUK and IAQM (January 2017) Land Use Planning and Development Control: Planning for Air Quality (v1.2)

2.5 In relation to Area 2. Area 3 borders Area 2 to the north. Existing residential dwellings, an allotment and the Cleator Moor football grounds border Area 2 to the east. Leconfield Street and woodland border Area 2 to the south. Area 1 borders Area 2 to the west.

2.6 In relation to Area 3. Open land borders Area 3 to the north and east. Area 1 and 2 border Area 3 to the south. Existing residential dwellings and Bowthorn Road border Area 3 to the west.

2.7 The site location and identification of the three Area's is shown in **Appendix A**.

2.8 The nearest Air Quality Management Area (AQMA) to the site is located approximately 54 km to the east of the site in Kendal. Copeland Borough Council currently does not have any declared AQMAs.

3 Proposed Development

3.1 The development comprises the development of three areas to create the Cleaton Moor Innovation Quarter; a science park specialising in nuclear and clean energy business and research. The proposal description is as follows:

"Provision of up to 44,350 sqm (GEA) floorspace for light industrial, general industrial and storage & distribution (Class E(g(ii&iii)), B2, B8 uses) and Student Accommodation (Sui Generis) with ancillary food/beverage (Class E(b)), education and community facility uses (Class F1(a & e)) with internal accesses, parking, service yards, attenuation basins, electricity substations and associated infrastructure, earthworks and landscaping."

3.2 The sui generis use (student accommodation) is located in Area 2.

3.3 The existing buildings in Area 1 will be retained and refurbished as part of the development. No demolition is required. The new development will include 1,147 car parking spaces and several new buildings in Areas 1, 2 and 3 at heights between 9 to 15 metres. Area's 1 and 2 will be accessible from Leconfield Street using the existing vehicle access. Area 3 will include two new site accesses at Bowthorn Road and Birks Road.

3.4 The existing commercial uses in Area 1 are served by 196 existing car parking spaces. The parking numbers would be retained as part of the new development. Consequently, the actual number of new car parking spaces to be provided is 958.

3.5 A site layout is provided in **Appendix B**.

4 Policy Context

4.1 Air Quality Objectives

4.1.1 The standards and objectives relevant to the LAQM framework have been prescribed through the Air Quality (England) Regulations (2000) and the Air Quality (England) (Amendment) Regulations 2002; the Air Quality Standards Regulations 2010 set out the combined Daughter Directive limit values and interim targets for Member State compliance.

4.1.2 The United Kingdom left the European Union on 31st January 2020 and is no longer a member state. However, the current framework of air quality legislation was converted into domestic law through the European Union (Withdrawal) Act 2018[3].

4.1.3 The relevant air quality standards and objectives are presented in **Table 1**. Pollutant standards relate to ambient pollutant concentrations in air, set on the basis of medical and scientific evidence of how each pollutant affects human health.

Table 1: Air Quality Strategy Objectives (England) for the Purposes of Local Air Quality Management

Pollutant	Air Quality Objective	
	Concentration	Measured As
Nitrogen dioxide (NO_2)	200 µg/m^3	1-hour mean not to be exceeded more than 18 times per year
	40 µg/m^3	Annual mean
Particles (PM_{10})	50 µg/m^3	24-hour mean not to be exceeded more than 35 per year
	40 µg/m^3	Annual mean
Particles ($PM_{2.5}$)	25 µg/m^3	Annual mean (target)

4.1.4 Where an air quality objective is unlikely to be met by the relevant deadline, local authorities must designate those areas as Air Quality Management Areas (AQMAs) and take action to work towards meeting the objectives. Following the designation of an AQMA, local authorities are required to develop an Air Quality Action Plan (AQAP) to work towards meeting the objectives and to improve air quality locally.

4.1.5 Possible exceedances of air quality objectives are generally assessed in relation to those locations where members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the objective.

4.1.6 As the development is for commercial use, the annual mean air quality objectives do not apply; however, the short-term objectives still apply[1].

5 Methodology

5.1 Data Sources

5.1.1 The air quality assessment has been undertaken and prepared with reference to information from several sources, as detailed in **Table 2**.

[3] UK Parliament (2018): http://www.legislation.gov.uk/ukpga/2018/16/contents/enacted

Table 2: Key Information Sources

Data Source	Reference
Copeland Borough Council (CBC)	CBC (2021) 2021 *Air Quality Annual Status Report*
Institute of Air Quality Management (IAQM)	IAQM (2014) *Assessment of Dust from Demolition and Construction* (v1.1)
Department for Environment Food and Rural Affairs (Defra)	Defra *Local Air Quality Management Technical Guidance TG(16), February 2018*
Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM)	EPUK and IAQM (January 2017) *Land Use Planning and Development Control: Planning for Air Quality (v1.2)*
Ministry of Housing, Communities & Local Government	Planning Practice Guidance: Air Quality, November 2019 National Planning Policy Framework (NPPF), July 2021
Defra's LAQM Support Tools	Local Air Quality Management 1 km x 1 km grid background pollutant maps NOx to NO_2 Calculator
Tetra Tech	Traffic Data
Air Pollution Services	Meteorological data from St Bees Head No. 2 for the year 2019

5.2 Consultation

5.2.1 The proposed air quality assessment methodology was sent to the Environmental Health Department of CBC[4] by email on 1st November 2021.

5.2.2 At the time of writing no response had been received. The air quality assessment has been prepared in accordance with the most recent legislation, guidance and best practice. Model verification has been undertaken to limit model uncertainty.

5.2.3 A construction phase assessment and an assessment of road traffic emissions for the operational phase was proposed to be undertaken to assess air quality changes at existing sensitive receptors and the site suitability in respects to air quality for future users. The types of assessments to be undertaken, meteorological data to be used, assessment roads, approach to verification and baseline data sources are detailed throughout this report and appendices.

[4] Email Miller Goodall Ltd. to CBC, 1st November 2021.

5.3 IAQM Construction Dust Assessment

5.3.1 The IAQM has produced guidance[5] on the assessment of air quality impacts arising from dust associated with construction activities and provides a methodology by which to complete such assessments. The IAQM methodology provides a risk assessment structure to determine the likely impact of the development on nearby receptor locations and recommends mitigation measures that should be implemented to reduce any such impact. The methodology for the assessment is shown in **Appendix C**. The study area in relation to dust and the zones of interest used within the assessment (<20 m, 20 m – 50 m and 50 – 100 m from the site) are shown in **Appendix D**. The dust assessment informed the recommended mitigation outlined in **Appendix E**.

5.4 Road Traffic Emissions Assessment

Air Dispersion Model

5.4.1 The validated Atmospheric Dispersion Modelling System for Roads (ADMS-Roads) v5.0.0.1 was used to assess the local air quality impact of development-generated vehicle exhaust emissions, on concentrations of NO_2, PM_{10} and $PM_{2.5}$ at existing receptors located adjacent to the assessed road network. A qualitative comparison to the short-term air quality objectives has been undertaken as future commercial sensitive receptors at the site would not be exposed to the annual mean air quality objective.

Assessment Scenarios

5.4.2 The assessment considered the following scenarios:

- Scenario 1: 2019 - base year;
- Scenario 2: 2032 - opening year 'without development'; and
- Scenario 3: 2032 - opening year 'with development'.

5.4.3 The proposed opening year is expected to be 2032, which is representative of the year when full build out and maximum vehicle generation is expected to occur. The maximum year that can be input into the Defra air quality tools (Emission Factor Toolkit, background maps, NOx to NO_2 calculator) is 2030. Therefore, 2032 traffic data has been used in the assessment and calculated based on the 2030 air quality inputs.

Traffic Data

5.4.4 The spatial scope for the assessment focused on those routes affected by the proposed development. The traffic data used in the assessment and a map of the road network modelled is provided in **Appendix F**. There are no committed developments which have required inclusion and assessment, as identified by the planning consultant, Avison Young, through contact with CBC.

5.4.5 Vehicles within the study area have been modelled at posted speed limits apart from the approach to junctions where queuing traffic sections are included in the model at 20 kph where appropriate following Defra guidance. Queue zones and speeds were selected based on best practice and the traffic queuing information identified on Google Maps.

[5] IAQM "Assessment of dust from demolition and construction" v1.1 2014

5.4.6 LAQM.TG (16) recommends temporal variations to be considered within air quality modelling. Therefore, a 7-day profile based on the Department for Transport's statistics was used within the model.

Meteorological Data

5.4.7 Meteorological data for 2019 from the St Bees Head No. 2 recording station was used in the ADMS-Roads model. This is the most representative recording station for the development site.

5.4.8 The wind rose for 2019 from St Bees Head No. 2 recording station is provided in **Appendix F**. Dispersion values for the site and meteorological station have been used. The factors applied for surface roughness (m) and the minimum monin-obukhov length (m) are outlined in **Appendix F**.

Sensitive Receptors

5.4.9 15 existing sensitive receptor locations were selected based on their proximity to road links affected by the proposed development, where the potential effect of development-related traffic emissions on local air pollution would be most significant.

5.4.10 Predicted changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations, as a result of development-generated traffic, were calculated at these locations. The ESR receptor locations are detailed in **Table 3** and shown in **Appendix A**.

