

REPORT

Dinting Vale, Glossop

Revised Air Quality Assessment

Client: Wain Homes (North West) Ltd

Reference: PC4629-RHD-ZZ-XX-RP-Z-0001

Status: S0/P01.02

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Executive Summary

An air quality assessment was undertaken as part of a planning application for a proposed residential development at Dinting Vale, also known as 'Adderley Place, Glossop' in accordance with HPBC's housing allocations. The assessment considered the potential for the Proposed Development to have an impact on local air quality at identified existing human and ecological receptor locations, during construction and operation. The suitability of the site for the proposed uses was also considered. The assessment was prepared in accordance with consultation carried out with HPBC.

Following submission of the air quality assessment, the A57 Link Roads application was granted a Development Consent Order. The Pollution Specialist Officer at HPBC requested a revised air quality assessment be submitted taking into account of the A57 Link Roads, and made some additional comments on the assessment methodology. This report has been prepared to incorporate the requests of the Pollution Specialist Officer and the required clarifications.

The impact of the construction of the Proposed Development was considered in accordance with the latest guidance available from the IAQM (IAQM, 2016). The assessment defined the sensitivity of the area and the risk of the construction of the development to cause dust impacts. Site specific mitigation measures were recommended, and with the implementation of these measures, the residual impacts from construction activities were considered to be **not significant** in accordance with IAQM guidance.

A road traffic emissions dispersion modelling assessment was undertaken to consider the impact of operational phase development-generated vehicles on identified receptor locations within the study area. The opening year (2026) was assessed. A sensitivity test was also carried out to assess the impact of the recently consented A57 Link Roads scheme which would affect traffic flows within the study area.

Annual mean concentrations of NO₂, PM_{2.5} and PM₁₀ were predicted to be below the relevant air quality Objectives at all locations, both 'without' and 'with' the Proposed Development. No exceedances of the short-term 1-hour mean Objective for NO₂ and 24-hour mean Objective for PM₁₀ were calculated, based on annual mean concentrations, at any receptors without or with the development in place. Impacts were predicted to be negligible at all receptors, and overall impacts were predicted to be **not significant**.

Proposed receptor locations were included in the dispersion model at locations representative of reasonable 'worst-case' potential future exposure to consider the suitability of the site for the proposed uses. Pollutant concentrations were predicted to be well below the air quality Objectives.

A sensitivity test was also carried out incorporating the impact of the A57 Link Road on traffic levels through the study area. Impacts were predicted to be negligible at all receptors, and overall impacts were predicted to be **not significant**.

The impact of road traffic emissions generated by the Proposed Development on designated ecological sites was predicted also to be **not significant** in accordance with Natural England (Natural England, 2018) and the IAQM (IAQM, 2020) guidance.

1 Introduction

An air quality assessment (report reference: PC2304-RHD-ZZ-XX-RP-Z-0001) was produced on behalf of Wain Homes (North West) Limited to support the planning application for site known as the Land At Dinting Vale, hereby referred to as the “Proposed Development” (planning reference: HPK/2022/0456). Following submission of the report, the A57 Link Roads scheme was granted a Development Consent Order. The Pollution Specialist Officer at High Peak Borough Council (HPBC) has requested the assessment incorporates the impact of the A57 Link Road on traffic levels through the study area. A number of other comments on the assessment methodology were also made.

This revised report incorporates the requests of the Pollution Specialist Officer and addresses their comments, which are included in **Appendix C** and summarised in **Section 1.3**.

The Proposed Development has been identified as a housing allocation under Policy DS4 of the High Peak Local Plan for approximately 130 dwellings; however, the Proposed Development currently consists of 92 dwellings.

The report provides a review of the existing air quality in proximity to the application site and assesses the suitability of the site for the proposed uses, in addition to the impact of the Proposed Development on local air quality. The assessment was undertaken in accordance with Local Air Quality Management Technical Guidance (LAQM TG22) provided by Defra.

Air pollution in urban areas is generally dominated by emissions from road vehicles. The quantity and composition of vehicle emissions are dependent on the type of fuel used, engine type, size and efficiency, vehicle speeds and the type of exhaust emission abatement equipment employed.

The main pollutants of concern from a public health perspective associated with road traffic emissions are nitrogen dioxide (NO₂) and fine particulate matter (PM₁₀ and PM_{2.5}). These pollutants are most likely to approach their respective air quality Objectives in proximity to major roads and congested areas.

1.1 Site Description and Surrounding Area

The site is located to south of the A57 Dinting Vale in Glossop. The site is located in a predominantly residential area with residential dwellings located to the north, south and centrally on the western boundary. A small section of the northern boundary runs adjacent to Dinting Vale. The remainder of the site is bound by undeveloped woodland.

The site currently comprises predominantly undeveloped land. A small access road runs through the north of the site with some small areas of existing woodland and vegetation on the site.

The Proposed Development site is shown in **Figure 1-1**.

1.2 Development Proposals

The proposals include a residential development with access from the A57 Dinting Vale comprising 92 dwellings (use class C3) with associated car parking and landscaping.

1.3 Consultation

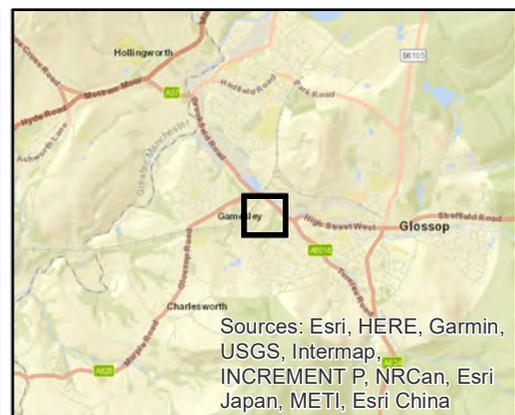
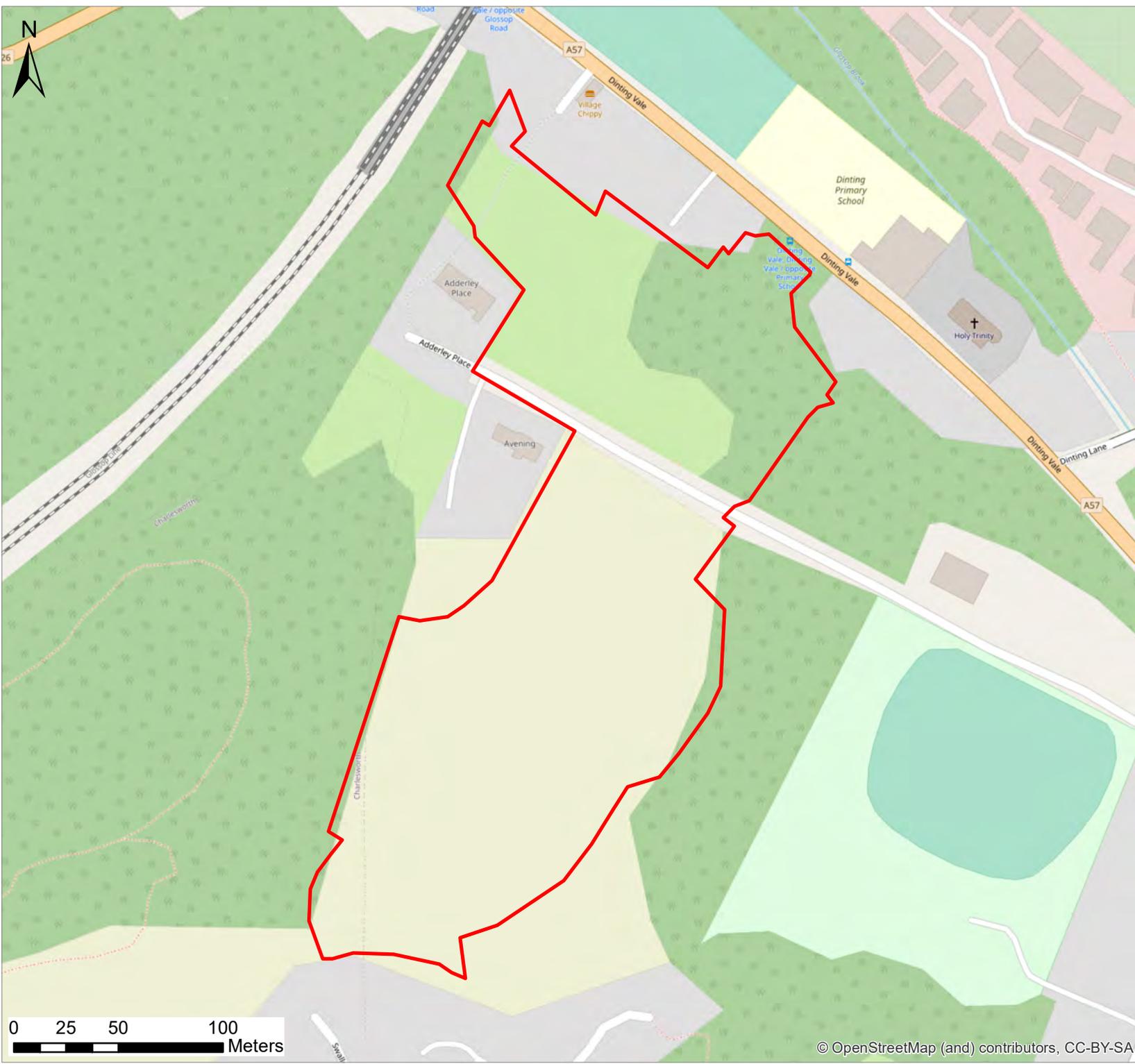
Consultation was undertaken with the Senior Pollution Officer at HPBC to agree the assessment methodology¹.

Following of submission of the air quality assessment to support the planning application (planning reference: HPK/2022/0456), the Pollution Specialist Officer at HPBC requested a revised air quality assessment should be prepared taking into account the information detailed in **Table 1-1**.

Table 1-1: HPBC response

Date / Document	Request	Response / where addressed in the report
Email from the Pollution Specialist Officer dated 20 December 2022	Consideration should be given to the effect of the A57 Link Roads application which has been approved.	Included as a sensitivity test and is considered in Section 5.2.2.1
	Inclusion of model input parameters, including clarity regarding traffic speeds (including justification for their use), topography (junction), model receptor locations/ heights/ use of the 'Advanced Street Canyon' module.	Included in Section 3.4.1 .
	Consideration of the impact of the gradient of the access road.	Included in the 'with development' scenarios, as detailed in Section 3.4.1.4 .
	Further clarification around the model validation given the difference between actual monitored results and predicted baseline.	The modelled receptors included within the comparison were not in the same location as the diffusion tube sites included within the verification process, which is the reason for the discrepancy. The modelled receptor locations have therefore been amended to allow for a like-for-like comparison. A revised comparison between the monitored results and the predicted baseline is included in Section 4.4.1 .

¹ Consultation was undertaken with Daniel McCrory of HPBC via email. Approval of the assessment methodology was received on 17/02/2022.



Legend

Red Line Boundary (approx.)

Title
Proposed Development Location Plan

Project
Dinting Vale, Glossop

Client
Wainhomes

Date
12/04/2022

Scale
1:2500

Figure
Figure 1-1

Checked by
CG

Number
1



2 Legislative Framework and Planning Policy

2.1 National Legislation

2.1.1 The Air Quality Strategy

The EU Air Quality Framework Directive 96/62/EC on Ambient Air Quality Assessment and Management entered into force in September 1996 (European Parliament, 1996). This was a framework for tackling air quality through setting European-wide air quality limit values in a series of Daughter Directives, prescribing how air quality should be assessed and managed by the Member States. Directive 96/62/EC and the first three Daughter Directives were combined to form the new EU Directive 2008/50/EC (European Parliament, 2008) on Ambient Air Quality and Cleaner Air for Europe, which came into force June 2008.

The 1995 Environment Act (HMSO, 1995) required the preparation of a national Air Quality Strategy (AQS) which set air quality standards and Objectives for specified pollutants. The Act also outlined measures to be taken by local planning authorities in relation to meeting these standards and Objectives (the Local Air Quality Management (LAQM) system).

