

A13. Air Quality

Purpose of the assessment: Introduction

- A13.1 This Chapter has been prepared to support the revised development proposal (September 2017) prepared for the site formerly known as the North Bierley Waste Water Treatment Works. The Scheme 2 development comprises B2/B8 employment within the Kirklees Council (KMBC) authority area. The developmental parameters of the scheme are shown in **Chapters A1 and A4** and **Technical Appendices A1.2**.
- A13.2 The assessment in July 2016 (and supporting Technical Appendix 13.0) is no longer valid and is replaced in its entirety by this new assessment and supporting ESA **Addendum Technical Appendix A13.0**.
- A13.3 The July 2016 ES considered the potential significant environmental effects of a mixed use scheme – residential and B2/B8 employment. The consultation process found no specific objections with respect to air quality mentioned in the North Bierley consultation response dated 29th November 2016.
- A13.4 This Chapter assesses the likely significant impacts of the Proposed Development as set out in Chapter A4 with respect to air quality. It describes the methods used to assess the impacts; the baseline conditions currently experienced at the application site and in the surrounding area; likely future conditions; the mitigation measures required to prevent, reduce or offset adverse effects; and the likely residual effects after these measures have been adopted.
- A13.5 During demolition and construction works potential impacts will be associated mainly with dust emissions. Potential operational impacts will be associated with increased traffic emissions associated with the proposed development.
- A13.6 This Chapter has been prepared by AECOM and is accompanied by **Addendum Technical Appendix A13.0**

Legislative framework, policy and guidance

National and European Air Quality Legislation and Policy

Local Air Quality Management

- A13.7 The provisions of Part IV of the Environment Act 1995 establish a national framework for air quality management, which requires all Local Authorities to conduct local air quality reviews. Section 82(1) of the Act requires these reviews to include an assessment of the current air quality in the area and the predicted air quality in future years. Should the reviews indicate that the objectives prescribed in the UK Air Quality Strategy (AQS) (Defra, 2007) [Ref A13.8] and the Air Quality Standards Regulations 2010 (Defra, 2010) [Ref A13.10] (henceforth referred to as the “Air Quality Regulations”) will not be met, the Local Authority is required to designate an Air Quality Management Area (AQMA). Action must then be taken at a local level to ensure that air quality in the area improves.

A13.8 The UK AQS (AQS) (Defra, 2007) (RefA13.8) identifies nine ambient air pollutants that have the potential to cause harm to human health. These pollutants are associated with local air quality problems, with the exception of ozone, which is instead considered to be a regional problem. Similarly, the Air Quality Regulations set objectives, but for just seven of the pollutants that are associated with local air quality. These objectives aim to reduce the health effects of the pollutants to negligible levels.

European Air Quality Directives

A13.9 The air quality objectives and limit values currently applicable to the UK can be split into two groups. Each has a different legal status and is therefore handled differently within the framework of UK air quality policy. These are:

- UK air quality objectives set down in regulations for the purposes of local air quality management; and
- European Union (EU) limit values transcribed into UK legislation for which compliance is mandatory.

Air Quality Criteria

A13.10 The Air Quality Framework Directive (96/62/EC) (Ref A13.2) on ambient air quality assessment and management defines the policy framework for 12 air pollutants known to have a harmful effect on human health and the environment. Ambient concentration limit values for the specific pollutants are set through a series of Daughter Directives.

A13.11 Following the Daughter Directives, Council Directive 2008/50/EC (Ref.A13.7) on ambient air quality and cleaner air for Europe came into force in 2008, and was transposed into national legislation in 2010 (The Air Quality Standards Regulations 2010 (Defra, 2010)) (Ref A13.10). It consolidated existing air quality legislation and made provisions for Member States to postpone limit value attainment deadlines and allow an exemption from the obligation to limit values for certain pollutants, subject to strict conditions and assessment by the European Commission (EC).

Air Quality Criteria

A13.12 The pollutants of concern for this assessment are NO₂ and PM₁₀. The Government's Air Quality Strategy objectives and EU limit values for NO₂ are:

- an annual mean concentration of 40 µg/m³; and
- a one-hour mean concentration of 200 µg/m³, not to be exceeded more than eighteen times per year

A13.13 The Government's Air Quality Strategy objectives and the EU limit value for PM₁₀ are:

- an annual mean concentration of 40 µg/m³ (gravimetric); and

- a 24-hour mean concentration of 50 µg/m³ (gravimetric) to be exceeded no more than 35 times per year.

Construction Dust

A13.14 Dust is defined as all particulate matter up to 75 µm in diameter and comprising both suspended and deposited dust, whereas PM₁₀ is a mass fraction of airborne particles of diameter of 10 µm or less. The health effects associated with dust include eye, nose and throat irritation in addition to the nuisance caused by deposition on cars, windows and property. Dust and PM₁₀ emissions arise from a number of sources, so demolition and construction activities and emissions from vehicles associated with the development should be considered.

Planning Policy

National Planning Policy Framework

A13.15 The following National Planning Policy Framework (NPPF)(Ref A13.14) paragraphs / policies are considered relevant to this assessment:

“Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan.”