Table 3: Existing Sensitive Receptor Locations

Receptor	Grid Ref	
ESR 1	299021	517205
ESR 2	299247	517088
ESR 3	299290	517086
ESR 4	300380	516245
ESR 5	300401	516170
ESR 6	301150	515607
ESR 7	301178	515557
ESR 8	301444	515405
ESR 9	301545	515313
ESR 10	301560	515323
ESR 11	302027	515059
ESR 12	302759	514582
ESR 13	302750	514566
ESR 14	302785	514571
ESR 15	302208	514165

5.4.11 The development includes student accommodation in Area 2. A proposed sensitive receptor has been selected in the building footprint of the proposed building, closest to the main sources of pollution (south east corner of the building). Area 2 is located the furthest, of the Area's, from the main pollutant sources.

5.4.12 The receptor has been modelled at the ground floor only. If pollutant concentrations are below the air quality objectives on the ground level, then concentrations are also likely to be below the objectives on the upper floors too. This is due to pollution decreasing with height and distance from the pollutant source. Due to the site location of PSR 1, it is considered that a detailed floor-by-floor modelling exercise is not required; as identified by the predicted modelled results for the ground floor.

5.4.13 NO_2, PM_{10} and $PM_{2.5}$ concentrations were calculated at this location to determine whether future site users may be exposed to elevated pollutant levels. The PSR locations are presented in **Table 4** and **Appendix A**.

Table 4: **Proposed Sensitive Receptor Locations**

Receptor	Grid Ref	
PSR 1	301847	515367

5.4.14 Commercial users would not be exposed to the annual mean or 24-hour mean air quality objectives. Hotel users may be exposed to the 24-hour mean. Defra LAQM.TG(16) provides a qualitative screening approach to determine whether there is a risk of exceedance of the one-hour NO_2 air quality objective. If the ambient NO_2 annual mean concentration is above 60 µg/m^3 there is a risk that the one-hour objective (200 µg/m^3) may be exceeded. A qualitative comparison to this screening method has been undertaken for this assessment.

Conversion of NOx to NO_2

5.4.15 Oxides of nitrogen (NO_x) concentrations were predicted using the ADMS-Roads model. The modelled road contribution of NO_x at the identified receptor locations was then converted to NO_2 using the NO_x to NO_2 calculator (v8.1, 2020)[6] following Defra guidance.

Emission Factors

5.4.16 Defra's Emission Factor Toolkit (EFT)[7] (V10.1, 2020) was used within the ADMS-Roads model to predict emissions from road vehicles for all scenarios.

5.4.17 Defra released EFT v11.0 in November 2021. However, this version update does not make any changes to the emissions below 2030, or alters v10.1. The changes relate to providing inputs from 2031 to 2050, however, these are specific to CO_2 inputs and assessments. None of the Defra tools have been updated beyond 2030.

Background Concentrations

5.4.18 The ADMS model requires the derivation of background pollutant concentration data that are factored to the year of assessment, to which the contributions from the assessed roads are added.

[6] Background maps. Tools. Local Air Quality Management Support - Defra, UK

[7] Emissions Factors Toolkit (defra.gov.uk)

5.4.19 CBC operate diffusion tube N3, an urban background air quality monitor. Background concentrations of NO_x NO_2 are used from this monitor and applied to all sensitive receptors.

5.4.20 Background concentrations of PM_{10} and $PM_{2.5}$ concentrations were obtained from the Defra LAQM support tools for the 1 km x 1 km grid squares covering the proposed development site and receptor locations for the years of assessment (2019 and 2032).

Model Verification

5.4.21 Model verification is the process of adjusting model outputs to improve the consistency of modelling results with respect to available monitored data.

5.4.22 Verification has been undertaken for NO_2. The verification procedure considers diffusion tubes N5, which are located within the study area. Diffusion tube N5 is listed as an urban background classification in the 2021 ASR, however, the monitor is located within 3 m of the B5295 kerb, which is the primary route to be used by vehicles of the development. In accordance with Defra LAQM.TG(16), it is considered to be a roadside classification for the purposes of this assessment; due to the monitor proximity to the B5295. The location of N5 is shown in **Appendix A** and the monitoring results are provided in **Section 6.2**.

5.4.23 The verification procedure and associated calculations are shown in **Appendix F**. A single verification factor has been derived and applied to all sensitive human and ecological receptors assessed. All modelled road NO_x concentrations have been adjusted by a factor of 2.4606.

5.4.24 There is no PM_{10} or $PM_{2.5}$ monitoring undertaken within the study area, therefore it was not possible to undertake verification for particulate matter concentrations.

Relevant Objectives

5.4.25 Pollutant concentration predictions for the student accommodation would be compared to both the annual mean and the short-term objectives.

5.4.26 The commercial sensitive receptors would not be relevant receptors in relation to annual mean air quality objectives due to the length of their exposure. Short-term objectives do apply to future commercial users of the development. A qualitative comparison to the Defra LAQM.TG(16) NO_2 60 µg/m^3 annual mean screening method has been undertaken for this assessment.

Assessment Significance Criteria

5.4.27 Guidance is provided by EPUK and IAQM[2] on criteria for determining the significance of a development's impact on local air quality. **Table 5** details the impact descriptors used for individual receptors in relation to annual mean pollutant concentrations. The overall significance of impacts was determined using professional judgement. Changes of 0%, i.e. less than 0.5%, will be described as Negligible.

Table 5: Impact descriptors for individual receptors

Long term average Concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)*			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

*AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'

5.5 Ecological Assessment

5.6 Vehicles exiting the site eastwards on the B5295 (Leconfield Street) and then southwards on Trumpet Road will travel past The River Ehen Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI). The River Ehen designation is located approximately 20 m from the roadside of Trumpet Road, as shown in **Appendix A.**

5.7 Natural England's '*approach to advising competent authorities on the assessment of road traffic emissions under the Habitat Regulations'* 2018 and IAQM '*A guide to the assessment of air quality impacts on designated nature conservation sites'* 2020 both specify a relevant screening threshold for the assessment of air quality impacts to ecological habitats. The criteria provided is an assessment may be necessary if the proposed development vehicle generation is more than 1,000 light-duty vehicle (LDV) AADT or 200 heavy-duty vehicle (HDV) AADT within 200 m of an ecological designation.

5.8 The assessment of air quality impacts to ecological habitats includes a requirement to assess the proposal in-isolation and in-combination. In-isolation is the development only traffic, whereas in-combination is the development traffic plus the cumulative development traffic. Both in-isolation and in-combination are compared to the vehicle generation criteria. If either methodology exceeds, then a detailed air quality assessment is likely to be required.

5.9 Tetra Tech, the appointed transport consultant, has confirmed that the proposed development vehicle generation (in-isolation) does not exceed the vehicle criteria for LDV or HDV. There is no committed development traffic to consider in the planning application (In-combination).

5.10 A detailed air quality assessment of vehicular emission impacts to the River Ehen SSSI and SAC does not require further assessment. Impacts are concluded to be screened out due to the criteria for assessment not being met.

6 Baseline Air Quality

6.1 Local Air Quality

6.1.1 Baseline air quality at the proposed development has been established by examining monitoring data produced by CBC (provided in the 2021 Annual Status Report) and background concentration maps provided by Defra for the grid squares covering the proposed development.

6.1.2 Currently, CBC does not have any declared AQMAs and air quality is regarded as being very good, as defined in the ASR. Cleator Moor resides in the Lake District and there are very few heavily trafficked pollutant sources in the western parts of the Lake District. Air pollution levels are expected to be low. The site location is shown in **Appendix A**.

6.1.3 CBC operates 24 non-automatic monitoring sites, but does not operate any automatic monitors. The 2021 ASR lists almost half of all the monitors as an urban background classification. LAQM.TG(16) suggests monitors within 15 m of a roadside are classed as a roadside classification. From review of the ASR, several of those monitors listed as urban background are within 15 m of a road.

6.2 Air Quality Monitoring

Nitrogen Dioxide (NO_2)

6.2.1 CBC operates two air quality monitors near the site.

6.2.2 Diffusion tube reference N5 is located approximately 560 m to the south east of the site on Leconfield Street. The ASR states this monitor is an urban background classification, however, it is located 3 m from the Leconfield Street kerb. For the purposes of this assessment, it is considered to be a roadside classification and has been used in the verification procedure; as it is located within 15 m of a road (per the criteria for a roadside classification in LAQM.TG(16))

6.2.3 Diffusion tube N3 is located approximately 2.8 km to the north west of the site and is an urban background monitor at the eastern outskirts of Whitehaven. Diffusion tube N5 is considered to be representative of the site conditions.

6.2.4 The 2020 monitoring data has been influenced by the Covid-19 pandemic. During 2020 significant traffic reductions were observed on local road networks caused by the stay-at-home orders. Air quality improvements were observed across the UK during 2020, but it is unlikely this is a long-term trend given the significant and abnormal traffic reductions that occurred during the affected time period.

6.2.5 The results from the diffusion tube are shown in **Table 6** and the monitor locations are shown in **Appendix A**.