The UK AQS was originally adopted in 1997 (DoE, 1997) and has been reviewed and updated in order to take account of the evolving EU Legislation, technical and policy developments and the latest information on health effects of air pollution. The strategy was revised and reissued in 2000 as the AQS for England, Scotland, Wales and Northern Ireland (DETR, 2000). This was subsequently amended in 2003 (DETR, 2003) and was last updated in July 2007 (Defra, 2007).

The UK Government published its Clean Air Strategy (CAS) in January 2019 (Defra, 2019a), which reset the focus for the first time since the 2007 Air Quality Strategy revision. The CAS identifies a series of 'new' air quality issues, including biomass combustion, shipping emissions, and releases from agricultural activities. There is a recognition that the effects of pollutant deposition on sensitive ecosystems and habitats needs greater focus. The concept of an overall exposure reduction approach is raised, in recognition that numerical standards are not safe dividing lines between a risk and a safe exposure, within a population with a varying age and health profile. The CAS is supplemented by an Industrial Strategy, policy guidance for the ports sector, a developing approach for aviation, and by plans for road transport fuels shift to zero emissions by 2040.

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

The current air quality standards and Objectives (for the purpose of LAQM) of relevance to this assessment are outlined in **Table 2-1**. Pollutant standards relate to ambient pollutant concentrations in air, set based on medical and scientific evidence of how each pollutant affects human health. Pollutant Objectives however incorporate future dates by which each standard is to be achieved, taking into account economic considerations, practicability and technical feasibility.

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, along with others, 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 improve air quality locally.

Possible exceedances of air quality Objectives are usually 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.

Table 2-1: Air Quality Strategy Objectives (England) for the Purpose of Local Air Quality Management

Pollutant	Air Quality Objective		To be Achieved by
	Concentration	Measured as*	
NO ₂	200µg.m ⁻³	1 hour mean not to be exceeded more than 18 times per year (equivalent to the 99.79 th percentile of hourly means)	31/12/2005
	40µg.m ⁻³	Annual mean	31/12/2005
Particles (PM ₁₀)	50µg.m ⁻³	24-hour mean not to be exceeded more than 35 times per year (equivalent to the 90.41 st percentile of 24-hour means)	31/12/2004
	40µg.m ⁻³	Annual mean	31/12/2004
Particles (PM _{2.5})	25µg.m ⁻³	Annual mean (target)	2020
		15% cut in annual mean (urban background exposure)	2010 – 2020

Note: * how the Objectives are to be measured is set out in the UK Air Quality (England) Regulations (2000)

National air quality Objectives also apply for the protection of vegetation and ecosystems, which are termed Critical Levels. Critical Levels apply irrespective of habitat type and are based on the concentration of the relevant pollutants in air. IAQM guidance (IAQM, 2020) recommends that only the annual mean Critical Level is used in assessments due to the comparative importance of annual effects to impacts upon vegetation, except where specifically required by the regulator where high short-term emissions may occur, such as from an industrial stack emission source. As such, given the consistent traffic exhaust emission source along road links, only annual mean Critical Levels were considered.

The Critical Levels of relevance to this assessment are detailed in **Table 2-2**.

Table 2-2: Critical Levels

Pollutant	Critical Level	
	Concentration	Measured as
Oxides of Nitrogen (NO _x)	30 µg.m ⁻³	Annual Mean
Ammonia (NH ₃)	3 µg.m ⁻³	Annual Mean

2.2 National Policy Guidance

2.2.1 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) (MHCLG, 2021) was updated in July 2021 and refers to the LAQM process by recognising that:

“Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas”.

The NPPF identifies that local planning authorities should maintain consistency within the Local Air Quality Management process and states that:

“Planning decisions should ensure that any new development within Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.”

2.2.2 Planning Policy Guidance

The UK Government Planning Practice Guidance (MHCLG, 2019b) provides guidance on how the planning process can take account of the impact new development may have on air quality.

The guidance states that air quality may be relevant to a planning application where:

- Traffic in the vicinity of the development may be affected by increasing volume or congestion or altering the fleet composition on local roads;
- New point sources of air pollution are to be introduced;
- People may be exposed to existing sources of pollution including dust;
- Potentially unacceptable impacts (such as dust) may arise during construction; and
- Biodiversity may be affected.

2.3 Local Planning Policy Guidance

2.3.1 Local Plan (HPBC, 2016)

The HPBC Local Plan (HPBC, 2016) was adopted in April 2016 and sets out the council’s policies and direction for future development in the borough up to 2031.

The proposed site is allocated within the Local Plan.

“Policy DS 4: Adderley Place, Glossop

Land amounting to 6.3 hectares is allocated for residential development of approximately 130 dwellings. Development will be subject to compliance with other relevant Local Plan policies.”

The Local Plan was reviewed and policy of relevance to air quality is detailed below:

“Policy EQ 10: Pollution Control and Unstable Land

The Council will protect people and the environment from unsafe, unhealthy and polluted environments.

This will be achieved by:

- *Ensuring developments avoid potential adverse effects and only permitting developments that are deemed (individually or cumulatively) to result in the following types of pollution if any remaining potential adverse effects are mitigated to an acceptable level by other environmental controls or measures included in the proposals. This may be achieved by the imposition of planning conditions or through a planning obligation. The Council will not permit any proposal that has an adverse effect on a European site:*
 - ***Air pollution (including odours or particulate emissions)”***

The HPBC Local Plan (HPBC, 2016) has been declared partially out of date. A review of the Local Plan has commenced with consultation taking place in Quarter 1 of 2023, however the new Local Plan is not expected to be adopted until 2026.

The requirements of this policy were considered in this air quality assessment.

3 Methodology and Assessment Criteria

3.1 Data Sources

The assessment was undertaken with reference to information from numerous sources, as detailed in **Table 3-1**.

Table 3-1: Data Sources Used in the Air Quality Assessment

Data Sources	Reference
HPBC	2022 Air Quality Annual Status Report (ASR) (HPBC, 2022)
HPBC	2021 Air Quality ASR (HPBC, 2021)
HPBC	2018 and 2019 Air Quality ASR (HPBC, 2019)
Department for Environment Food and Rural Affairs (Defra)	LAQM Technical Guidance TG22 (Defra, 2022)
Defra's LAQM Support Tools	LAQM 1km x 1km grid background pollutant maps (Defra, 2020a)
Institute of Air Quality Management (IAQM)	Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2016)
IAQM and Environmental Protection UK (EPUK)	Land-use Planning and Development Control: Planning for Air Quality (IAQM & EPUK, 2017)

3.2 Baseline Air Quality Conditions

HPBC has published a series of Review and Assessment documents in accordance with the LAQM process. The latest ASR for 2022 (HPBC, 2022) (which contains 2021 data) was reviewed to establish baseline air quality conditions at, and in proximity to, the site.

Background air pollutant concentrations corresponding to the 1 x 1 km grid squares covering the study area were obtained from the latest 2018-based air pollutant maps provided by Defra (Defra, 2020a). Background concentrations for the base year (2019) were obtained to establish baseline air quality conditions at the receptor locations identified and were used for verification and the 2019 baseline scenario. 2026 background concentrations were used in the assessment of the development for the opening year.

3.3 Construction Phase Assessment

An assessment of potential impacts associated with the construction phase was undertaken in accordance with the IAQM guidance (IAQM, 2016). A summary of the assessment process is provided below:

Construction phase assessment steps:

- 1) Screen the need for a more detailed assessment;
- 2) Separately for demolition, earthworks, construction and trackout:
 - A. Determine potential dust emission magnitude;
 - B. Determine sensitivity of the area; and
 - C. Establish the risk of dust impacts.
- 3) Determine site specific mitigation; and
- 4) Examine the residual effects to determine whether or not additional mitigation is required.

It should be noted that trackout is defined as the transport of dust and dirt from the construction site onto the public road network. Full details of the assessment methodology are provided in **Appendix A**.

Defra technical guidance (Defra, 2022) states that emissions from Non-Road Mobile Machinery (NRMM)² used on construction sites are unlikely to have a significant impact on local air quality where relevant control and management measures are employed. As such, emissions from NRMM were not considered quantitatively in this assessment, and the relevant control measures to be employed are detailed in **Section 6**.

3.4 Operation Phase Road Traffic Emissions Assessment

The traffic data provided by the Transport Consultant was based on a quantum of 111 residential units; however, the application is for 92 units. As such, the trip generation figures used within this assessment are therefore robust and the assessment is considered reasonably 'worst-case'.

The number of vehicle trips generated by the Proposed Development during its operation were screened using the criteria detailed in **Table 3-4** to determine whether a detailed air quality assessment was required.

The transport consultant for the scheme advised that the scheme will generate 595 two-way LDV movements. When distributed on the local road network this results in a maximum increase on any road link of 335 AADT which occurs along Dinting Vale (A57) to the west of the site access.

This exceeds the IAQM and EPUK screening criteria detailed in **Table 3-4** for roads within or adjacent to an AQMA. A detailed air quality assessment was therefore required to assess the impact of development-generated traffic emissions at human receptors. The methodology for the detailed air quality assessment is included in **Section 3.4.1** below.

Consideration was also given to potential impacts of emissions from vehicles on the Ancient Woodlands (AWs) within 200 m of road network. Impacts were screened using criteria provided in Natural England guidance (Natural England, 2018).

3.4.1 Detailed Air Quality Assessment

The Atmospheric Dispersion Modelling System for Roads (ADMS-Roads) v5.0.1.3 was used to assess the potential local air quality impact associated with development-generated vehicle exhaust emissions, on ambient concentrations of NO₂, PM_{2.5} and PM₁₀ at identified existing sensitive human receptors located adjacent to the local road network. Air pollutant concentrations were also determined at the proposed residential dwellings within the development site to consider the suitability of the site for the proposed use.

² Non-Road Mobile Machinery is defined as any mobile machinery, transportable industrial equipment or vehicle fitted with an internal combustion engine not intended for passenger or goods transport by road. Explanatory Memorandum to the UK Non Road Mobile Machinery (Emissions of Gaseous & Particulate Pollutants) (Amendment) Regulations (2006).

3.4.1.1 Assessment Scenarios

The Proposed Development is anticipated to be completed and fully occupied in 2026. The assessment therefore considered the following scenarios:

- Scenario 1 – Verification / Base Year (2019);
- Scenario 2 – Opening year with existing road layout (2026) *'without development'*;
- Scenario 3 – Opening year with existing road layout (2026) *'with development'*;

The 2019 base year was selected as the most recent year with available meteorological and ambient air quality monitoring data to verify the results of the dispersion modelling assessment.

Sensitivity Test

The A57 Link Roads scheme was granted a Development Consent Order in August 2022 and is anticipated to be finished between 2025 and 2030. The A57 Link Roads project will include the creation of two new link roads, of which the A57 Link Road is proposed to create a new single carriageway link from the A57 at Mottram Moor to a new junction on the A57 in Woolley Bridge. The Proposed Development is located approximately 1.5 km to the north-east of the proposed A57 Link Road.

At the request of the Pollution Specialist Officer at HPBC, this assessment considered the impact of the A57 Link Road on traffic through the study area. As there was a recent legal challenge on the scheme, the assessment was included as a sensitivity test to mirror the approach taken by the project's Transport Consultant. The sensitivity test considered the following scenarios:

- Scenario 4 - Sensitivity test: Opening year with A57 Link Road (2026) *'without development'*
- Scenario 5 - Sensitivity test: Opening year with A57 Link Road (2026) *'with development'*

3.4.1.2 Traffic Data

The Transport Consultant for the scheme, SCP Transport, provided trip generation and distribution figures for the development.

Air Quality Consultants (AQC) carried out a roads modelling assessment on behalf of HPBC in 2019 to assess the need for an AQMA along Dinting Vale (HPBC, 2019). The assessment included all road links required in this assessment. The 24-hour AADT flows and Heavy Duty Vehicle (HDV) percentages were therefore obtained from the 2019 report and used within this assessment³. As the assessment used 2018 flows, the Transport Consultant provided growth factors to determine traffic flows for the base year (2019) and opening year (2026) scenarios using the Trip End Model Presentation Program (TEMPro), which takes into account traffic growth from committed developments.

For the sensitivity test, the Transport Consultant provided adjustment factors to account for the impact of the A57 Link Road on traffic flows on the road links within the study area. The adjustment factors were applied to the 2026 baseline traffic flows to determine the opening year (2026) flows with the A57 Link Road fully operational.