A13.16 The NPPF was supplemented by Planning Practice Guidance (RefA13.14) in March 2014. The guidance about air quality states:

“Whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife).”

“When deciding whether air quality is relevant to a planning application, considerations could include whether the development would:

Significantly affect traffic in the immediate vicinity of the proposed development site or further afield. This could be by generating or increasing traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; adds to turnover in a large car park; or result in construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more.

Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; or extraction systems (including chimneys) which require approval under pollution control legislation or biomass boilers or biomass-

fuelled CHP plant; centralised boilers or CHP plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area;

Expose people to existing sources of air pollutants. This could be by building new homes, workplaces or other development in places with poor air quality.

Give rise to potentially unacceptable impact (such as dust) during construction for nearby sensitive locations.

Affect biodiversity. In particular, is it likely to result in deposition or concentration of pollutants that significantly affect a European-designated wildlife site, and is not directly connected with or necessary to the management of the site, or does it otherwise affect biodiversity, particularly designated wildlife sites.”

A13.17 The Air Quality Planning Practice Guidance also indicates that with regard to the development management process, should a development (following mitigation) lead to an unacceptable risk from air pollution, prevent sustained compliance with EU limit values or national objectives for pollutants or fail to comply with the requirements of the Habitats Regulations, then consideration should be given to how the proposal could be amended to make it acceptable, or where not practicable, to whether planning permission should be refused.

A13.17 With respect to dust emissions, the NPPF states that:

“The National Planning Policy Framework makes it clear that unavoidable dust emissions are controlled, mitigated or removed at source. A dust assessment study should be undertaken...”

Local planning policy

A13.18 KMBC is currently in the process of developing its new Local Plan. Policies from their Unitary Development Plan (1999) (Ref A13.33) as saved, relating to air quality include policy T1;

“Priority will be given to:

- (i) *satisfying the needs of all sections of the community through an effectively integrated transport system with emphasis on improving public transport and encouraging a modal shift away from travel by private car;*
- (ii) *promoting a transport network on which it is safe to travel and which causes minimal disturbance through danger, noise and air pollution”*

A13.19 The Transport Strategy 2040 (Ref A13.26) developed by the West Yorkshire Combined Authority (WYCA) and the West Yorkshire District Councils of Bradford, Calderdale, Kirklees, Leeds and Wakefield includes specific air quality considerations for Kirklees;

- *“Having frequent, reliable and cost effective bus services is also a key local aim making the most of investment in ticketing improvements and hybrid/electric buses for air quality improvements”.*
- Under Protect and enhance Green Infrastructure and the Built Environment;

- “Consideration must be given to the potential impact, protection and mitigation of air quality at all stages of delivering transport projects”
- Under Create more accessible people friendly local centres and neighbourhoods;
 - “We will wherever possible seek to mitigate the impacts that major transport corridors have on communities, to reduce the severance, noise and poor air quality that can affect people’s quality of life.”
- In terms of how the Transport Strategy fits with the Strategic Economic Plan (Priority number 4 – Infrastructure for Growth). Transport Strategy Core Themes: Places to live and work
 - “Improved air quality must always be a key consideration”

A13.20 Bradford Metropolitan District Council adopted its Core Strategy in August 2017 [Ref 13.27] The Core Strategy

- Sets out the broad aims and objectives for sustainable development within the Bradford District for the next 15 to 20 years until 2030.
- Sets out broad policies for guiding and restraining development.
- Sets out the broad locations for new housing, employment and infrastructure investment.
- Take account of national and regional planning policy along with the Community Strategy.
- Does not allocate specific sites for new housing and employment development.

A13.21 Of specific interest to this application is under Section 5.4 Planning for Places - Environment;

“Air quality and health within the District has improved in line with both National Air Quality Standards and indicators and the principles of best practice. Through a range of actions, a reduction in emissions from sources which contribute to poor air quality has been secured. An improvement in the health of the District’s population”.

The fraction of mortality attributable to particulate air pollution over each monitoring period (IND15 (EV)).

A reduction in exposure to particulate air pollution, resulting in a reduction in the fraction of mortality attributable to air pollution over each monitoring period (IND15 (EV)).

A13.22 Under Environmental Protection (Section 5.4.159) the strategic policies and proposals for determining the broad locations for development set out in this document have the potential to affect the quality of land, air and water within the District. As a consequence

of this, impacts could also affect public health and quality of life. Where development may have a potential impact on the quality of land, air and water, either directly or indirectly, particularly where there may be an impact on health, this is considered to be a material planning consideration.

A13.23 Kirklees Council and Bradford Council are both part of the West Yorkshire Low Emissions Strategy Group (WYLES). This air quality assessment has been undertaken in accordance with the draft West Yorkshire Air Quality and Emissions Technical Planning Guidance (WYLEG, 2014) (RefA13.24) as prepared by WYLES. The guidance document forms part of an overarching Low Emissions Strategy and provides a template for integrating air quality considerations into land-use planning and development management policies that can influence the reduction of road transport emissions in West Yorkshire. It is aimed at helping regional authorities deliver national air quality objectives through cost effective service planning, brought about by the joint working and individual mandates adopted as part of each authority's policy.