Table 6: Annual Mean NO_2 Concentrations Monitored by CBC within the Study Area

Site ID	Location		Annual Mean NO_2 Concentrations ($\mu g/m^3$)			
			2017	2018	2019	2020
N3 (urban background)	299020	517245	8.2	8.6	7.3	6.0

Site ID	Location		Annual Mean NO_2 Concentrations (µg/m³)			
			2017	2018	2019	2020
N5 (roadside)	302260	514890	10.8	10.8	10.0	7.4
Annual Mean NO_2 air quality objective				40 µg/m³		

6.2.6 The monitoring results in **Table 6** indicate that annual mean concentrations of NO_2 were below the NO_2 annual mean objective at the identified monitoring sites during the period shown.

6.2.7 The results indicate that the short-term objective for NO_2 was unlikely to be exceeded at the identified monitoring sites as monitored annual mean concentrations were well below the indicative screening concentration of 60 µ/gm³ during the period shown.

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

6.2.8 CBC does not undertake PM_{10} or $PM_{2.5}$ monitoring in the vicinity of the proposed development site, neither is there any nearby representative monitoring available.

6.3 Background Concentrations

6.3.1 CBC operates diffusion tube N3, an urban background air quality monitor. The NO_2, and calculated NOx, concentrations were used for the 2019 base year scenario. The result from this monitor was also used to calculate the background concentrations for NO_x and NO_2 used within the air quality model for the opening year of the development. These calculations were completed in accordance with LAQM.TG(16) and are shown in **Appendix F**. The background NO_2 concentration for both 2019 and 2030 has been applied for all sensitive receptors assessed.

6.3.2 There is no background monitoring of PM_{10} or $PM_{2.5}$ carried out in close proximity to the development. Background concentrations of PM_{10} and $PM_{2.5}$ have been obtained from the background concentration maps provided by Defra for the grid squares covering the proposed development and receptor locations[8] are shown in **Table 7**.

Table 7: Background Pollutant Concentrations Obtained for the 1km x 1km Grid Squares Covering the Site and Receptor Locations*

Grid Square	Pollutant	2019 (µg/m³)	2032 (µg/m³)
299500, 517500 (ESRs 1 – 3)	NO_2	7.3	5.18
	PM_{10}	9.32	7.91
	$PM_{2.5}$	5.99	4.71
300500, 516500 (ESRs 4 – 5)	NO_2	7.3	5.18
	PM_{10}	8.80	8.18
	$PM_{2.5}$	5.40	4.90

[8] http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

Grid Square	Pollutant	2019 (µg/m³)	2032 (µg/m³)
301500, 515500 (ESRs 6 – 11)	NO_2	7.3	5.18
	PM_{10}	9.30	8.67
	$PM_{2.5}$	5.69	5.19
302500, 514500 (ESRs 12 – 15)	NO_2	7.3	5.18
	PM_{10}	8.94	8.31
	$PM_{2.5}$	5.66	5.17
301500, 515500 (PSR 1)	NO_2	7.3	5.18
	PM_{10}	9.30	8.67
	$PM_{2.5}$	5.69	5.19

** NO_2 concentration obtained from diffusion tube N3 (2019 value listed to 1 d.p. in ASR). Particulate matter concentrations obtained from the 2018 based background maps*

7 Construction Dust Impact Assessment

7.1 Step 1 – Requirement for a Detailed Assessment

7.1.1 There are sensitive receptors located within 350m of the site boundary, therefore, a detailed assessment of the construction phase of the development has been undertaken. There are no ecological designations within 50m of the site boundary or trackout routes which require assessment.

7.2 Step 2 – Assess the Risk of Dust Impacts

Step 2A Dust Emission Magnitude

7.2.1 The potential dust emission magnitude in relation to the development has been determined using the criteria detailed in **Table C1** in **Appendix C**. The scale and nature of works onsite were considered to determine the potential dust emission magnitude for earthwork activities, construction and trackout activities. Information to determine the classification has been estimated from the site plans, Google Earth and information provided by the Applicant. The dust emission magnitude is outlined in **Table 8.**

7.2.2 The construction is expected to be carried out over several years and focused in each Area through phasing. It is not anticipated that daily trackout movements would exceed 50 per day. A medium classification is concluded for trackout.

Table 8: Dust Emission Magnitudes for Each Activity

Activity	Dust Emission Magnitudes	Justification for Sensitivity Classification
Demolition	N/A	• N/A
Earthworks	Large	• the site area is >10,000 m²
Construction	Large	• total building volume to be constructed is estimated at >100,000 m³

Activity	Dust Emission Magnitudes	Justification for Sensitivity Classification
Trackout	Medium	• there are likely to be 10 – 50 HDV outward movements in any one day

Step 2B Sensitivity of the Receptors to Dust Soiling and Health Effects

7.2.3 Dwellings are located within a distance of 20 m from the site boundary. In accordance with the criteria in **Table C2** in **Appendix C** and the IAQM guidance, the sensitivity of human receptors is **high**.

Step 2B Sensitivity of the Area to Dust Soiling and Human Health Effects of PM_{10}

7.2.4 The sensitivity of the area for dust soiling and human health effects has been determined using the criteria detailed in **Table C3 and Table C4** respectively in **Appendix C.**

7.2.5 The sensitivity of the area to dust soiling and human health for each activity is summarised in **Table 9**.

Table 9: Outcome of Defining the Sensitivity of the Area

Pollution	Activity	Sensitivity of the Surrounding Area	Justification for Sensitivity Classification
Dust Soiling	Demolition	N/A	N/A
	Earthworks	High	There are 10 – 100 highly sensitive residential receptors within 20 m of the site boundary
	Construction	High	There are 10 – 100 highly sensitive residential receptors within 20 m of the site boundary
	Trackout	High	There are 10 – 100 highly sensitive residential receptors within 20 m of the trackout route, up to 500 m from the site exit
Human Health	Demolition	N/A	N/A
	Earthworks	Low	There are 10 – 100 highly sensitive residential receptors within 20 m of the site boundary. Background pollutant concentrations are below 24 µg/m^3
	Construction	Low	There are 10 – 100 highly sensitive residential receptors within 20 m of the site boundary. Background pollutant concentrations are below 24 µg/m^3
	Trackout	Low	There are 10 – 100 highly sensitive residential receptors within 20 m of the trackout route. Background pollutant concentrations are below 24 µg/m^3

Step 2C Risk of Impacts

7.2.6 The dust emission magnitude and sensitivity of the area were combined and the risk of impacts determined using the criteria detailed in **Table C5** to **Table C8** in **Appendix C.**

7.2.7 A summary of the risks, before mitigation measures are applied, for dust soiling and human health are shown in **Table 10**.

Table 10: Risk of Dust Impacts

Potential Impact	Dust Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	High Risk	High Risk	Medium Risk
Human Health	N/A	Low Risk	Low Risk	Low Risk

7.3 Step 3 – Site-Specific Mitigation

7.3.1 Step 3 of the IAQM guidance identifies appropriate site-specific mitigation. These measures are related to the site risk for each activity. Mitigation measures specific to earthworks, construction and trackout are proposed based on the risk classifications in **Table 10**. Recommended mitigation measures are shown in **Appendix E.**

7.3.2 The general mitigation measures (for site management, preparing and maintaining the site, operating vehicle/machinery, operations and waste management), are appropriate for a site with a 'high risk' classification (in this instance the site is classified as "high" risk due to earthworks and construction)[9].

7.4 Step 4 – Determine Significant Effects

7.4.1 The characteristics of the site and the surrounding area suggest that mitigation would not be impracticable or ineffective. With the implementation of the mitigation measures, therefore, the residual impacts from the construction are considered to be not significant when considered following IAQM guidance.

8 Road Traffic Assessment

8.1 Baseline Assessment

8.1.1 The ADMS-Roads model was used to estimate contributions of vehicle exhaust emissions to annual NO_2, PM_{10} and $PM_{2.5}$ concentrations for the '*baseline*' and '*without development'* scenarios considered in the assessment.

8.1.2 The 24-hour AADT flows used in the assessment are detailed in **Appendix F**. **Table 11** details the results of the baseline assessment.

Table 11: Predicted Baseline NO_2, PM_{10} and $PM_{2.5}$ Annual Mean Concentrations (μg/m³) at Existing Sensitive Receptor Locations

[9] For those mitigation measures that are general, the highest risk category should be applied. For example, if the site is medium risk for earthworks and construction, but a high risk for track-out, the general measures applicable to a high risk site should be applied.

Receptor	Receptor Height above Ground Level (m)	Scenario 1: Base Year (2019)			Scenario 2: Without Development (2032)		
		NO_2 (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	NO_2 (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)
ESR 1	1.5	12.14	9.67	6.19	6.84	8.26	4.90
ESR 2	1.5	11.77	9.67	6.19	6.71	8.27	4.90
ESR 3	1.5	12.45	9.72	6.22	6.95	8.32	4.94
ESR 4	1.5	14.41	9.36	5.72	7.63	8.74	5.21
ESR 5	1.5	11.38	9.09	5.57	6.57	8.47	5.06
ESR 6	1.5	15.76	9.97	6.08	8.14	9.35	5.57
ESR 7	1.5	11.11	9.60	5.86	6.50	8.97	5.36
ESR 8	1.5	18.81	9.99	6.10	9.08	9.34	5.57
ESR 9	1.5	13.24	9.76	5.96	7.18	9.13	5.45
ESR 10	1.5	13.76	9.80	5.98	7.36	9.17	5.47
ESR 11	1.5	10.97	8.63	5.51	6.46	8.02	5.02
ESR 12	1.5	10.75	9.18	5.80	6.35	8.54	5.30
ESR 13	1.5	11.09	9.21	5.82	6.46	8.58	5.32
ESR 14	1.5	8.74	9.05	5.73	5.66	8.41	5.22
ESR 15	1.5	10.21	9.17	5.79	6.14	8.53	5.29
		Annual Mean NO_2 & PM_{10} Air Quality Objective				**40 (µg/m^3)**	
		Annual Mean $PM_{2.5}$ Target Level Objective				**25 (µg/m^3)**	

8.1.3 The baseline air quality assessment for the base year (2019) and opening year *'without development'* (2032) scenarios indicate that concentrations of NO_2, and PM_{10} are below the respective annual mean air quality objectives and the $PM_{2.5}$ annual mean target at all sensitive receptors assessed.