Table 3-2 details the impact of the A57 Link Road on traffic flows through the study area.

³ Table E.1, 2018 and 2019 ASR, HPBC, 2019.

Table 3-2: Impact of the A57 Link Road on traffic flows through the study area

Road Link	Change in 2026 traffic flows as a result of the A57 Link Road (%)
Dinting Vale (West of Glossop Road)	8.2%
Glossop Road	-5.3%
Dinting Vale (West of Site access)	-1.1%
Dinting Vale (East of Site access)	-1.0%
Dinting Vale (East of Dinting Lane)	-1.0%
Simmondly Lane	0.0%
Dinting Vale (East of Simmondly Lane)	-1.0%
Primrose Lane	15.8%
High Street West	-6.4%

A time varying emissions file was used to take account of the variation of traffic by hour of the day and day of the week. As no traffic surveys were undertaken as part of the Transport Assessment, hourly factors were calculated using the 2020 motor vehicles traffic distribution data obtained from the Department for Transport website⁴. **Figure 3-1** shows the diurnal profile of traffic flows on all roads by time of the day and day of the week.

Traffic speeds were included in the air dispersion model as follows:

- Small roundabouts and queues were modelled at 5km/h. Due to the known congestion within the study area, a speed of 5km/h was considered most appropriate at replicating the traffic conditions; and,
- Speed data for free-flowing traffic conditions were obtained from national speed limits.

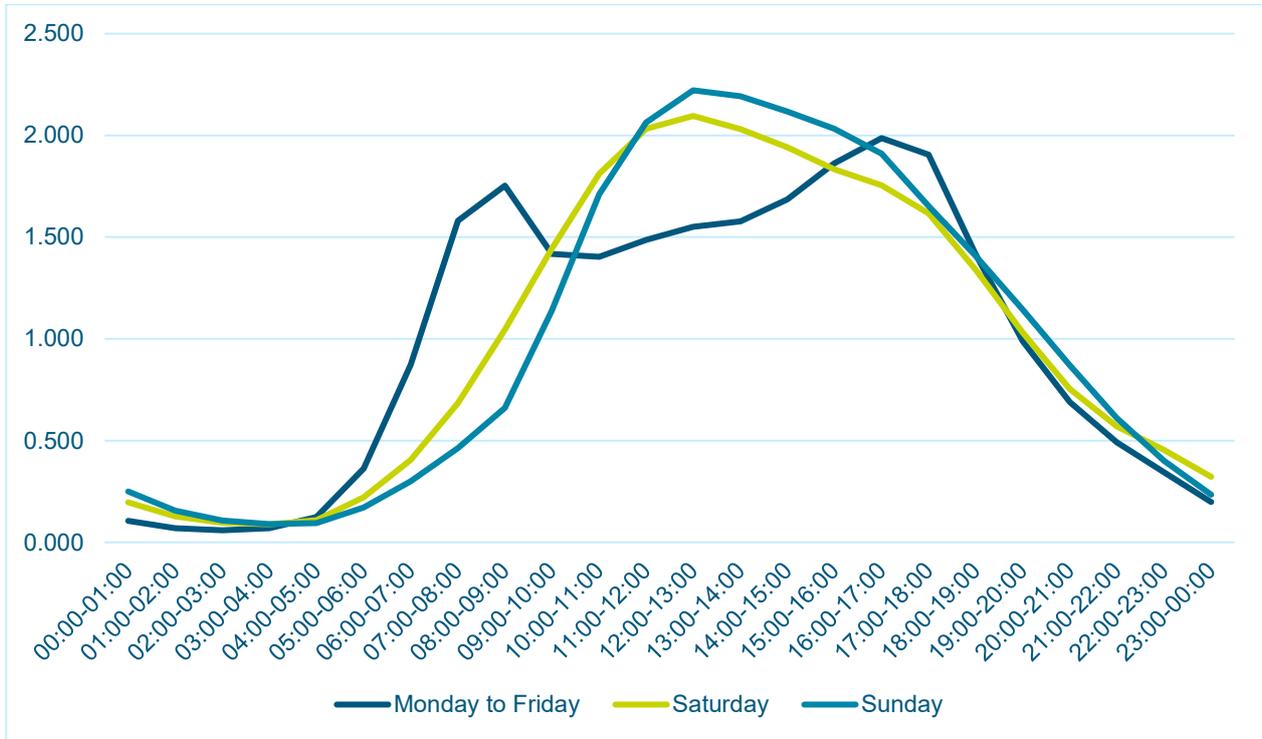
Benefits of the A57 Link Road include reducing congestion between Manchester and Sheffield, which encompasses Dinting Vale road located within the modelled study area, as well as reducing pollution for neighbouring properties. Despite the A57 Link Road reducing congestion in the local area, traffic speeds were kept the same in the sensitivity test scenarios to provide a conservative assessment.

Much of the study area is impacted by street-canyons, where poor dispersion leads to increased concentrations of pollutants. Street canyons were therefore modelled with location specific heights using the 'Advanced Street Canyon' module within ADMS-Roads. Street canyons were also used in the modelling assessment undertaken by AQC on behalf of HPBC (HPBC, 2019). Following a review on Google Streetview to confirm that their assumptions remained appropriate, their approach was replicated with street canyons assigned in the same locations. Building heights were estimated from Google Streetview.

Traffic data for each road link used in the assessment are detailed in **Appendix B**.

⁴ Table TEA0307 Motor vehicle traffic distribution by time of day and day of the week on all roads, Great Britain: 2020, Department for transport: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/981987/tra0307.ods

Figure 3-1: Diurnal Flow Profile for All Roads by Hour of the Day and Day of Week



3.4.1.3 Meteorological Data

The closest meteorological station to the Proposed Development site is located at Manchester Airport, located 22.6 km to the south-west. The difference in elevation between the development site and Manchester Airport is -48.5 m.

It is noted from the most recent HPBC ASR that data from the Emley Moor meteorological station was used in the modelling undertaken by AQC on behalf of HPBC. This station is located 26.4 km to the north-east. However, 100 % of cloud cover data was missing for all years between 2017 and 2021 and the difference in elevation is 140.5 m.

Neither of these sites provide data that are truly representative of the Dinting Vale site, given the distances from the Proposed Development and the difference in elevation.

Accordingly, for this particular assessment, given the remote location of the site from meteorological recording stations, numerical weather prediction (NWP) met data were used. This consists of hourly sequential data that are synthesised by the UK Meteorological Office from their global weather model systems. The data, which can be generated for the entire UK land area, on a resolution of a 3 km by 3 km grid, have been widely available for the last 15 years and are now widely used for air quality impact modelling assessments in areas remote from active recording stations. A further advantage of using this data is that the records are always 100 % complete, being uncompromised by equipment outages and the detection limits of instruments, particularly some of the older wind anemometers, which can have lower cut-off wind speeds of 1 m s⁻¹.

Research carried out by Lucas and Bethan⁵, demonstrated that NWP data produces no significant changes on the accuracy of short- and long-term dispersion modelling predictions when compared to observed weather data. A literature review carried out by Ball, Hill and Jenkinson (2008) stated an advantage of NWP data over meteorological measurement data is the absence of gaps in the data series⁶. Therefore, it is considered reliable for this assessment.

In this instance, the NWP was centred at the site and therefore takes into account the general topography of the local area. The data was in the form of an hourly sequential dataset for 2019.

3.4.1.4 Surface Roughness and Gradients

Surface roughness is a value (in metres) which is used to modify the wind profile within the model to represent the spatial density, orientation and height of obstacles to the approaching wind. A surface roughness of 0.3 m was selected to represent the dispersion and met site which is representative of 'Agricultural areas (max)'.

Road-traffic emissions on roads with a gradient >2.5% can increase emissions significantly, especially HDVs (Defra, 2022). The main access road into the Proposed Development includes a single length of road at a gradient of 1:10. This was incorporated into the 'with development' scenarios to identify the impact on the adjoining residential properties (modelled existing receptors ER1 and ER2), as requested by the Pollution Specialist Officer (detailed in **Table 1-1**). The impact of the gradient on road traffic emissions was calculated using the latest version of the Emission Factor Toolkit (EFT), in accordance with Defra guidance in LAQM.TG (Defra, 2022).

⁵ *NWP parameters for use in ADMS 3.1 dispersion modelling. Lucas V and Bethan, S., 2004*

⁶ *Integration of air quality modelling and monitoring methods: review and applications., EA, 2008.*

3.4.1.5 Model Verification

Model verification is the process of adjusting model outputs to improve the consistency of modelling results with respect to available monitored data. In this assessment, model uncertainty was minimised following Defra and IAQM & EPUK guidance.

HPBC undertakes monitoring using NO₂ diffusion tubes at three locations along the A57 in close proximity of the site, as shown in **Figure 4-1**. The verification process was undertaken using these three diffusion tubes. As detailed in **Section 3.4.1.2**, much of the study area is impacted the effects of street-canyons. The monitoring locations used for verification are within street-canyons, therefore leading to increased concentrations of pollutants.

The derived adjustment factor is provided in **Table 3-3**.

Table 3-3: Model Verification

Model Verification	NO ₂ Monitoring Location		
	HP21	HP22	HP25
2019 Annual Mean Monitored Total NO ₂ Concentration (µg.m ⁻³)	38.9	31.3	46.3
2019 Annual Mean Background NO ₂ Concentration* (µg.m ⁻³)	9.78	9.86	9.78
Monitored Road Contribution NO _x (total - background) (µg.m ⁻³)	59.0	41.9	76.6
Modelled Road Contribution NO _x (excludes background) (µg.m ⁻³)	22.8	20.2	42.4
Ratio of Monitored Road Contribution NO _x / Modelled Road Contribution NO _x	2.59	2.08	1.81
Adjustment Factor for Modelled Road Contribution	2.00		
Adjusted Modelled Road Contribution NO _x (µg.m ⁻³)	45.5	40.3	84.6
Modelled Annual Mean Total NO ₂ (based on empirical NO _x / NO ₂ relationship) (µg.m ⁻³)	32.9	30.4	49.6
Monitored Annual Mean Total NO ₂ (µg.m ⁻³)	38.9	31.3	46.3
% Difference [(modelled - monitored) / monitored] x 100	-15 %	-3 %	7 %
*Obtained from Defra background maps			

The Root Mean Square Error (RMSE) is “used to define the average error or uncertainty of the model” and should be within the ideal value of 4 µg.m⁻³ (i.e. 10% of the annual mean NO₂ Objective of 40 µg.m⁻³), as specified in Defra technical guidance (TG22) (Defra, 2022). If the RMSE value is higher than ± 25% of the Objective (i.e. 10 µg.m⁻³), Defra guidance recommends that model inputs and verification should be revised. The RMSE of the model was 4 µg.m⁻³. Model performance in this assessment was therefore considered to be suitable, as the RMSE was within the ideal value.

The greatest difference between the modelled and monitored concentrations occurs at the diffusion tube site HP21. HP21 is located along Dinting Vale (A57) on the façade of Dinting C of E Primary School in close proximity to a bus stop and a pedestrian crossing. Both the bus stop and pedestrian crossing are a source of localised emissions due to idling vehicles however they are difficult to replicate in the dispersion model.

3.4.1.6 Emission Factors

Emission factors were obtained from the EFT v11 provided by Defra (Defra, 2022). Emission factors of NO_x, PM₁₀ and PM_{2.5} for the Base Year (2019) and Opening Year (2026) were used in the assessment scenarios. This approach was agreed with HPBC during consultation. Whilst there has historically been some uncertainty as to the future emission forecasts contained within the Emission Factor Toolkit, research undertaken by Air Quality Consultants (Air Quality Consultants, 2020a) concluded that v10.1 of the Emission Factor Toolkit, which contains identical emissions factors and route types to EFT v11 for the years 2018 to 2030, provides a reasonable prediction of vehicle emissions into the future, and that sensitivity testing is not required.

3.4.1.7 Conversion of NO_x to NO₂

NO_x concentrations were predicted using the ADMS-Roads model. The modelled road contribution of NO_x at the identified receptor locations was converted to NO₂ using the NO_x to NO₂ calculator v8.1 (Defra, 2020b), in accordance with Defra guidance (Defra, 2022).

3.4.1.8 Calculation of Short-Term Pollutant Concentrations

A relationship between the annual mean and the number of 24-hour mean exceedances of PM₁₀ was taken from Defra guidance (Defra, 2022):

$$\text{Number of 24-Hour Mean Exceedances} = -18.5 + 0.00145 * \text{Annual Mean}^3 + (206 / \text{Annual Mean})$$

This method was used in the assessment to predict the number of 24-hour mean exceedances of the relevant PM₁₀ Objective. The method does have limitations as it can not be applied when the annual mean PM₁₀ concentration is lower than 14.8 µg.m⁻³ however, below this value it can assumed the number of exceedances is 0.

Research projects completed on behalf of Defra and the Devolved Administrations (Laxen and Marnier, 2003 and AEAT, 2008) concluded that the hourly mean NO₂ Objective is unlikely to be exceeded if annual mean concentrations are predicted to be less than 60 µg.m³. This value was therefore used as an annual mean equivalent threshold to evaluate likely exceedance of the hourly mean NO₂ Objective.

3.5 Assessment Significance Criteria

3.5.1 Construction Phase Dust and Particulate Matter Assessment

In assessing the significance of construction dust impacts using the IAQM guidance (IAQM, 2016), the dust emission magnitude is combined with the sensitivity of the area to determine the risk of impacts prior to mitigation. Full details are provided in **Appendix A**. Once appropriate mitigation measures were identified, the significance of construction phase impacts were determined.

3.5.2 Operational Phase Road Traffic Emissions Assessment

3.5.2.1 Human Receptors

Screening

The potential impact on local air quality of traffic movements generated by the Proposed Development were screened using the methodology detailed in the latest IAQM and EPUK guidance (IAQM and EPUK, 2017).

This document sets out criteria for increases in traffic flows for Light Duty Vehicle (LDV) and Heavy Duty Vehicle (HDV) movements, above which a detailed assessment of air quality impacts may be required. If

increases in traffic flows are below the criteria, there are unlikely to be any significant air quality impacts as a result of the development and detailed assessment of air quality is not necessary.

If the criteria are exceeded, either a simple or detailed assessment should be undertaken. Where it can be concluded that a significant impact on local air quality is unlikely to occur, a simple assessment can be carried out. If significant impacts are possible, then detailed dispersion modelling may be required.

The assessment criteria are detailed in **Table 3-4**.

Table 3-4: IAQM and EPUK Road Traffic Assessment Criteria

Vehicle Type	Criteria
LDVs	A change in AADT of more than 100 within or adjacent to an AQMA, or more than 500 elsewhere
HDVs	An increase in HDV movements of more than 25 per day within or adjacent to an AQMA, or more than 100

Detailed Assessment

Where a detailed dispersion modelling was determined to be required, the significance of effects were determined for existing and proposed receptors as set out below.

Proposed Receptors

Predicted pollutant concentrations at the development site were compared to the UK air quality Objective values. This enabled a determination of the suitability of the site in relation to future air pollution levels.

Existing Receptors

Guidance is provided by the IAQM and EPUK (IAQM & EPUK, 2017) on determining the significance of a development's effect on local air quality. **Table 3-5** details the impact descriptors that take account of the magnitude of change in the predicted pollutant concentration, and the concentration in relation to the air quality Objectives. The guidance recommends that the assessment of significance of effect should take into account the following factors:

- The existing and future air quality in the absence of the Proposed Development;
- The extent of current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

The guidance also states that a judgement of impact significance should be made by a competent professional who is suitably qualified. This air quality assessment and determination of the significance of the development on local air quality was undertaken by current members of the IAQM.

Table 3-5: Impact Descriptors for Individual Receptors

Annual Mean Concentration Predicted at Receptor in Assessment Year	% Change in Concentration relative to the Air Quality Assessment Level (AQAL)			
	1 to 2	2 to 5	6 to 10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76% to 94% of AQAL	Negligible	Slight	Moderate	Moderate
95% to 102% of AQAL	Slight	Moderate	Moderate	Substantial
103% to 109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Note: Figures are to be rounded up to the nearest round number. Any value less than 1% after rounding (effectively less than 0.5%) will be described as "Negligible".

3.5.2.1 Designated Ecological Sites

Natural England guidance on the assessment of road traffic impacts on designated ecological sites (Natural England, 2018) references the screening criteria contained in the DMRB guidance (Highways England, 2019) to determine whether a development may give rise to significant impacts on habitats. These criteria are detailed in **Table 3-6**.

Table 3-6: Screening Criteria for Designated Ecological Sites

Guidance document	Criteria	
DMRB	LDVs	Increase of 1,000 annual average daily traffic (AADT) or more
	HGVs	An increase in HGV movements of 200 per day or more

The screening criteria detailed above are considered by Natural England to equate to a 1% change in the Critical Load or Level (Natural England, 2018) which is regarded as a threshold of insignificance. A change of this magnitude is likely to be within the natural range of fluctuations in deposition and is unlikely to be perceptible.

However, consideration should be given to impacts associated with a project or plan both in isolation, and in addition to other plans or projects which may affect the same designated site (an 'in-combination' assessment). The outcome of recent court judgements (notably the Wealden Judgement, 2017) has led to the requirement for the 1% criterion (or the screening criteria detailed in **Table 3-6**) to be applied to the in-combination impact to determine whether impacts remain insignificant, or whether further ecological investigation is required.

4 Description of Baseline Conditions

4.1 Local Air Quality Management

The Proposed Development is not located within a statutory AQMA; however, Dinting Vale (A57), the road adjacent to the Proposed Development, was declared an AQMA in 2019 in respect of annual mean concentrations of NO₂.

4.2 Air Quality Monitoring

Automatic (continuous) monitoring was undertaken at one site within HPBC during 2020. This was at a rural site located at Ladybower 15.3 km to the south-east. Due to the distance and rural setting of this monitoring site, this site is not considered representative of the Proposed Development.

As mentioned previously, HPBC undertake ambient air quality monitoring within the study area using NO₂ diffusion tubes. HPBC does not undertake diffusion tube monitoring at any background locations. Monitoring locations are shown in **Figure 4-1**. Monitoring data from 2016 to 2020 locating along the A57 in close proximity to the Proposed Development are detailed in **Table 4-1** and exceedances of the annual mean Objective are shown in bold text.

Table 4-1: Annual Mean NO₂ Monitoring Data (2016 - 2020)

Site Ref.	Location	Site Type	Distance to the development site	Monitored Concentration – Annual Mean (µg.m ⁻³)				
				2017	2018	2019	2020	2021
HP21*	Dinting School (A57)	Roadside	30 m to the east	44.4	41.3	38.9	29.3	32.4
HP25*	A57 / Dinting Vale / Glossop Road (West Bound)	Roadside	130 m to the northwest	-	53.6	46.3	36.1	36.6
HP22*	236 High Street West, Glossop (A57)	Roadside	350 m to the east	37.2	33.6	31.3	24.7	26.4

Notes: * Diffusion tubes are located in duplicate

The results in **Table 4-1** show that the annual mean NO₂ Objective of 40 µg.m⁻³ was exceeded at two locations across the five-year period, which is consistent with the AQMA designation. The annual mean Objective was not exceeded at any locations in 2020 or 2021; however, monitoring data from these years should be treated with caution as the Covid-19 pandemic had a significant impact on traffic levels. Despite this, monitoring still indicates a declining trend in annual mean concentrations of NO₂ since at least 2017.

HPBC do not carry out any monitoring of PM₁₀ or PM_{2.5} within the study area.

4.1 Defra Background Maps

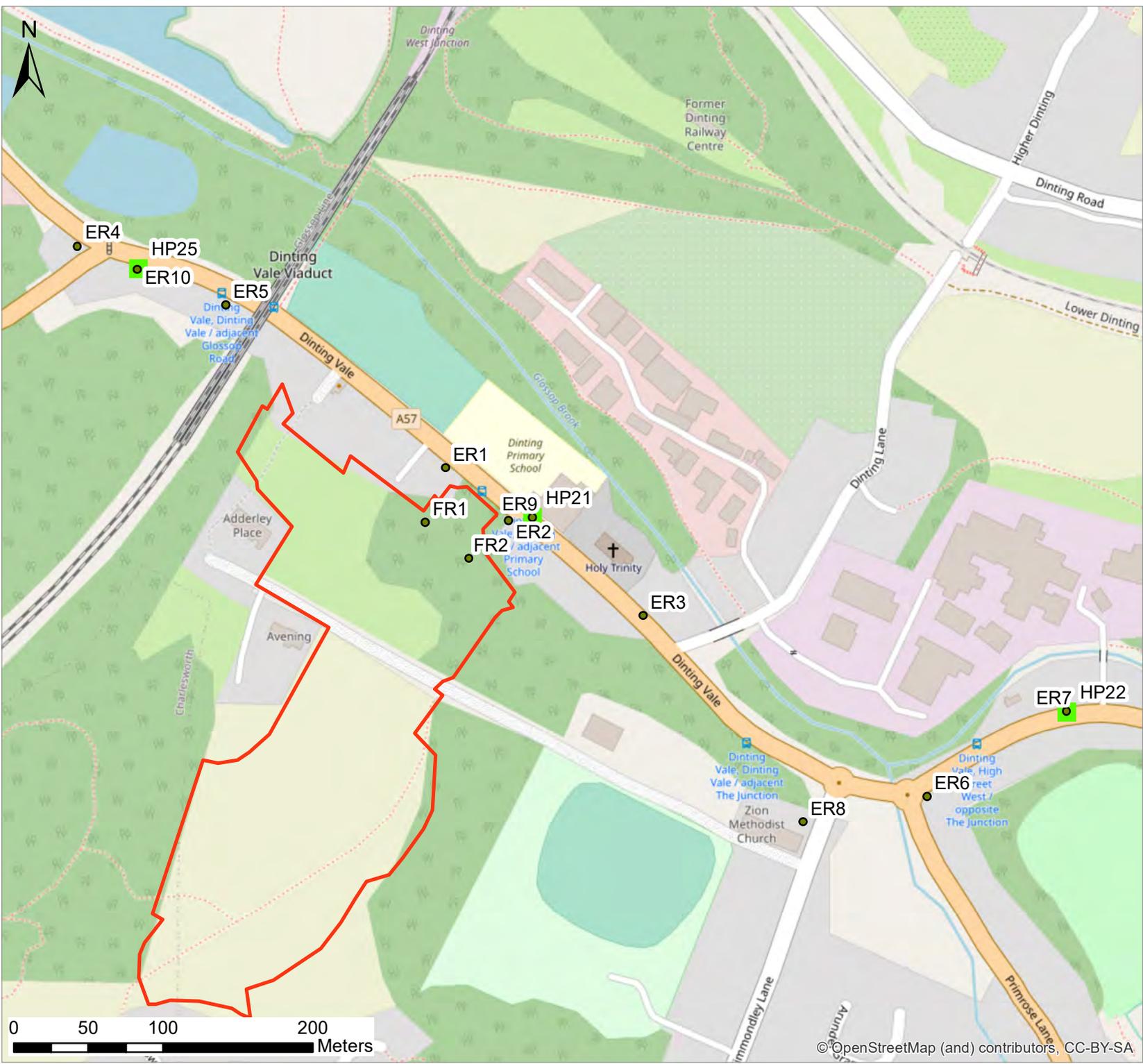
Reference was also made to Defra's background air pollution maps available on the UK-Air website. The background maps are presented in 1 km x 1 km grid squares across England, Wales, Scotland and Northern Ireland. The current version of the background maps (reference year 2018) contains estimates for oxides of nitrogen (NO_x), NO₂, PM₁₀ and PM_{2.5} for the period 2018 to 2030.

Predicted background concentrations for the base year (2019), current year (2023) and opening year (2026) are summarised in **Table 4-2**.

Table 4-2: Predicted Annual Mean Background Map Concentrations for Grid Square 401500, 394500

Pollutant	Annual mean concentration ($\mu\text{g.m}^{-3}$)			Air quality Objective
	2019	2023	2026	
NO _x	12.06	11.02	9.94	-
NO ₂	9.86	8.51	7.72	40
PM ₁₀	9.78	9.29	9.08	40
PM _{2.5}	6.58	6.21	6.05	25

Background concentrations of NO₂, PM₁₀ and PM_{2.5} at the Proposed Development were 'well below' (less than 75% of) their respective annual mean air quality Objective for all years reviewed.