8.2 Impact Assessment

Existing Receptors

8.2.1 Predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for the opening year (2032) *'with development'* scenario at 15 ESR locations are detailed in **Table 12**, **Table 13** and **Table 14**. The predicted change in NO_2, PM_{10} and $PM_{2.5}$ concentrations at existing sensitive receptors between the *'without development'* and *'with development'* scenarios were compared to the significance criteria detailed in EPUK and IAQM guidance[2] and contained within **Table 5**.

Table 12: NO_2 Dispersion Modelling Results and Significance of Development for the Opening Year (2032) Scenario at Existing Receptor Locations

Receptor	Without Development μg/m³	Concentration with Development μg/m³	Impact μg/m³	% of AQAL with Development	% Change relative to AQAL	Impact Descriptor
ESR 1	6.84	7.00	0.16	17.50	+0.40	Negligible
ESR 2	6.71	6.91	0.20	17.28	+0.50	Negligible
ESR 3	6.95	7.18	0.23	17.95	+0.57	Negligible
ESR 4	7.63	8.01	0.38	20.03	+0.95	Negligible
ESR 5	6.57	6.66	0.09	16.65	+0.23	Negligible
ESR 6	8.14	8.76	0.62	21.90	+1.55	Negligible
ESR 7	6.50	6.74	0.24	16.85	+0.60	Negligible
ESR 8	9.08	9.54	0.46	23.85	+1.15	Negligible
ESR 9	7.18	7.31	0.13	18.28	+0.33	Negligible
ESR 10	7.36	7.50	0.14	18.75	+0.35	Negligible
ESR 11	6.46	6.50	0.04	16.25	+0.10	Negligible
ESR 12	6.35	6.38	0.03	15.95	+0.08	Negligible
ESR 13	6.46	6.49	0.03	16.23	+0.08	Negligible
ESR 14	5.66	5.67	0.01	14.18	+0.02	Negligible
ESR 15	6.14	6.16	0.02	15.40	+0.05	Negligible
			Annual Mean NO_2 Air Quality Objective		**40 (μg/m³)**	

Table 13: PM_{10} Dispersion Modelling Results and Significance of Development for the Opening Year (2032) Scenario at Existing Receptor Locations

Receptor	Without Development μg/m³	Concentration with Development μg/m³	Impact μg/m³	% of AQAL with Development	% Change relative to AQAL	Impact Descriptor
ESR 1	8.26	8.30	0.04	20.74	+0.10	Negligible
ESR 2	8.27	8.31	0.04	20.78	+0.10	Negligible
ESR 3	8.32	8.38	0.06	20.94	+0.15	Negligible
ESR 4	8.74	8.83	0.09	22.08	+0.23	Negligible
ESR 5	8.47	8.49	0.02	21.23	+0.05	Negligible
ESR 6	9.35	9.49	0.14	23.72	+0.35	Negligible

Receptor	Without Development µg/m³	Concentration with Development µg/m³	Impact µg/m³	% of AQAL with Development	% Change relative to AQAL	Impact Descriptor
ESR 7	8.97	9.02	0.05	22.55	+0.12	Negligible
ESR 8	9.34	9.42	0.08	23.55	+0.20	Negligible
ESR 9	9.13	9.16	0.03	22.90	+0.07	Negligible
ESR 10	9.17	9.21	0.04	23.02	+0.10	Negligible
ESR 11	8.02	8.03	0.01	20.08	+0.02	Negligible
ESR 12	8.54	8.55	0.01	21.37	+0.03	Negligible
ESR 13	8.58	8.58	0.00	21.46	+0.00	Negligible
ESR 14	8.41	8.41	0.00	21.03	+0.00	Negligible
ESR 15	8.53	8.54	0.01	21.34	+0.02	Negligible
			Annual Mean PM_{10} Air Quality Objective		**40 (µg/m³)**	

Table 14: $PM_{2.5}$ Dispersion Modelling Results and Significance of Development for the Opening Year (2032) Scenario at Existing Receptor Locations

Receptor	Without Development µg/m³	Concentration with Development µg/m³	Impact µg/m³	% of AQAL with Development	% Change relative to AQAL	Impact Descriptor
ESR 1	4.90	4.92	0.02	19.69	+0.08	Negligible
ESR 2	4.90	4.93	0.03	19.72	+0.12	Negligible
ESR 3	4.94	4.96	0.02	19.86	+0.08	Negligible
ESR 4	5.21	5.26	0.05	21.05	+0.20	Negligible
ESR 5	5.06	5.08	0.02	20.30	+0.08	Negligible
ESR 6	5.57	5.64	0.07	22.58	+0.28	Negligible
ESR 7	5.36	5.39	0.03	21.54	+0.12	Negligible
ESR 8	5.57	5.61	0.04	22.45	+0.16	Negligible
ESR 9	5.45	5.46	0.01	21.85	+0.04	Negligible
ESR 10	5.47	5.49	0.02	21.95	+0.08	Negligible
ESR 11	5.02	5.02	0.00	20.09	+0.00	Negligible
ESR 12	5.30	5.30	0.00	21.21	+0.00	Negligible

Receptor	Without Development µg/m^3	Concentration with Development µg/m^3	Impact µg/m^3	% of AQAL with Development	% Change relative to AQAL	Impact Descriptor
ESR 13	5.32	5.32	0.00	21.28	+0.00	Negligible
ESR 14	5.22	5.23	0.01	20.90	+0.04	Negligible
ESR 15	5.29	5.29	0.00	21.17	+0.00	Negligible
			Annual Mean $PM_{2.5}$ Target Level Objective		**25 (µg/m^3)**	

8.2.2 The results of the ADMS-Roads modelling assessment for 2032 indicate that annual mean concentrations of NO_2 and PM_{10} would be below the respective annual objectives as well as the $PM_{2.5}$ annual mean target in 2032, at all existing sensitive receptor locations within the study area, for both '*with*' and '*without*' the development.

8.2.3 Predicted annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ are expected to have an increase of less than 0.5% at all existing sensitive receptors assessed. It is likely that concentrations predicted at individual receptor locations are also representative of worst-case exposure as they are close to the main junctions used by development traffic. The proposed development is therefore predicted to have a ***negligible*** impact on concentrations of NO_2, PM_{10} and $PM_{2.5}$ in 2032.

Proposed Receptors

8.3 NO_2, PM_{10}, and $PM_{2.5}$ concentrations have been predicted at one proposed sensitive receptor location. This receptor is representative of the student accommodation ground floor which is closest to the main pollutant sources in Area 2.

8.4 The results of the air quality assessment are shown in **Table 15**. Proposed sensitive receptor locations are shown in **Appendix A**.

Table 15: Air Quality Concentrations at Proposed Sensitive Receptors

Proposed Sensitive Receptor	2032 With Development – Pollutant Concentrations		
	NO_2 Concentration with Development µg/m^3	PM_{10} Concentration with Development µg/m^3	$PM_{2.5}$ Concentration with Development µg/m^3
PSR 1	5.40	8.72	5.22

8.4.1 The air quality predictions demonstrate that air quality concentrations at the location of the student accommodation are well below the air quality objectives and target level. Pollutant concentrations reduce with height and distance from the source, therefore, the concentrations above the ground floor would also be well below the air quality objectives and target level.

8.4.2 LAQM.TG(16) provides a qualitative screening approach to determine whether there is a risk of exceedance of the one-hour NO_2 air quality objective. If the ambient NO_2 annual mean concentration is above 60 µg/m^3 there is a risk that the one-hour objective (200 µg/m^3) may be exceeded.

8.4.3 The predicted NO_2 concentrations are all well below 60 µg/m^3 and, therefore, when considered in light of guidance in LAQM.TG (16), the 1-hour mean objective is unlikely to be exceeded.

8.4.4 The short term PM_{10} objective is predicted to be met at the proposed receptor location with no exceedances of the daily mean objective of 50 µg/m^3.

8.4.5 Commercial sensitive receptors will, therefore, not be exposed to adverse air quality that exceeds the annual, 24-hour or one-hour mean air quality objective.

8.4.6 The site is therefore considered suitable for residential (student) and commercial use with regards to air quality.

9 Mitigation

9.1 The air quality assessment has predicted the site will not have a significant impact on local air quality. Mitigation in relation to vehicular emission impacts is not required. However, best practice measures should still be adopted where possible, these may include:

- Control of Construction Emissions. In this case, mitigation of construction dust will be achieved by the use of the mitigation measures outlined in **Appendix E**.
- Electric vehicle charging infrastructure or charge points.
- Travel Plan.