Legend

- Modelled Receptor Locations
- Diffusion Tube Monitoring Sites
- Red Line Boundary (approx.)

Title
Diffusion Tube and Modelled Receptor Location Plan

Project
Dinting Vale, Glossop

Client
Wain Homes (Noth West) Ltd

Date
28/02/2022

Scale
1:3500

Figure
Figure 4-1

Checked by
CG

Number
1



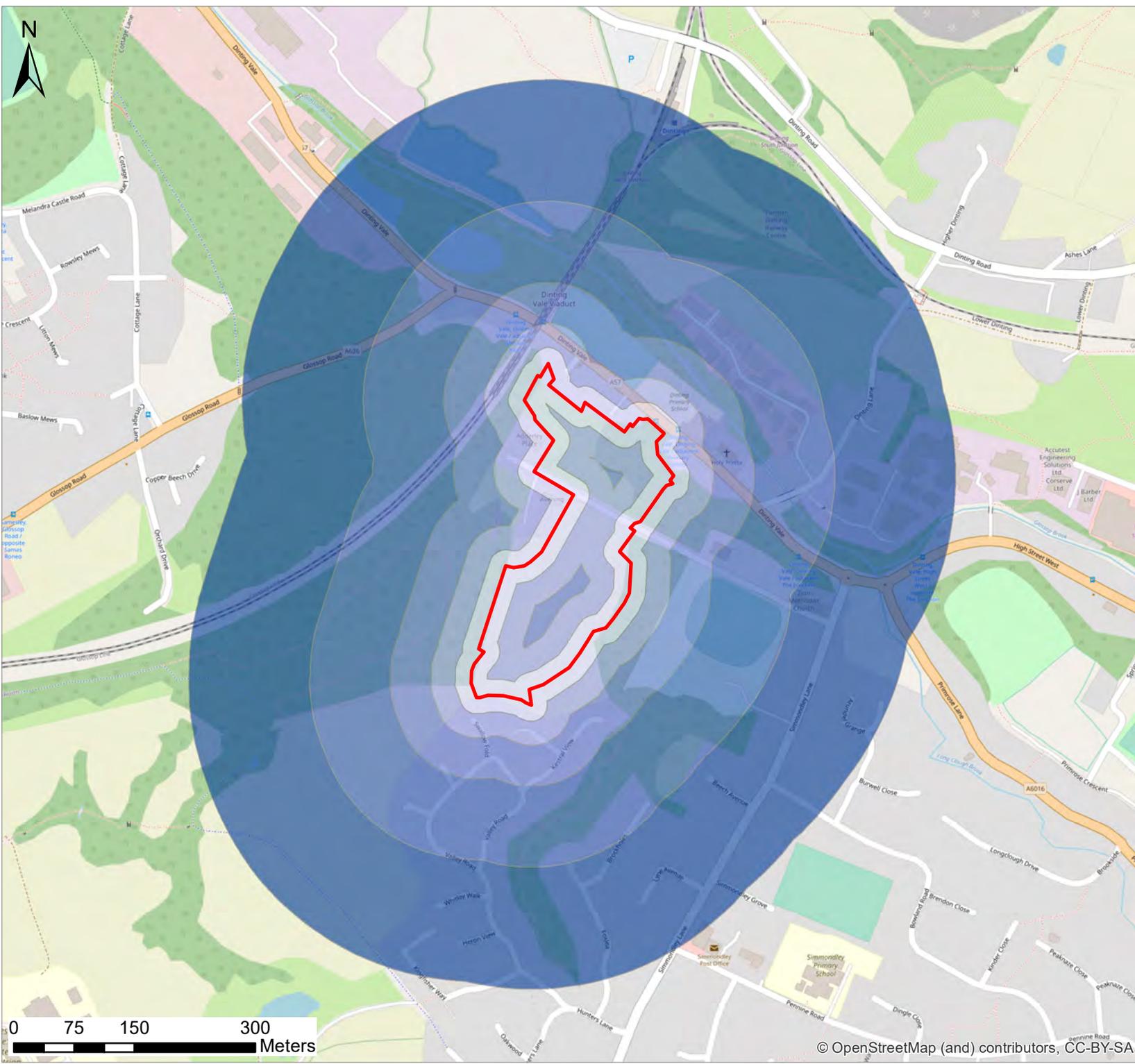
4.2 Identification of Receptor Locations

4.2.1 Construction Phase Dust and Particulate Matter Assessment

The IAQM (IAQM, 2016) guidance states that a Detailed Assessment is required if 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). Internal guidance from Natural England recommends that ecological receptors within 200 m of a site should be considered in a construction dust and particulate matter assessment, as opposed to only those ecological sites within 50 m of the site (as stated in IAQM guidance). There are no statutory designated ecological sites within 200 m of the site boundary however, Dinting Vale Wood, an ancient woodland, is located 40 m to the west of the southern boundary at its closest point. There are human receptors within 350 m of construction phase works. A Detailed Assessment was therefore required.

The closest human receptors to construction phase works are located within 20 m of the site boundary to the north, west and south.

The distance boundaries for the construction phase assessment are detailed in **Figure 4-2**.



Legend

Red Line Boundary (approx.)

Construction Phase Dust Distance Buffers

- 20 m
- 50
- 100
- 200
- 350

Title
Distance Boundaries for the Construction Phase Assessment

Project
Dinting Vale, Glossop

Client
Wainhomes

Date	Scale
12/04/2022	1:6500

Figure
Figure 4-2

Checked by	Number
CG	1



4.2.2 Operational Phase Road Traffic Emissions Assessment

4.2.2.1 Designated Ecological Sites

The Dinting Vale Wood is designated an Ancient Woodland and is located within 200 m of the assessed road network.

4.2.2.2 Human Health

Proposed Receptors

Proposed on-site receptor locations were included in the assessment to determine the suitability of the site for the proposed use. The assessment considered potential future public exposure at locations of proposed residential dwellings located closest to pollution sources (roads). Receptors were included in the dispersion model at a height of 1.5 m to represent expected exposure (breathing height). Receptors were chosen in reasonable 'worst-case' locations to provide a conservative assessment.

The proposed receptor locations are detailed in **Table 4-3** and **Figure 4-1**.

Table 4-3: Proposed Receptor Locations

Receptor	Location	Grid Reference (m)	
		X	Y
PR1	Proposed residential receptor	401990	394341
PR2	Proposed residential receptor	402019	394317

Existing Receptors

Existing sensitive receptor locations were identified within the study area for consideration in the assessment. Predicted changes in NO₂, PM_{2.5} and PM₁₀ concentrations as a result of development-generated traffic were determined at these locations.

The sensitive receptor locations were selected based on their proximity to road links affected by the Proposed Development, where the potential effect of development-generated traffic emissions on local air pollution has the potential to be most significant.

The Pollution Specialist Officer commented on the difference in the predicted concentrations within the 2019 base year and verification scenario, compared with the monitored concentrations at nearby diffusion tubes, as detailed in **Table 1-1**. The location of the existing receptors ER7 and ER9 included within the comparison were amended to the location of the diffusion tubes so a more direct comparison could be undertaken. The location of receptor ER10 remained the same.

Receptors were modelled at a height of 1.5 m.

The sensitive receptor locations are detailed in

Table 4-4 and in **Figure 4-1**.

Table 4-4: Existing Sensitive Receptor Locations

Receptor	Location	Receptor type	Grid Reference	
			X	Y
ER1	45 Dinting Vale	Residential	402003	394377
ER2	35 Dinting Vale	Residential	402045	394342
ER3	12 Dinting Vale	Residential	402135	394279
ER4	Junction of Dinting Vale and Glossop Road	Residential	401757	394524
ER5	87 Dinting Vale	Residential	401856	394485
ER6	379 High Street W	Residential	402325	394159
ER7* (HP22)	234 High Street W	Residential	402418	394215
ER8	8 Simmondley Lane	Residential	402242	394142
ER9* (HP21)	Dinting C of E Primary School / Holy Trinity Church C of E	School	402061	394344
ER10** (HP25)	105 Dinting Vale	Residential	401797	394507

* Receptor locations were adjusted to match the corresponding diffusion tube site operated by HPBC
 ** HP25 is located on a lamppost therefore receptor ER10 was located on the closest façade of the nearest residential property.
 (HP##) The HPBC operated diffusion tube site in the same location/close proximity to the modelled receptor

4.3 Background Concentrations

2019 background concentrations of NO₂, PM_{2.5} and PM₁₀ were obtained from the latest 2018-based air pollutant concentration maps provided by Defra for the grid squares covering the study area and were used for model verification and in the 2019 baseline scenario. 2026 background concentrations were used for the future year scenarios. The background concentrations used in the assessment are detailed in **Table 4-5**.

Table 4-5: Background Pollutant Concentrations (µg.m⁻³)

Receptor	2019 Concentration (µg.m ⁻³)			2026 Concentration (µg.m ⁻³)		
	NO ₂	PM ₁₀	PM _{2.5}	NO ₂	PM ₁₀	PM _{2.5}
ER1	9.78	9.58	6.45	7.65	8.88	5.93
ER2	9.78	9.58	6.45	7.65	8.88	5.93
ER3	9.78	9.58	6.45	7.65	8.88	5.93
ER4	9.86	9.78	6.58	7.72	9.08	6.05
ER5	9.86	9.78	6.58	7.72	9.08	6.05
ER6	9.78	9.58	6.45	7.65	8.88	5.93
ER7	9.78	9.58	6.45	7.65	8.88	5.93
ER8	9.78	9.58	6.45	7.65	8.88	5.93
ER9	9.78	9.58	6.45	7.65	8.88	5.93
ER10	9.86	9.78	6.58	7.72	9.08	6.05

Background concentrations of NO₂, PM_{2.5} and PM₁₀ within the study area were 'well below' (less than 75% of) their respective annual mean air quality Objectives and PM_{2.5} target. Concentrations of PM₁₀ and PM_{2.5} do not show such a reduction into the future as NO₂, as the primary drivers for reductions in NO₂ are improvements in emission standards and the increased uptake of low-emission vehicles. Emissions of PM₁₀ and PM_{2.5} do not occur solely from exhausts, as these pollutants are also emitted from brake and tyre wear and natural sources, and therefore their rate of reduction is slower even when higher proportions of low-emission vehicles are within the national fleet.

4.4 Baseline Road Traffic Emissions Assessment

The ADMS-Roads model was used to estimate contributions of vehicle exhaust emissions to annual and short-term NO₂, PM_{2.5} and PM₁₀ concentrations for the 'base year' (2019) and opening year 'without development' (2026) scenarios considered in the assessment. The 24-hour AADT flows and HDV percentages used in the assessment are detailed in **Appendix B**.

Table 4-6 provides the results of the baseline assessment, which include modelled road traffic and background contributions. Exceedances of the annual mean Objective are shown in bold text.

Table 4-6: Predicted Baseline NO₂, PM_{2.5} and PM₁₀ Annual Mean Concentrations (µg.m⁻³) at Existing Receptor Locations

Receptor	Annual Mean NO ₂ (µg.m ⁻³)	PM ₁₀		Annual Mean PM _{2.5} (µg.m ⁻³)
		Annual Mean (µg.m ⁻³)	Number of days >50 µg.m ⁻³	
Scenario 1: Base Year (2019)				
ER1	17.8	11.1	0	7.3
ER2	36.5	15.2	0	9.7
ER3	28.0	13.2	0	8.6
ER4	24.8	11.0	0	7.4
ER5	20.2	11.3	0	7.5
ER6	29.2	11.2	0	7.4
ER7	31.1	12.7	0	8.3
ER8	14.3	10.0	0	6.7
ER9	33.8	13.8	0	8.9
ER10	45.9	12.9	0	8.5
Scenario 2: Without Development (2026)				
ER1	12.5	10.4	0	6.8
ER2	24.5	14.6	0	9.1
ER3	19.0	12.7	0	8.0
ER4	17.3	10.3	0	6.8
ER5	14.2	10.7	0	6.9
ER6	20.4	10.5	0	6.8
ER7	19.1	12.0	0	7.7
ER8	10.4	9.3	0	6.2
ER9	20.6	13.1	0	8.3
ER10	31.5	12.1	0	7.8
Air Quality Objective	Annual mean NO₂ and PM₁₀ Objective of 40 µg.m⁻³ Annual Mean PM_{2.5} Objective of 25 µg.m⁻³ No greater than 35 exceedances of the daily mean PM₁₀ Objective of 50 µg.m⁻³			

Pollutant concentrations were predicted to be below the annual mean Objectives at the majority of receptors in the 2019 baseline scenario with the exception of annual mean NO₂ concentrations at ER10. This receptor is located near the junction of Glossop Road and Dinting Vale, on the façade of the residential property closest to the location of the HPBC diffusion tube monitoring site HP25 which recorded a concentration of

46.3 $\mu\text{g.m}^{-3}$ in the same year. This was the only diffusion tube site operated by HPBC within Dinting Vale which recorded exceedances of the annual mean Objective in 2019. Further details of the comparison between predicted and monitored NO_2 concentrations are provided below.

All pollutant concentrations were predicted to be below the annual mean Objectives at all receptors in the 2026 future year baseline scenario.

In accordance with Defra guidance (Defra, 2022), it may be assumed that exceedances of the 1-hour mean Objective for NO_2 are unlikely as the predicted annual mean concentrations are less than $60 \mu\text{g.m}^{-3}$. The short-term PM_{10} Objective was predicted to be met at all modelled locations with no exceedances of the daily mean Objective of $50 \mu\text{g.m}^{-3}$.

4.4.1 Comparison of predicted and monitored NO_2 concentrations

The Pollution Specialist Officer at HPBC noted the difference between monitored and modelled NO_2 concentrations in the verification and 2019 base year scenario. The reason for this discrepancy was that the receptor locations did not exactly match the modelled diffusion tube locations; as such, modelled receptor locations were amended to be more representative of the diffusion tube sites operated by HPBC. **Table 4-7** below compares the monitored concentrations against the representative modelled receptor in the verification and 2019 base year scenarios.

All existing receptors in the 2019 base year scenario were modelled at a height of 1.5 m to represent breathing height, whereas for the purpose of model verification the diffusion tubes were modelled at the height stated within the ASR.

Table 4-7: Comparison between monitored and modelled NO_2 concentrations in the verification and 2019 base year scenarios

Receptor	2019 Annual Mean Monitored Total NO_2 Concentration ($\mu\text{g.m}^{-3}$)	Verification		2019 Base Year	
		Modelled Annual Mean Total NO_2 ($\mu\text{g.m}^{-3}$)	% Difference [(modelled - monitored) / monitored] x 100	Modelled Annual Mean Total NO_2 ($\mu\text{g.m}^{-3}$)	% Difference [(modelled - monitored) / monitored] x 100
ER7 (HP22)*	31.3	30.4	-2.9 %	31.1	-0.6%
ER9 (HP21)*	38.9	32.9	-15 %	33.8	-13.1%
ER10 (HP25)**	46.3	49.6	7 %	45.9	-0.9%

* Receptor locations were adjusted since the original air quality assessment to match the corresponding diffusion tube operated by HPBC

** HP25 is located on a lamppost therefore receptor ER10 was located on the closest façade of the nearest residential property.

(HP##) HPBC operated diffusion tube in the same/close proximity to the modelled receptor

With the amended existing receptor locations, the predicted concentrations in the verification and 2019 base year scenarios are more closely aligned. The difference in the concentrations between the two scenarios is attributed to the difference in modelled receptor height. In addition, for modelled receptor ER10, the diffusion tube HP25 is located on a lamppost adjacent to the roadside whereas ER10 is located

on the façade of the nearest residential property. Diffusion tube HP25 is therefore exposed to increased levels of road traffic emissions.

As stated in **Section 3.4.1.5**, the greatest difference between the monitored and modelled concentrations in the verification scenario occurs at HP21. This is due localised sources of emissions (a bus stop and pedestrian crossing) near to the diffusion tube site which are difficult to replicate in the dispersion model.

5 Impact Assessment

5.1 Construction Phase Dust and Particulate Matter Assessment

A qualitative assessment of construction phase dust and PM₁₀ emissions was carried out in accordance with IAQM guidance (IAQM, 2016). Full details of the methodology and dust assessment undertaken are provided in **Appendix A**.

The construction works associated with the Proposed Development have the potential to impact on local air quality conditions, as follows:

- Dust emissions generated by demolition, excavation, construction and earthwork activities associated with the construction of the Proposed Development have the potential to cause nuisance to, and soiling of, sensitive receptors;
- Combustion emissions (especially NO₂, but also PM_{2.5} and PM₁₀) generated by construction traffic travelling on the local road network have the potential to adversely impact local air quality at sensitive receptors situated adjacent to the routes utilised by construction vehicles; and
- Emissions of NO₂, PM_{2.5} and PM₁₀ from non-road mobile machinery (NRMM) operating within the Proposed Development site have the potential to adversely impact local air quality at sensitive receptors in close proximity to the works.

The potential for sensitive receptors to be affected will depend on where the dust-generating activity takes place within the application site, the nature of the activity and mitigation measures in place (controls), the meteorological dispersion conditions and the distance of the receptor from the dust emission source.

As described in **Section 3.3**, emissions from NRMM have not been considered in the assessment, but the relevant control and management measures are included in **Section 6**.

5.1.1 Step 1: Screen the Need for a Detailed Assessment

The IAQM guidance states that a Detailed Assessment is required if there are human receptors located within 350 m and ecological sites within 200 m (from Natural England internal guidance) of the site boundary. There are human receptors present within 350 m of the site boundary and Dinting Vale Wood is located within 200 m of the Proposed Development. Therefore, a Detailed Assessment was undertaken.

5.1.2 Step 2A: Define the Potential Dust Emission Magnitude

The IAQM guidance recommends that the dust emission magnitude is determined for demolition, earthworks, construction and trackout. The dust magnitudes for these activities were determined from site plans and in accordance with the IAQM methodology and, are summarised in **Table 5-1**.

As a worse case, it was assumed for the purposes of the construction phase dust assessment that the construction activities (i.e. earthworks, construction and trackout) will occur in close proximity to the nearby

residential properties. This therefore represents a conservative scenario should the development be constructed in phases.

Table 5-1: Dust Emission Magnitude for the Site

Construction Activity	Dust Magnitude	Justification
Demolition	n/a	The site is undeveloped therefore no demolition activities are required. The impacts of dust arising from the demolition phase have not been considered further.
Earthworks	Large	Total site area >10,000 m ² .
Construction	Medium	Total building volume was estimated to be between 25,000 m ³ to 100,000 m ³ .
Trackout	Large	As the site is undeveloped, the unpaved road length will be > 100 m. However, it is anticipated the construction of the internal road network will take place early in the construction programme.

The risk of potential impact of construction phase dust and PM₁₀ emissions during earthworks, construction and trackout is used to recommend appropriate mitigation measures. The dust magnitude for construction activities was categorised as '**medium**' for construction and '**large**' for all other applicable activities.

5.1.3 Step 2B: Define the Sensitivity of the Area

The sensitivity of human receptors to dust soiling and health effects of PM₁₀ associated with earthworks, construction and trackout activities during construction of the Proposed Development were determined and are summarised in

Table 5-2.

5.1.3.1 Sensitivity of the Area to Dust Soiling

- Earthworks and construction: it is assumed there will be between 10 to 100 high sensitivity residential receptors within 20 m of the site boundary. The sensitivity is therefore **high**.
- Trackout: it is assumed that greater than 100 residential receptors would be present within 50 m of roads used to access the site, up to 500 m from the site entrance. The sensitivity is therefore **high**.

5.1.3.2 Sensitivity of the Area to Health Effects of PM₁₀

- Earthworks and construction: the background PM₁₀ concentration is less than 24 µg.m⁻³ and there are assumed to be between 10 to 100 high sensitivity residential receptors within 20 m of the site boundary. The sensitivity is therefore **low**.
- Trackout: the background PM₁₀ concentration is less than 24 µg.m⁻³ and there were assumed to be greater than 100 high-sensitivity receptors within 50 m of roads used to access the site, up to 500 m from the site entrance. The sensitivity is therefore **low**.

5.1.3.3 Sensitivity of the Area to Ecological Impacts

- Earthworks, construction and trackout: Dinting Vale Wood is located within 50 m of the site boundary and proposed trackout route. Dinting Vale Wood is classed as a medium sensitivity receptor and therefore the sensitivity of the area is **low**.

Table 5-2: Outcome of Defining the Sensitivity of the Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	n/a	High	High	High
Human Health	n/a	Low	Low	Low
Ecological Impact	n/a	Low	Low	Low

5.1.4 Step 2C: Define the Risk of Impacts

The dust emission magnitude detailed in **Table 5-1** is combined with the sensitivity of the area detailed in **Table 5-2** to determine the risk of impacts with no mitigation applied. The risks concluded for dust soiling and human health are provided in **Table 5-3**.

Table 5-3: Summary Dust Risk Table to Define Site-Specific Mitigation

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	n/a	High Risk	Medium Risk	High Risk
Human Health	n/a	Low Risk	Low Risk	Low Risk
Ecological Impact	n/a	Low Risk	Low Risk	Low Risk

The risk of dust soiling impacts during the construction phase were therefore described as '**medium risk**' for construction, and '**high risk**' for earthworks and trackout. The impacts on human health and ecological receptors were described as '**low risk**' for all activities. Step 3 and Step 4 of the guidance, which are the 'site specific mitigation' and 'determining the significant effects', are discussed in **Section 6** of this report.

5.2 Operational Phase Road Traffic Emissions Assessment

5.2.1 Designated Ecological Sites

The number of vehicles generated by the Proposed Development are well below the screening criterion of 1,000 AADT identified by Natural England (Natural England, 2018) and the IAQM (IAQM, 2020) as the threshold at which impacts on designated ecological sites may occur. However, this threshold should be applied to in-combination traffic flows with other plans and projects in the area.

Given the scale of project-generated traffic, the addition of traffic from cumulative developments would not be expected to exceed the 1,000 AADT threshold, and as such significant impacts would not occur. Furthermore, the site is allocated for development and therefore it is expected that a local plan-level Habitats Regulations Assessment (HRA) was undertaken to determine the cumulative impact on designated ecological sites.

5.2.2 Human Health

The 24-hour AADT flows and HDV percentages used in the air quality assessment scenarios are detailed in **Appendix B**. The results of the dispersion modelling assessment are presented in the following sections.

Proposed receptors

The Proposed Development will introduce future human receptors (i.e., exposure pathways) to operational phase air pollutant concentrations. Concentrations of NO₂, PM₁₀ and PM_{2.5} were predicted at locations representative of future residential within the Proposed Development site to consider the potential worst-case impacts at these locations.

Predicted total concentrations at each receptor are detailed in **Table 5-4**, which include emissions from the modelled road network and background pollutant concentrations.

Table 5-4: Predicted Total Pollutant Concentrations for 2026 at Proposed Receptor Locations

Receptor	Total NO ₂	Total PM ₁₀		Total PM _{2.5}
	Annual Mean Conc. (µg.m ⁻³)	Annual Mean Conc. (µg.m ⁻³)	Number of Days >50 µg.m ⁻³	Annual Mean Conc. (µg.m ⁻³)
PR1	8.6	9.3	0	6.2
PR2	8.4	9.1	0	6.0

Pollutant concentrations were predicted to be 'well below' (i.e. less than 75% of) the relevant Objectives at all modelled proposed receptor locations.

The assessment showed that all NO₂ concentrations were below 60 µg.m⁻³ and therefore, in accordance with Defra guidance in LAQM.TG (22) (Defra, 2022), the 1-hour mean Objective is unlikely to be exceeded. The short-term PM₁₀ Objective was predicted to be met at all modelled locations with no exceedances of the daily mean Objective of 50 µg.m⁻³.

As such, it is concluded that future receptors at the Proposed Development are highly unlikely to be exposed to elevated pollutant concentrations as a result of road traffic emissions.