9.2 The site has been designed to ensure buildings are setback into the site. There are also multiple site access points provided, which will ensure vehicles are dispersed onto the local road network into multiple directions, reducing the risk of impacts occurring at a single point of entry and road network.

10 Summary of Impacts and Conclusion

10.1 This air quality report assesses the potential changes in air quality due to the construction and operation of the proposed development and whether these potential changes would significantly alter air quality.

10.2 The assessment of dust soiling and human health impacts during the construction phase of the development results in the proposal of dust mitigation measures. The implementation of these will ensure that residual dust impacts during the construction phase are not significant.

10.3 Concentrations of NO_2 and PM_{10} are likely to be below their respective long and short-term objectives at the proposed development site which is therefore considered suitable for residential (student) and commercial use with regards to air quality. Concentrations of $PM_{2.5}$ are expected to be below the annual mean target.

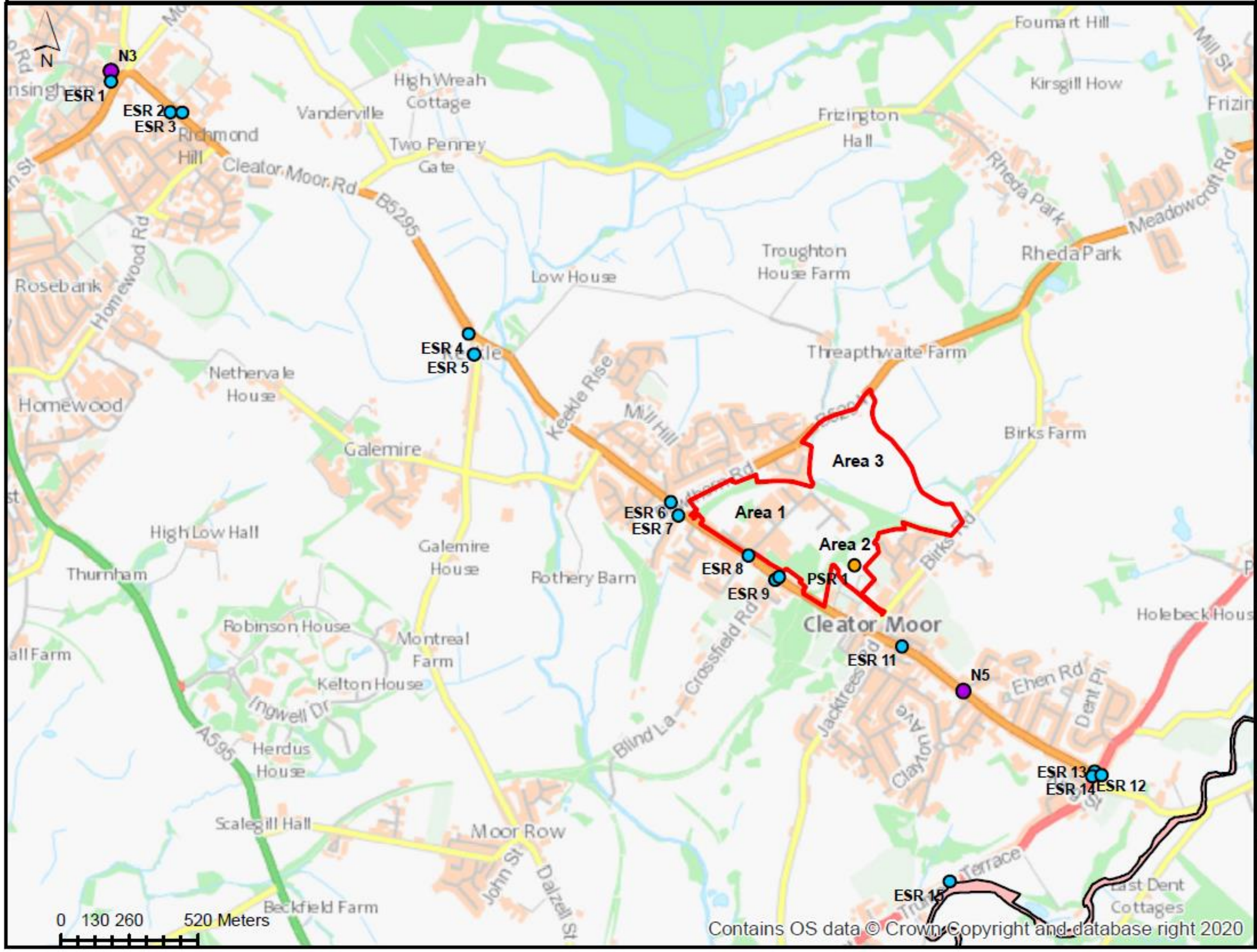
10.4 The proposed development is not expected to have a significant impact on local air quality.

10.5 There is, therefore, no reason for this application to be refused on the grounds of air quality.

APPENDICES

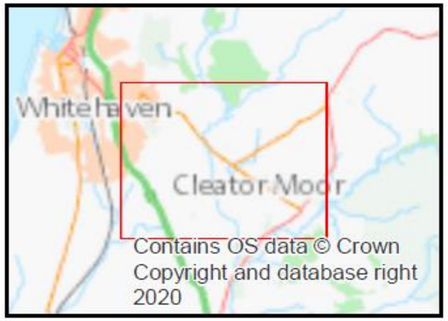
This page is left blank intentionally

Appendix A: Site Location



Legend

- Red Line Boundary
- Existing Sensitive Receptor
- Proposed Sensitive Receptor
- CBC Monitors
- River Ehen SSSI, SAC



Rev.	Date	Purpose of revision	Drawn By	Approved By
1	21/01/2022	Initial Issue	PW	LG

MILLER GOODALL
ACOUSTICS AND AIR QUALITY

Project: Leconfield Industrial Estate

Client: Copeland Borough Council

Report Number: 102682

Scale @ A4: 1:26,000

This page is left blank intentionally

Appendix B: Site Layout

This page is left blank intentionally

Appendix C: IAQM Dust Risk Assessment Methodology

The following section outlines criteria developed by the IAQM for the assessment of air quality impacts arising from construction and demolition activities[5]. The assessment procedure is divided into four steps and is summarised below:

Step 1: Screen the Need for a Detailed Assessment

An assessment will normally be required where there are human receptors within 350 m of the site boundary and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s). Ecological receptors within 50 m of the site boundary or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s), are also identified at this stage. An ecological receptor refers to any sensitive habitat affected by dust soiling. For locations with a statutory designation, such as a Site of Specific Scientific Interest (SSSI), Special Area of Conservation (SACs) and Special Protection Areas (SPAs), consideration should be given as to whether the particular site is sensitive to dust. Some non-statutory sites may also be considered if appropriate.

Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is 'negligible' and any effects will not be significant.

Step 2: Assess the Risk of Dust Impacts

In step two, a site is allocated to a risk category on the basis of the scale and nature of the works (Step 2A) and the sensitivity of the area to dust impacts (Step 2B). These two factors are combined in Step 2C to determine the risk of dust impacts before the implementation of mitigation measures. The assigned risk categories may be different for each of the construction activities outlined by the IAQM (construction, demolition, earthworks and trackout). A site can be divided into zones, for example on a large site where there are differing distances to the nearest receptors.

Step 2A: Define the Potential Dust Emission Magnitude

Dust emission magnitude is based on the scale of the anticipated works and is classified as Small, Medium or Large. The IAQM guidance recommends that the dust emission magnitude is determined separately for demolition, earthworks, construction and trackout. **Table C1** describes the potential dust emission class criteria for each outlined activity.

Table C1: Criteria Used in the Determination of Dust Emission Magnitude

Activity	Criteria used to Determine Dust Emission Magnitude		
	Small	Medium	Large
Demolition	Total building volume <20,000 m^3, construction materials with low potential for dust release.	Total building volume 20,000 m^3 – 50,000 m^3, potential dusty construction material.	Total building volume >50,000 m^3, potentially dusty construction material.
Earthworks	Total site area <2,500 m^2, soil type with large grain	Total site area 2,500 – 10,000 m^2, moderately dusty soil type	Total site area >10,000 m^2, potentially dusty soil type
Construction	Total building volume <25,000 m^3.	Total building volume 25,000 – 100,000 m^3.	Total building volume >100,000 m^3.
Trackout	<10 outward HDV trips in any one day. Unpaved road length <50 m.	10-50 outward HDV trips in any one day. Unpaved road length 50-100 m.	>50 outward HDV trips in any one day. Unpaved road length >100 m.

Step 2B: Define the Sensitivity of the Area

The sensitivity of the area takes into account the following factors:

- the specific sensitivities of receptors in the area;
- the proximity and number of receptors;
- the local background PM_{10} concentration; and
- site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of windblown dust.

The criteria detailed in **Table C2** is used to determine the sensitivity of the receptor in relation to dust soiling, health effects and ecological effects.