Existing Receptors

Predicted NO₂, PM_{2.5} and PM₁₀ concentrations for the Opening Year 2026 '*with development*' scenario at existing receptor locations are detailed in **Table 5-5**, the results include the contribution from the modelled road network and the relevant future year background pollutant concentrations. Concentrations for the '*without development*' scenario and the predicted change in NO₂, PM_{2.5} and PM₁₀ concentrations, as a result of the Proposed Development, are also shown for comparison purposes.

Table 5-5: Predicted Annual Mean Pollutant Concentrations and Impact of Development for the Opening Year (2026) Scenario at Existing Receptor Locations

Receptor	Without Development ($\mu\text{g.m}^{-3}$)	With Development ($\mu\text{g.m}^{-3}$)	Change ($\mu\text{g.m}^{-3}$)	Change as % of Objective	Impact Descriptor
Annual Mean NO₂					
ER1	12.4	12.5	0.1	0%	Negligible
ER2	24.2	24.4	0.2	0%	Negligible
ER3	18.9	18.9	0.1	0%	Negligible
ER4	17.2	17.2	0.0	0%	Negligible
ER5	14.1	14.2	0.1	0%	Negligible
ER6	20.2	20.2	0.0	0%	Negligible
ER7	19.1	19.2	0.0	0%	Negligible
ER8	10.4	10.4	0.0	0%	Negligible
ER9	20.6	20.7	0.1	0%	Negligible
ER10	31.5	31.6	0.1	0%	Negligible
Annual Mean Particulate Matter (PM₁₀)					
ER1	10.4	10.4	0.0	0%	Negligible
ER2	14.6	14.7	0.1	0%	Negligible
ER3	12.7	12.7	0.0	0%	Negligible
ER4	10.3	10.3	0.0	0%	Negligible
ER5	10.7	10.7	0.0	0%	Negligible
ER6	10.4	10.5	0.0	0%	Negligible
ER7	12.0	12.0	0.0	0%	Negligible
ER8	9.3	9.3	0.0	0%	Negligible
ER9	13.1	13.2	0.0	0%	Negligible
ER10	12.1	12.2	0.0	0%	Negligible
Short-Term PM₁₀ – Number of Days >50$\mu\text{g.m}^{-3}$					
ER1	0	0	0	-	-
ER2	0	0	0	-	-
ER3	0	0	0	-	-
ER4	0	0	0	-	-
ER5	0	0	0	-	-
ER6	0	0	0	-	-
ER7	0	0	0	-	-
ER8	0	0	0	-	-
ER9	0	0	0	-	-
ER10	0	0	0	-	-

Receptor	Without Development ($\mu\text{g.m}^{-3}$)	With Development ($\mu\text{g.m}^{-3}$)	Change ($\mu\text{g.m}^{-3}$)	Change as % of Objective	Impact Descriptor
Annual Mean Particulate Matter (PM_{2.5})					
ER1	6.8	6.8	0.0	0%	Negligible
ER2	9.1	9.2	0.0	0%	Negligible
ER3	8.0	8.0	0.0	0%	Negligible
ER4	6.8	6.8	0.0	0%	Negligible
ER5	6.9	7.0	0.0	0%	Negligible
ER6	6.8	6.8	0.0	0%	Negligible
ER7	7.7	7.7	0.0	0%	Negligible
ER8	6.2	6.2	0.0	0%	Negligible
ER9	8.3	8.3	0.0	0%	Negligible
ER10	7.8	7.8	0.0	0%	Negligible

As detailed in **Table 5-5**, predicted pollutant concentrations were predicted to be below the respective air quality Objectives for all pollutants in the opening year of 2026. The highest change in annual mean NO₂ concentrations was predicted to occur at ER2 with increase of 0.2 $\mu\text{g.m}^{-3}$. ER2 is located to the south of the site access on Dinting Vale which experiences the highest change in development traffic. The change in concentrations was predicted to give rise to a negligible impact at all receptors for all pollutants, in accordance with IAQM and EPUK guidance (IAQM and EPUK, 2017).

The assessment showed that all NO₂ concentrations were below 60 $\mu\text{g.m}^{-3}$ and therefore, in accordance with Defra guidance in LAQM.TG (22) (Defra, 2022), the 1-hour mean Objective is unlikely to be exceeded. The short-term PM₁₀ Objective was predicted to be met at all modelled locations with no exceedances of the daily mean Objective of 50 $\mu\text{g.m}^{-3}$, and no change in the number of days exceeding 50 $\mu\text{g.m}^{-3}$.

5.2.2.1 Sensitivity Test

The results of the sensitivity test are presented in the following section. The sensitivity test assumes the A57 Link Road has been constructed by 2026.

Proposed receptors

Predicted total concentrations at each receptor are detailed in **Table 5-6**, which include emissions from the modelled road network and background pollutant concentrations.

Table 5-6: Sensitivity Test: Predicted Total Pollutant Concentrations for 2026 at Proposed Receptor Locations

Receptor	Total NO ₂	Total PM ₁₀		Total PM _{2.5}
	Annual Mean Conc. ($\mu\text{g.m}^{-3}$)	Annual Mean Conc. ($\mu\text{g.m}^{-3}$)	Number of Days >50 $\mu\text{g.m}^{-3}$	Annual Mean Conc. ($\mu\text{g.m}^{-3}$)
PR1	8.6	9.3	0	6.2
PR2	8.4	9.1	0	6.0

The A57 Link Road is predicted to have no material impact on pollutant concentrations at the Proposed Development with all pollutant concentrations predicted to be comparable to those predicted with the existing road layout.

As such, in the event that the A57 Link Road is constructed it is concluded that future receptors at the Proposed Development are highly unlikely to be exposed to elevated pollutant concentrations as a result of road traffic emissions.

Existing Receptors

Predicted NO₂, PM_{2.5} and PM₁₀ concentrations for the Sensitivity Test: Opening Year 2026 '*with development*' scenario at existing receptor locations are detailed in **Table 5-7**, the results include the contribution from the modelled road network and the relevant future year background pollutant concentrations. Concentrations for the '*without development*' scenario and the predicted change in NO₂, PM_{2.5} and PM₁₀ concentrations, as a result of the Proposed Development, are also shown for comparison purposes.

Table 5-7: Sensitivity Test: Predicted Annual Mean Pollutant Concentrations and Impact of Development for the Opening Year (2026) Scenario at Existing Receptor Locations

Receptor	Without Development (µg.m ⁻³)	With Development (µg.m ⁻³)	Change (µg.m ⁻³)	Change as % of Objective	Impact Descriptor
Annual Mean NO₂					
ER1	12.4	12.5	0.1	0%	Negligible
ER2	24.0	24.2	0.2	0%	Negligible
ER3	18.8	18.8	0.1	0%	Negligible
ER4	17.3	17.4	0.1	0%	Negligible
ER5	14.1	14.2	0.1	0%	Negligible
ER6	20.5	20.5	0.0	0%	Negligible
ER7	18.5	18.5	0.0	0%	Negligible
ER8	10.4	10.4	0.0	0%	Negligible
ER9	20.5	20.6	0.1	0%	Negligible
ER10	31.5	31.6	0.1	0%	Negligible
Annual Mean Particulate Matter (PM₁₀)					
ER1	10.4	10.4	0.0	0%	Negligible
ER2	14.6	14.6	0.1	0%	Negligible
ER3	12.6	12.7	0.0	0%	Negligible
ER4	10.3	10.3	0.0	0%	Negligible
ER5	10.7	10.7	0.0	0%	Negligible
ER6	10.4	10.5	0.0	0%	Negligible
ER7	11.8	11.8	0.0	0%	Negligible
ER8	9.3	9.3	0.0	0%	Negligible
ER9	13.1	13.1	0.0	0%	Negligible

Receptor	Without Development ($\mu\text{g.m}^{-3}$)	With Development ($\mu\text{g.m}^{-3}$)	Change ($\mu\text{g.m}^{-3}$)	Change as % of Objective	Impact Descriptor
ER10	12.1	12.1	0.0	0%	Negligible
Short-Term PM₁₀ – Number of Days >50$\mu\text{g.m}^{-3}$					
ER1	0	0	0	-	-
ER2	0	0	0	-	-
ER3	0	0	0	-	-
ER4	0	0	0	-	-
ER5	0	0	0	-	-
ER6	0	0	0	-	-
ER7	0	0	0	-	-
ER8	0	0	0	-	-
ER9	0	0	0	-	-
ER10	0	0	0	-	-
Annual Mean Particulate Matter (PM_{2.5})					
ER1	6.8	6.8	0.0	0%	Negligible
ER2	9.1	9.1	0.0	0%	Negligible
ER3	8.0	8.0	0.0	0%	Negligible
ER4	6.8	6.8	0.0	0%	Negligible
ER5	6.9	7.0	0.0	0%	Negligible
ER6	6.8	6.8	0.0	0%	Negligible
ER7	7.6	7.6	0.0	0%	Negligible
ER8	6.2	6.2	0.0	0%	Negligible
ER9	8.3	8.3	0.0	0%	Negligible
ER10	7.8	7.8	0.0	0%	Negligible

As detailed in **Table 5-5**, with the A57 Link Road fully operational the predicted pollutant concentrations were predicted to be below the respective air quality Objectives for all pollutants in the opening year of 2026. The highest change in annual mean NO₂ concentrations was predicted to occur at ER2 with increase of 0.2 $\mu\text{g.m}^{-3}$. The change in concentrations was predicted to give rise to a negligible impact at all receptors for all pollutants, in accordance with IAQM and EPUK guidance (IAQM and EPUK, 2017).

The assessment showed that all NO₂ concentrations were below 60 $\mu\text{g.m}^{-3}$ and therefore, in accordance with Defra guidance in LAQM.TG (22) (Defra, 2022), the 1-hour mean Objective is unlikely to be exceeded. The short-term PM₁₀ Objective was predicted to be met at all modelled locations with no exceedances of the daily mean Objective of 50 $\mu\text{g.m}^{-3}$, and no change in the number of days exceeding 50 $\mu\text{g.m}^{-3}$.

5.2.3 Impact Significance

The assessment determined that development traffic impacts upon local air quality at human receptors are **not significant** based upon:

- The impact of the Proposed Development, both with and without the A57 Link Road, is likely to have a **negligible** impact on existing receptor locations;
- The predicted concentrations included the contribution from traffic flows associated with committed developments; and
- The development was not predicted to cause a breach of any of the air quality Objectives at any identified sensitive receptor location, both with and without the A57 Link Road.

The requirements of the planning policies are therefore met.

6 Mitigation Measures

6.1 Construction Phase Dust Mitigation

6.1.1 Step 3: Site-Specific Mitigation

Step three of the IAQM (IAQM, 2016) guidance identifies appropriate site-specific mitigation. These measures are related to the site risk for each activity.

The dust assessment determined that there was a risk of impacts resulting from construction activities without the implementation of mitigation measures. The IAQM guidance document also suggests a number of dust mitigation measures which could be implemented to reduce potential adverse effects associated with high, medium and low risk sites. It is recommended that the good practice measures outlined in the IAQM guidance are followed.

In addition, best practice measures relating to control of emissions from NRMM are also included, as specified in Defra technical guidance (Defra, 2022).

The recommendations below should be detailed in a Construction Environmental Management Plan (CEMP) to prevent or minimise the release of dust and / or dust being deposited at nearby receptor locations. Particular attention should be given to operations which shall unavoidably take place close to the site boundary. The effective implementation of the CEMP will ensure that any potential dust releases associated with the construction phase will be reduced.

6.1.1.1 Highly Recommended Mitigation Measures

A list of mitigation measures that are highly recommended for a **high risk** site, as determined by Step 2 of the dust assessment, by the IAQM are provided below.

Communications

- 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.
- Display the head or regional office contact information.
- 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.

Dust Management

- Develop and implement a CEMP, which may include measures to control other emissions, approved by the local authority.

- 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.
- Make the complaints log available to the local authority when asked.
- 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.
- 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 windowsills within 100 m of site boundary, with cleaning to be provided if necessary.
- Carry out regular site inspections to monitor compliance with the CEMP, record inspection results, and make an inspection log available to the local authority when asked.
- 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.
- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is practicable.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Consider enclosure of site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Take measures to control site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible.
- Cover, seed or fence stockpiles to prevent wind whipping.
- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- 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).
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)
- 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.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- 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.
- Bonfires and burning of waste materials should not be permitted.

Measures Specific to Earthworks

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

Measures Specific to Construction

- 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 overflowing during delivery.

Measures Specific to Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Install a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- 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. Locate site access gates at least 10m from receptors where possible.

Measures Specific to NRMM

NRMM and plant would be well maintained. If any emissions of dark smoke occur, then the relevant machinery should stop immediately, and any problem rectified. In addition, the following controls should apply to NRMM:

- All NRMM should use fuel equivalent to ultralow sulphur diesel (fuel meeting the specification within EN590:2004);
- All NRMM should comply with regulation (the appropriate NRMM regulations);
- All NRMM will be fitted with Diesel Particulate Filters (DPF) conforming to defined and demonstrated filtration efficiency (load/duty cycle permitting);
- The ongoing conformity of plant retrofitted with DPF, to a defined performance standard, should be ensured through a programme of onsite checks; and,
- Fuel conservation measures should be implemented, including instructions to (i) throttle down or switch off idle construction equipment; (ii) switch off the engines of trucks while they are waiting to access the site and while they are being loaded or unloaded and (iii) ensure equipment is properly maintained to ensure efficient fuel consumption.

6.2 Operational Phase Mitigation Measures

The impact of traffic-related emissions generated by the Proposed Development on local air quality was assessed by dispersion modelling and was considered to be **not significant** and therefore no mitigation measures are proposed.

7 Conclusions

This air quality report was prepared as part of a planning application for a proposed residential development comprising 92 residential units at Dinting Vale, Glossop. The assessment considered the potential for the Proposed Development to have an impact on local air quality at identified existing human and ecological receptor locations, during construction and operation, and at future occupants of the development due to exposure to operational phase pollutant concentrations. The assessment was prepared in accordance with consultation carried out with HPBC.

The impact of the construction of the Proposed Development was considered in accordance with the latest guidance available from the IAQM (IAQM, 2016). The assessment defined the sensitivity of the area and the risk of the construction of the development to cause dust impacts. Site specific mitigation measures were recommended, and with the implementation of these measures, the residual impacts from construction activities were considered to be **not significant** in accordance with IAQM guidance.

A road traffic emissions dispersion modelling assessment was undertaken to consider the impact of operational phase development-generated vehicles on identified receptor locations within the study area. The provided traffic data were based upon a quantum of development of 111 residential units. The trip generation figures used within the assessment are therefore robust and the assessment is considered reasonably 'worst-case'. The base year (2019) and the opening year (2026) with and without the development were assessed. At the request of the Pollution Specialist Officer, the impact of the A57 Link Road was considered; due to a recent legal challenge against the scheme the results were reported as a sensitivity test. Annual mean concentrations of NO₂, PM_{2.5} and PM₁₀ were predicted to be below the relevant air quality Objectives at all locations, both 'without' and 'with' the Proposed Development. No exceedances of the short-term 1-hour mean Objective for NO₂ and 24-hour mean Objective for PM₁₀ were calculated, based on annual mean concentrations, at any receptors without or with the development in place.

The impact of road traffic emissions generated by the Proposed Development on existing human receptors was predicted to be **not significant** in accordance with IAQM and EPUK guidance (IAQM & EPUK, 2017).

The suitability of the site for the proposed uses was also considered. Proposed receptor locations were included in the dispersion model at locations representative of potential future exposure and pollutant concentrations were predicted to be well below the air quality Objectives at the site.

The impact of road traffic emissions generated by the Proposed Development on designated ecological sites was predicted also to be **not significant** in accordance with Natural England (Natural England, 2018) and the IAQM (IAQM, 2020) guidance.

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Appendix A: Construction Phase Methodology and Assessment

The following section outlines criteria developed by the Institute of Air Quality Management (IAQM) (IAQM, 2016) for the assessment of air quality impacts arising from construction activities. The assessment procedure is divided into five steps and is summarised below.

Step 1: Screening 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). Internal guidance from Natural England recommends that designated ecological receptors within 200 m of a site should be considered in a construction dust and particulate matter assessment, as opposed to only those ecological sites within 50 m of a site (as stated in IAQM Guidance (IAQM, 2016)). Therefore, to provide a conservative assessment, ecological receptors within 200 m of the site boundary are also identified at this stage. A designated ecological site 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'.

Step 2: Assess the Risk of Dust Impacts

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 (demolition, construction, earthworks and trackout).

Step 2A: Define the Potential Dust Emission Magnitude

The IAQM guidance recommends that the dust emission magnitude is determined for demolition, earthworks, construction and trackout. The dust emission magnitude is based on the scale of the anticipated works. **Table A1** describes the potential dust emission class criteria for each outlined construction activity.

Table A1: Criteria Used in the Determination of Dust Emission Class

Activity	Criteria used to Determine Dust Emission Class		
	Small	Medium	Large
Demolition	<ul style="list-style-type: none"> Total building volume <20,000m²; Material with low potential for dust release Demolition activities <10m above ground level. 	<ul style="list-style-type: none"> Total building volume 20,000 – 50,000m²; Potentially dusty material. Height of building between 10-20m above ground level. 	<ul style="list-style-type: none"> Total building volume >50,000m²; Potentially dusty material. Demolition activities >20m above ground level.

Activity	Criteria used to Determine Dust Emission Class		
	Small	Medium	Large
Earthworks	<ul style="list-style-type: none"> Total site area <2,500m²; <5 heavy moving earth vehicles active at any one time. 	<ul style="list-style-type: none"> Total site area 2,500 – 10,000m²; 5 – 10 heavy moving earth moving vehicles active at any one time. 	<ul style="list-style-type: none"> Total site area >10,000m², >10 heavy earth moving vehicles active at any one time.
Construction	<ul style="list-style-type: none"> Total building volume <25,000m³; Construction material with low potential for dust release. 	<ul style="list-style-type: none"> Total building volume 25,000 – 100,000m³; Potentially dusty construction material (e.g. concrete). 	<ul style="list-style-type: none"> Total building volume >100,000m³; On site concrete batching.
Trackout	<ul style="list-style-type: none"> <10 outward HDV trips in any one day; Unpaved road length <50m. 	<ul style="list-style-type: none"> 10 – 50 outward HDV trips in any one day. Unpaved road length 50 – 100m. 	<ul style="list-style-type: none"> >50 outward HDV trips in any one day; Unpaved road length >100m.

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 PM₁₀ concentration; and
- site-specific factors, such as the presence of natural shelters, such as trees, to reduce the risk of windblown dust.

Table A2: Criteria for Determining Sensitivity of Receptors

Sensitivity of Receptor	Criteria for Determining Sensitivity	
	Dust Soiling Effects	Health Effects of PM ₁₀
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
Medium	Parks, places of work	Office and shop workers not occupationally exposed to PM ₁₀
Low	Playing fields, farmland, footpaths, short-term car parks and roads	Public footpaths, playing fields, parks and shopping streets

The criteria detailed in **Tables A3** and **A4** were used to determine the sensitivity of the area to dust soiling effects and human health impacts. **Figure 4-2** details the distance bands, as detailed in **Tables A3** and **A4**, from the site boundary for use in the construction phase assessment.

Table A3: 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

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

Table A4: 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 ³	>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 ³	>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
	<28 µg.m ³	≥1	Low	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low	Low

The sensitivity of the area to dust soiling and human health impacts to each activity is summarised in **Table A5**, and in **Table 5-2** within **Section 5.1** of the report.

Step 2C: Define the Risk of Impacts

The dust emission magnitude and sensitivity of the area are combined and the risk of impacts from each activity (demolition, earthworks, construction and trackout) before mitigation is applied should be determined using the criteria detailed in **Tables A5 to A7**.

Table A5: Risk of Dust Impacts – Demolition

Potential Impact	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 A6: Risk of Dust Impacts – Earthworks and Construction

Potential Impact	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 A7: Risk of Dust Impacts – Trackout

Potential Impact	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: 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. The highly recommended mitigation for the proposed scheme are detailed in **Section 6** of this report.

Step 4: Determine Significant Effects

With the implementation of the above mitigation measures, the residual impacts from the construction are considered to be **not significant**, in accordance with IAQM guidance.

Appendix B: Traffic Data

Table B1: Traffic data – existing road layout

Road Link	2019 Base Year		2026 Opening Year		2026 Opening Year with Development	
	Total AADT	HGV (%)	Total AADT	HGV (%)	Total AADT	HGV (%)
Dinting Vale (West of Glossop Road)	17,927	4.6	19,342	4.6	19,677	4.5
Glossop Road	12,368	2.2	13,344	2.2	13,430	2.1
Dinting Vale (West of Site access)	20,684	4.4	22,317	4.4	22,738	4.3
Dinting Vale (East of Site access)	20,684	4.4	22,317	4.4	22,492	4.3
Dinting Vale (East of Dinting Lane)	20,849	4.3	22,494	4.3	22,669	4.3
Simmondly Lane	4,596	1.7	4,959	1.7	4,982	1.7
Dinting Vale (East of Simmondly Lane)	16,932	3.6	18,268	3.6	18,421	3.6
Primrose Lane	5,274	9.1	5,690	9.1	5,747	9.0
High Street West	16,860	2.8	18,191	2.8	18,287	2.8

Table B2: Sensitivity test traffic data- A57 Link Road

Road Link	2019 Base Year		2026 Opening Year		2026 Opening Year with Development	
	Total AADT	HGV (%)	Total AADT	HGV (%)	Total AADT	HGV (%)
Dinting Vale (West of Glossop Road)	17,927	4.6	20,928	4.6	21,263	4.5
Glossop Road	12,368	2.2	12,637	2.2	12,723	2.1
Dinting Vale (West of Site access)	20,684	4.4	22,072	4.4	22,493	4.3
Dinting Vale (East of Site access)	20,684	4.4	22,094	4.4	22,269	4.3
Dinting Vale (East of Dinting Lane)	20,849	4.3	22,269	4.3	22,444	4.3
Simmondly Lane	4,596	1.7	4,959	1.7	4,982	1.7
Dinting Vale (East of Simmondly Lane)	16,932	3.6	18,085	3.6	18,238	3.6
Primrose Lane	5,274	9.1	6,589	9.1	6,646	9.0
High Street West	16,860	2.8	17,027	2.8	17,123	2.8



Appendix C: High Peak Borough Council email dated 20 December 2022

From: Christopher Humphreys <Christopher.Humphreys@highpeak.gov.uk>
Sent: 20 December 2022 09:06
To: Steven Gunn-Russell <Stevengr@whitepeakplanning.co.uk>
Subject: HPK/2022/0456 Dinting Vale, High Peak

Good morning Steven,

Application number	HPK/2022/0456	Application type	Full Planning - Large scale MAJOR apps
Site address	Land At, Dinting Vale, Dinting, Glossop, Derbyshire,	Proposal	Proposed residential development comprising 100 dwellings including areas of public open space, landscaping and associated works

Energy/ sustainability statements are not an item Environmental Health would normally comment on and therefore has not been reviewed.

In terms of **air quality**, it is understood from the meeting held on 24th November 2022, that a **revised assessment** was to be prepared and submitted to take into account the following:

- The A57 link road which has been approved.
- Inclusion of model input parameters, including clarity regarding traffic speeds (including justification for their use), topography (junction), model receptor locations/ heights/ use of the ‘Advanced Street Canyon’ module.
- Consideration to the impact of the gradient of the access road.
- Further clarification around the model validation given the difference between actual monitored results and predicted baseline (see table below).

Receptor	Actual results 2019	Model Validation 2019	Error Reported	Predicted Baseline 2019	Error (?)
ER7 (HP22)	31.3	30.4	-3%	23.3	-26%
ER9 (HP21)	38.9	32.9	-15%	30.4	-22%
ER10 (HP25)	46.3	49.6	7%	45.9	-7%

The applicant is advised that the latest iteration of the ASR (2022) is available on the Council website:

<https://www.highpeak.gov.uk/article/342/Air-quality>

The revised assessment will need to be considered prior to the determination of the planning application to ensure that the proposed development will not result in a significant adverse impact on the Dinting Vale Air Quality Management Area (AQMA).

Kind regards,

Christopher Humphreys
 Pollution Specialist Officer
 Environmental Health