Table C2: Criteria for Determining Sensitivity of Receptors

Sensitivity of Receptor	Criteria for Determining Sensitivity		
	Dust Soiling Effects	Health Effects of PM_{10}	Ecological Sites
High	Dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms	Residential properties, hospitals, schools and residential care homes	International or national designation *and* the features may be affected by dust soiling
Medium	Parks, places of work	Office and shop workers not occupationally exposed to PM_{10}	Presence of an important plant species where dust sensitivity is uncertain or locations with a national designation with features that may be affected by dust deposition
Low	Playing fields, farmland, footpaths, short-term car parks and roads	Public footpaths, playing fields, parks and shopping streets	Local designation where features may be affected by dust deposition

Table C3 and **Table C4** are then used to define the sensitivity of the area to dust soiling and human health effects. This should be derived for each of construction, demolition, earthworks and trackout.

Table C3: Sensitivity of the Area to Dust Soiling Effects on People and Property.

Receptor Sensitivity	Number of Receptors	Distance from Source (m)*			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

*distances considered are to the dust source

Table C4: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentrations	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m^{-}	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m^{3}	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m^{3}	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m^{3}	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32 µg/m^{-}	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 µg/m^{3}	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 µg/m^{3}	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 µg/m^{3}	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

The sensitivity of the area is then summarised.

Step 2C Define the Risks of Impacts

The dust emission magnitude from **Table C1** and sensitivity of the area and receptors from **Table C2**, **Table C3** and **Table C4** are combined, and the risk of impacts from each activity (demolition, earthworks, construction and trackout) before mitigation is applied, is determined using the criteria detailed in **Table C5** to **Table C8.**

Table C5: Risk of Dust Impacts - Demolition

Potential Impact Sensitivity of the Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table C6: Risk of Dust Impacts- Earthworks

Potential Impact Sensitivity of the Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table C7: Risk of Dust Impacts- Construction

Potential Impact Sensitivity of the Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table C8: Risk of Dust Impacts- Trackout

Potential Impact Sensitivity of the Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

Step 3 Determine Site Specific Mitigation

Step three of the IAQM guidance identifies appropriate site-specific mitigation. These measures are related to whether the site is a low, medium or high risk site.

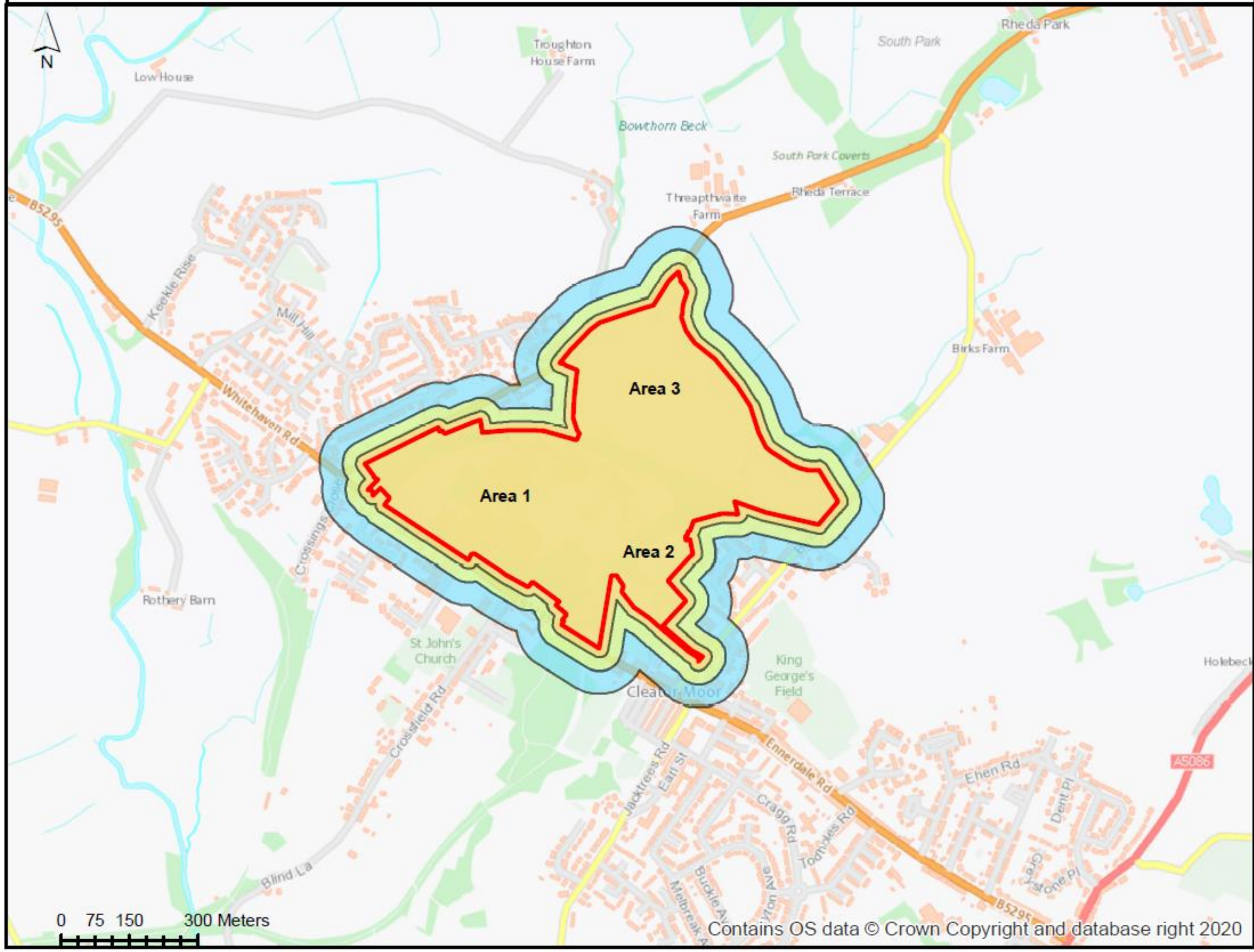
Step 4 Determine Significance of Residual Effects

At step four the significance of residual effects is assessed. For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'.

There may be cases where, for example, there is inadequate access to water for dust suppression to be effective, and even with other mitigation measures in place there may be a significant effect. Therefore, it is important to consider the specific characteristics of the site and the surrounding area to ensure that a conclusion of no significant effect is robust.

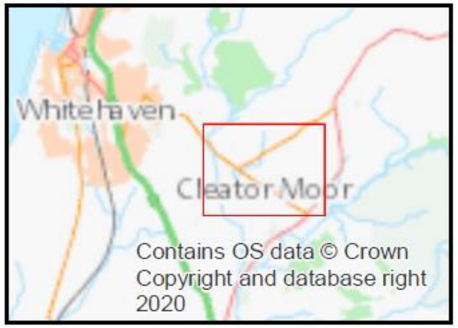
This page is left blank intentionally

Appendix D: Construction Zone Area of Effects



Legend

- Red Line Boundary
- 20m
- 50m
- 100m



Rev.	Date	Purpose of revision	Drawn By	Approved By
1	28/02/2022	Initial Issue	PW	LG

MILLER GOODALL
ACOUSTICS AND AIR QUALITY

Project: Leconfield Industrial Estate

Client: Copeland Borough Council

Report Number: 102682

Scale @ A4: 1:15,000

This page is left blank intentionally

Appendix E: IAQM Dust Assessment Mitigation

xx Highly Recommended **x Desirable**

Measures relevant for demolition, earthworks, construction and trackout.

Mitigation Measure	High Risk
Communications	
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	xx
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.	xx
Display the head or regional office contact information.	xx
Develop and implement a Dust Management Plan (DMP).	xx
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.	xx
Make the complaints log available to the local authority when asked.	xx
Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.	xx
Hold regular liaison meetings with other high risk construction sites within 500 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.	xx
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.	xx
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.	xx
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.	xx
If requested by the Local Authority: 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.	xx
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.	xx

Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	xx
Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period.	xx
Avoid site runoff of water or mud.	xx
Keep site fencing, barriers and scaffolding clean using wet methods.	xx
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.	xx
Cover, seed or fence stockpiles to prevent wind whipping.	xx
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.	xx
Ensure all vehicles switch off engines when stationary - no idling vehicles.	xx
Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable.	xx
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).	xx
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	xx
Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	xx
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.	xx
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	xx
Use enclosed chutes and conveyors and covered skips.	xx
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	xx
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.	xx
Waste management	
Avoid bonfires and burning of waste materials.	xx

<u>Measures specific to earthworks.</u>

Mitigation Measure	High Risk

Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	xx
Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	xx
Only remove the cover in small areas during work and not all at once.	xx

Measures specific to construction.

Mitigation Measure	High Risk
Avoid scabbling (roughening of concrete surfaces) if possible.	xx
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.	xx
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.	xx

Measures specific to trackout.

Mitigation Measure	Medium Risk
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.	xx
Avoid dry sweeping of large areas.	xx
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	xx
Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable	xx
Record all inspections of haul routes and any subsequent action in a site log book.	xx
Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	xx
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	xx
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.	xx
Access gates to be located at least 10 m from receptors where possible.	xx

Appendix F: Assessment and Model Inputs

This appendix outlines the inputs used in the road traffic emissions assessment.

Future Year Background Concentrations

Background concentrations of NO_2 and NO_x for future year assessments (20##) have been determined using the following formula:

$$Future\ Year\ Concentration = Base\ Year\ Concentration \times \frac{DEFRA\ Map\ Future\ Year\ Concentration}{DEFRA\ Map\ Base\ Year\ Concentration}$$

Table E1 shows the predicted background concentrations derived from urban background air quality monitor 'N3'.

Table E1: Calculation of Diffusion Tube 'N3' Background NO_X and NO_2 Concentrations

Monitoring Site	Pollutant	2019 Monitored Concentration	Defra – 2019 NO_2 Concentration	Defra – 2019 NOx Concentration	Defra – 2030 NO_2 Concentration	Defra – 2030 NOx Concentration	Calculated NO_2 Concentration	Calculated NOx Concentration
Values		7.3	6.31	8.01	4.47	5.59	-	-
2019	NO_2 & NO_x	-	-	-	-	-	**7.3**	**9.28**
2030	NO_2 & NO_x	-	-	-	-	-	**5.18**	**6.47**

Traffic Data

The ADMS-Roads model requires the inclusion of detailed road traffic data for the routes to be affected by the proposed development.

Traffic data has been provided as 24-hour Annual Average Daily Traffic (AADT) and heavy-duty vehicle percentages (HGV%). No average speed traffic survey information was available, therefore, posted speed limits have been utilised in the model. Areas of congestion, queuing and junction locations have been modelled at reduced speeds of 20 km/h.

The traffic data used in the assessment is detailed in **Table F1** and presented in **Figure F1**.

Table F1: Traffic Data used in the Assessment

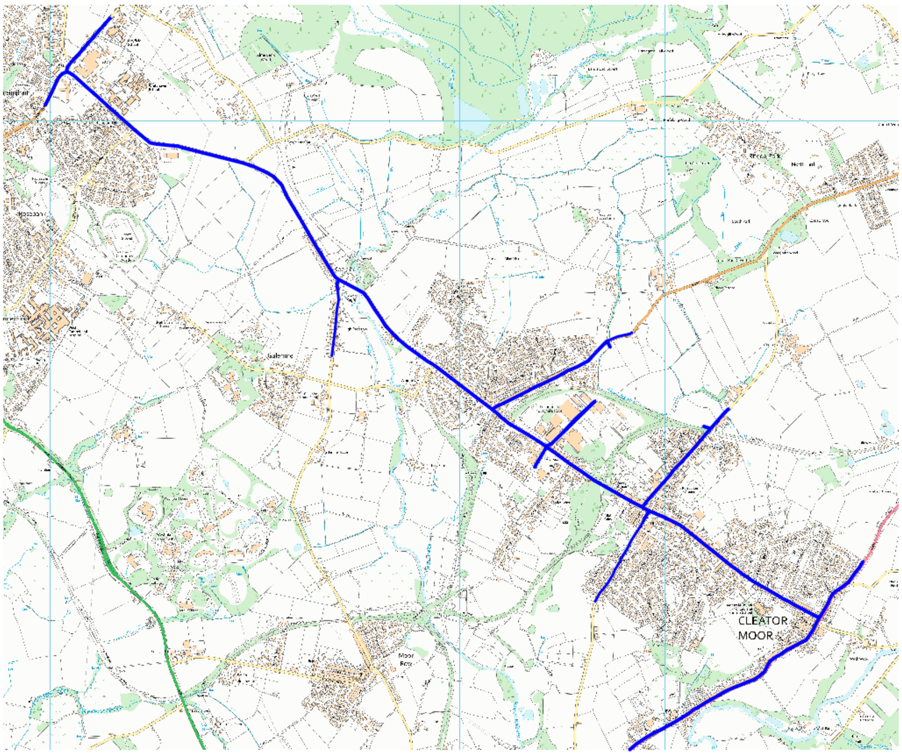
Link Number	Road	Speed (km/h)	2019 Base Year/Verification		2032 Without Development		2032 With Development		Total AADT Change
			AADT LDV	AADT HDV	AADT LDV	AADT HDV	AADT LDV	AADT HDV	
1	Moresby Road	48	13,514	283	14,528	304	15,010	314	492
2	Main Street	48	13,049	254	14,028	274	15,435	301	1,434
3	B5295 (east of Main Street)	48	12,504	283	13,442	304	15,325	347	1,926
4	B5295 (west of Dalzell Street)	48 & 64	14,155	283	15,217	305	17,829	357	2,664
5	Dalzell Street	48	3,812	127	4,098	137	4,098	137	0
6	B5295 (east of Dalzell Street)	48	11,816	478	12,702	514	15,263	617	2,664
7	Bowthorn Road - South of Site B Entrance	48	3,394	41	3,648	44	5,119	62	1,489
8	Bowthorn Road - North of Site B Entrance	48	3,394	41	3,648	44	3,890	47	245
9	B5295 (west of Bowthorn Road)	48	12,017	223	12,918	240	15,612	290	2,743
10	B5295 (east of Bowthorn Road)	48	12,373	193	13,302	208	15,374	240	2,104
11	B5295 (west of Site A Entrance)	48	6,074	177	6,529	190	8,103	236	1,620
12	B5295 (east of Site A Entrance)	48	11,201	421	12,041	453	12,765	480	751

Link Number	Road	Speed (km/h)	2019 Base Year/Verification		2032 Without Development		2032 With Development		Total AADT Change
			AADT LDV	AADT HDV	AADT LDV	AADT HDV	AADT LDV	AADT HDV	
13	Site A site access	48	972	26	1,045	28	2,466	66	1,459
14	Little Croft	48	2,894	77	3,112	82	3,112	82	0
15	B5295 (west of Birks Road)	48	11,250	206	12,094	222	13,310	244	1,239
16	B5295 (east of Birks Road)	48	11,582	135	12,451	145	12,911	150	465
17	Birks Road (north of B5295)	48	2,774	18	2,983	20	3,787	25	810
18	B5295 (west of Jacktrees Road)	48	11,302	225	12,150	242	12,919	257	784
19	B5295 (east of Jacktrees Road)	48	4,882	103	5,248	111	5,364	114	118
20	Jacktrees Road	48	5,229	72	5,621	77	6,278	86	666
21	Trumpet Road	48	4,542	184	4,883	198	4,997	203	118
22	Frizington Road	48	2,524	93	2,687	99	2,687	99	0
23	B5295 (west of A5086)	48	3,627	21	3,861	22	3,979	23	118
24	Site B Access Road	48	0	0	0	0	1,491	0	1,491
25	Bowthorn Road (north of B5295)	48	1,738	21	1,868	22	3,350	40	1,500
26	Birks Road (south of Site C Access)	48	2,884	9	3,101	10	3,908	13	810

Link Number	Road	Speed (km/h)	2019 Base Year/Verification		2032 Without Development		2032 With Development		Total AADT Change
			AADT LDV	AADT HDV	AADT LDV	AADT HDV	AADT LDV	AADT HDV	
27	Birks Road North of Site C Access)	48	2,869	19	3,084	20	3,156	21	73
28	Site C Access Road	48	351	0	377	0	1,260	0	883

Figure F1: Spatial Model Scope

Note: In relation to the link number locations, they correspond to a left to right orientation (i.e. Link 1 in the left side of the image, continuing right, with Link 28 in the right side of the image). Trumpet Road (Link 21) is the road link passing the River Ehen ecological designation (maximum vehicle generation of 114 well below the 1,000 AADT criteria for ecological assessment requirement)



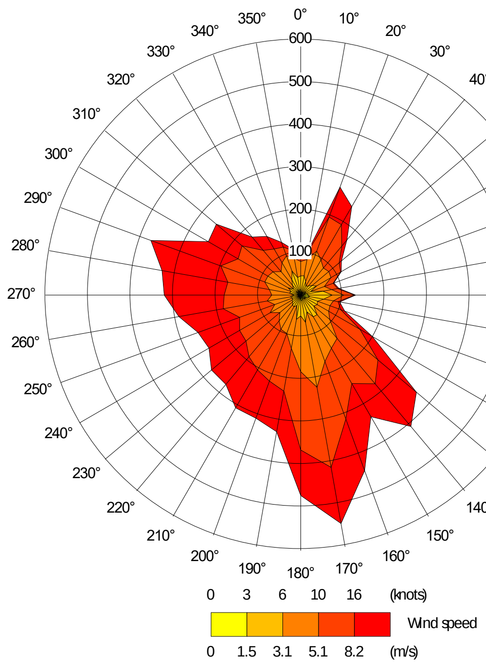
Meteorological Data

The air quality assessment includes the use of the 2019 St Bees Head No. 2 meteorological recording station.

The St Bees Head No. 2 recording station is located approximately 4.8 km to the west of the proposed development site and is considered to be the most representative of the site conditions in terms of altitude and distance.

The 2019 wind rose for St Bees Head No. 2 recording station is provided in **Figure F2**.

Figure F2: Wind Rose



Dispersion and Meteorological Site Characteristics

The air dispersion characteristics for the site and meteorological recording station differ, therefore, these have been adjusted accordingly within ADMS-Roads. **Table F2** details the adjustments made.

Table F2: Dispersion and Meteorological Site Characteristics

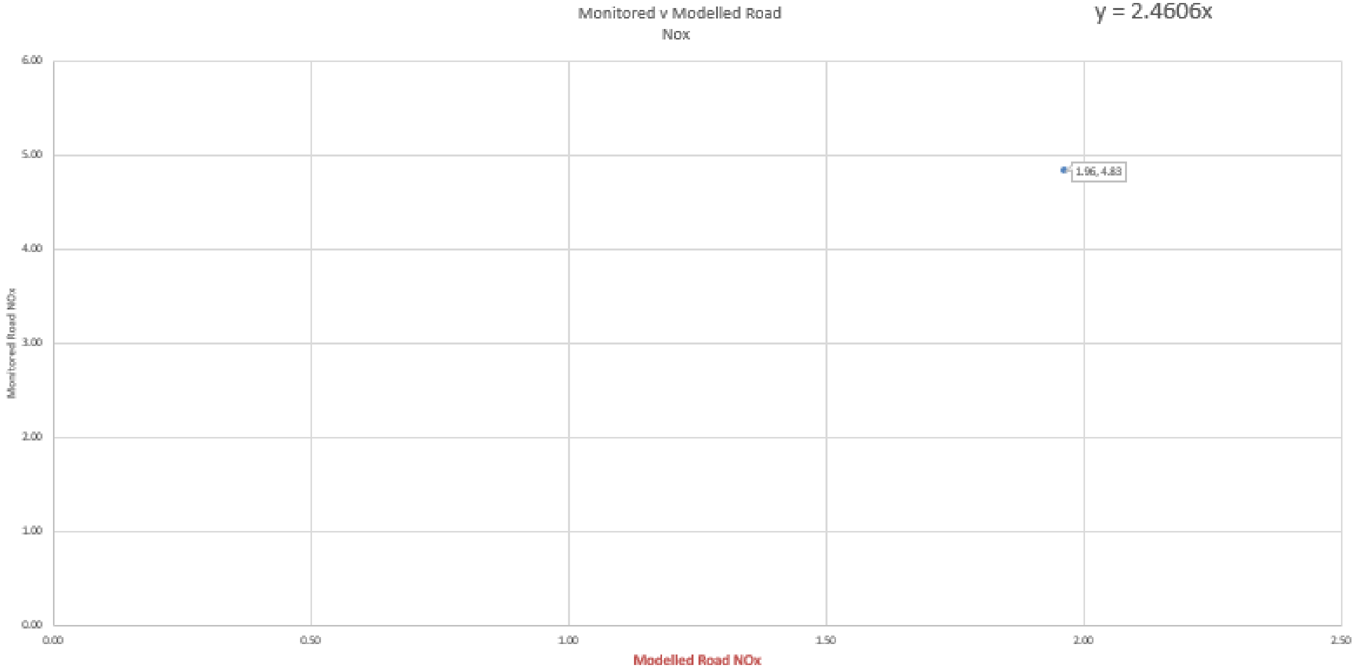
Parameter	Dispersion Site	Meteorological Site
Surface Roughness	0.5 m	0.2 m
Surface Albedo	0.23	0.23
Minimum Monin-Obukov Length	10 m	10 m
Priestley-Taylor Parameter	1	1

Model Verification

Model verification has been completed for NO_2. There is no PM_{10} nor $PM_{2.5}$ monitoring undertaken within the study area, therefore, it was not possible to undertake verification of PM_{10} or $PM_{2.5}$ concentrations. The verification procedure for the selected air quality monitors of this assessment is detailed in **Table F3.**

Table F3: NO_2 Model Verification Procedure

Monitor	Monitored Total NO_2	Monitored Road NO_X	Background NO_2	Background NO_X	Monitored Road Contribution NO_2 (total - background)	Modelled Road Contribution NO_X (excludes background)	Ratio of Monitored Road Contribution NO_X / Modelled Road Contribution NO_X	Adjustment Factor	Adjusted Road Contribution NO_X	Adjusted Modelled Total Nox (including background NO_X)	Modelled Total NO_2 (based on empirical NO_X / NO_2 relationship)	% Difference [(modelled - monitored) / monitored] x 100
N5	10.00	4.83	7.30	9.28	2.70	1.96	2.46	**2.4606**	4.83	14.11	10.00	0.00



Glossary of Terms

AADT Annual Average Daily Traffic flow

Air Quality Standard Pollutant standards relate to ambient pollutant concentrations in air, set on the basis of medical and scientific evidence of how each pollutant affects human health and the environment

Air Quality Objective Pollutant Objectives incorporate future dates by which a standard is to be achieved, taking into account economic considerations, practicability and technical feasibility

Annual Mean A mean pollutant concentration value in air which is calculated on a yearly basis, yielding one annual mean per calendar year. In the UK air quality regulations, the annual mean for a particular substance at a particular location for a particular calendar year is:

(a) in the case of lead, the mean of the daily levels for that year;

(b) in the case of nitrogen dioxide, the mean of the hourly means for that year;

(c) in the case of PM_{10}, the mean of the 24-hour means for that year.

Annoyance (Dust) Loss of amenity due to dust deposition or visible dust plumes, often related to people making complaints, but not necessarily sufficient to be a legal nuisance.

AQAP Air Quality Action Plan

AQEG Air Quality Expert Group

AQMA Air Quality Management Area

AQMP Air Quality Management Plan

AQO Air Quality Objective

AQS Air Quality Strategy for England, Scotland, Wales and Northern Ireland

Background Concentrations The term used to describe pollutant concentrations which exist in the ambient atmosphere, excluding local pollution sources such as roads and stacks

Construction Any activity involved with the provision of a new structure (or structures), its modification or refurbishment. A structure will include a residential dwelling, office building, retail outlet, road, etc.

Construction Impact Assessment An assessment of the impacts of demolition, earthworks, construction and trackout. In this Guidance, specifically the air quality impacts.

Defra Department for Environment, Food and Rural Affairs

Demolition Any activity involved with the removal of an existing structure (or structures). This may also be referred to as de-construction, specifically when a building is to be removed a small part at a time.

Deposited Dust that is no longer in the air and which has settled onto a surface. Deposited dust is also sometimes called amenity dust or nuisance dust, with the term nuisance applied in the general sense rather than the specific legal definition.

DMP Dust Management Plan; a document that describes the site-specific methods to be used to control dust emissions.

Dust Solid particles that are suspended in air, or have settled out onto a surface after having been suspended in air. The terms dust and particulate matter (PM) are often used interchangeably, although in some contexts one term tends to be used in preference to the other. In this guidance the term 'dust' has been used to include the particles that give rise to soiling, and to other human health and ecological effects. Note: this is different to the definition given in BS 6069, where dust refers to particles up to 75 µm in diameter.

Earthworks Covers the processes of soil-stripping, ground-levelling, excavation and landscaping.

Effects The consequences of the changes in airborne concentration and/or dust deposition for a receptor. These might manifest as annoyance due to soiling, increased morbidity or morality due to exposure to PM_{10} or $PM_{2.5}$ or plant dieback due to reduced photosynthesis. The term 'significant effect' has a specific meaning in EIA regulations. The opposite is an insignificant effect. In the context of construction impacts any effect will usually be adverse, however, professional judgement is required to determine whether this adverse effect is significant based in the evidence presented.

EPUK Environmental Protection UK

HDV Heavy Duty Vehicle

Impacts The changes in airborne concentrations and/or dust deposition. A scheme can have an 'impact' on airborne dust without having any 'effects', for instance if there are no receptors to experience the impact.

LAQM Local Air Quality Management

LDV Light Duty Vehicle

Mg/m^3 Microgrammes (of pollutant) per cubic metre of air. A measure of concentration in terms of mass per unit volume. A concentration of 1 µg/m^3 means that one cubic metre of air contains one microgramme (millionth of a gramme) of pollutant

NO_2 Nitrogen Dioxide

NOx A collective term used to represent the mixture of nitrogen oxides in the atmosphere, as nitric oxide (NO) and nitrogen dioxide (NO_2)

NPPF National Planning Policy Framework

Nuisance The term nuisance dust is often used in a general sense when describing amenity dust. However, this term also has specific meanings in environmental law:

Statutory nuisance, as defined in S79(1) of the Environmental Protection Act 1990 (as amended from time to time).

Private nuisance, arising from substantial interference with a person's enjoyment and us of his land.

Public nuisance, arising from and act or omission that obstructs, damages or inconveniences the right of the community.

Each of these applying in so far as the nuisance relates to the unacceptable effects of emissions. It is recognised that a significant loss of amenity may occur at lower levels of emission than would constitute a statutory nuisance.

Note: as nuisance has a specific meaning in environmental law, and to avoid confusion, it is recommended that the term is not used in a more general sense.

$PM_{2.5}$ The fraction of particles with a mean aerodynamic diameter equal to, or less than, 2.5 μm. More strictly, particulate matter which passes through a size selective inlet as defined in the reference method for the sampling and measurement of $PM_{2.5}$, EN 14907, with a 50% efficiency cut-off at 2.5 μm aerodynamic diameter

PM_{10} The fraction of particles with a mean aerodynamic diameter equal to, or less than, 10 μm. More strictly, particulate matter which passes through a size selective inlet as defined in the reference method for the sampling and measurement of PM_{10}, EN 12341, with a 50% efficiency cut-off at 10 μm aerodynamic diameter

Running Annual Mean A mean pollutant concentration value in air which is calculated on an hourly basis, yielding one running annual mean per hour. The running annual mean for a particular substance at a particular location for a particular hour is the mean of the hourly levels for that substance at that location for that hour and the preceding 8759 hours

Trackout The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy duty vehicles (HDVs) leave the construction/demolition site with dusty materials, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site.

MILLER GOODALL
ACOUSTICS AND AIR QUALITY