Assessment Methodology

A13.24 The potential for air quality impacts have been assessed for two distinct phases:

- The 'construction' phase (including demolition works): during which the greatest impact is expected to be from dust; and
- The 'operational' phase: when the impacts will be primarily associated with vehicle emissions.

Construction Phase Methodology

A13.25 In accordance with the draft West Yorkshire Air Quality and Emissions Technical Planning Guidance (WYLEG, 2014) (RefA13.24), the impacts associated with the construction phase of the proposed development have been qualitatively assessed with reference to the IAQM published 'Guidance on the assessment of dust from demolition and construction' (IAQM, 2014) (RefA13.19).

- According to the IAQM, the main air quality impacts that may arise during demolition and construction activities are:
- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes, which are evidence of dust emissions;
- Elevated PM₁₀ concentrations, as a result of dust generating activities on site; and
- An increase in concentration of airborne particles and NO₂ due to exhaust emissions from diesel powered vehicles and equipment on site and vehicles accessing the site.

A13.26 Activities on construction sites are classified into four types to reflect their different potential impacts:

- Demolition;
- Earthworks;
- Construction; and
- Track-out (The transportation of dust and dirt from the construction site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network).
- The steps followed to determine the risk of impacts, appropriate mitigation measures to be adopted, and significance of residual impacts are as defined by the IAQM and included in **Addendum Technical Appendix A13.0**.

Operational Phase Methodology

- The operational phase assessment follows the methodology outlined in the draft West Yorkshire Air Quality and Emissions Technical Planning Guidance (WYLEG, 2014). In addition, the Environmental Protection UK and Institute of Air Quality Management, 'Land-use planning and development control: planning for air quality' (May 2015) (RefA13.17) was also followed to determine the magnitude and significance of the impacts

Stage 1: Development Type Classification

A13.27 Developments should be classified as minor, medium or major based on the Department for Transport (DfT) threshold criteria for Transport Assessments and Travel Plans and anticipated changes in traffic associated with the development (**Table A13.1**).

Table A13.1: Development Classification

Development Classification	Criteria
Minor	Development proposals that do not meet the requirement for a Transport Assessment
Medium	Development proposals that meet the requirements for a Transport Assessment
Major	Development proposal that meet the requirements for a Transport Assessment and where one or more of the following is true: Where the proposed development falls within the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011 and includes air quality and/or transport as a specific likely impact. Proposals located within an Air Quality Management Area (AQMA).

Proposals that could increase the existing traffic flow on roads of > 10,000 AADT by 5% or more.

Proposals that increase traffic 5% on road canyons with >5,000AADT.

Proposals that could introduce or significantly alter congestion (DfT Congestion) and includes the introduction of substantial road infrastructure changes.

Proposals that reduce average speeds by more than 10km/h

Proposals that include additional HGV movements by more than 10% of total trips.

Where significant demolition and construction works are proposed.

Requirement for Transport Assessments and Travel Plans

A13.28 According to the DfT (DfT, 2015b) (Ref A13.16), a Transport Assessment and Travel Plan would be required if the proposed development meets the criteria shown in **Table A13.2**. The proposed scheme comprises of B2/B8 units, covering an area of up to 35,284 sqm.

Table A13.2: DfT Criteria for Transport Assessments and Travel Plans

Land Use	Description	Transport Assessment Required
General Industrial (B2)	General industry (other than B1)	>4000 m ²
Storage or Distribution (B8)	Storage or distribution centres – wholesale warehouses, distribution centres & repositories	>5000 m ²

Traffic Data

A13.29 Data were supplied by the AECOM Transportation, the project transportation consultants, in the form of AADT flows and percentage HGVs for the future year with and without the development in place (2022). Year 2017 AADT for the M606 mainline flow was extracted from the Highways England WebTRIS online database, an appropriate growth factor was then applied to represent 2022 AADT (using a TEMPro NTM⁷ daily growth factor).

A13.30 The traffic forecast based on year 2017 and implementation year 2022 estimated that 1,388 vehicles per day would be associated with the proposed development. All vehicles are anticipated to gain access to and from the site from Cliff Hollins Lane, west of the proposed site access, after which, the majority of vehicles turn left onto Mill Carr Hill Road. At the junction of Mill Carr Hill Road and Bradford Road, the majority of

⁷ <https://www.gov.uk/government/publications/tempro-downloads>

development vehicles are anticipated to turn left to gain access to the M62 and the wider road network than towards Oakenshaw.

A13.31 With reference to the criteria shown in **Table A13.1**, a proposal is considered to be 'Major' if the development is anticipated to result in an increase of 5% on roads of > 10,000 AADT flows. Bradford Road south of Mill Carr Hill Road is the only road which meets this criterion.

A13.32 Similarly, a proposal is considered to be 'Major' if the development results in additional HGV movements of more than 10% of total movements. According to the traffic data for the proposed Scheme approximately 26% of the development flow will be HGVs, which equates to approximately 358 additional HGV movements per day on the local road network.

A13.33 Speed data for all roads was based on national speed limits and represent the average speed in any given hour. Emission factors for each selected speed therefore accounts for the transient behaviour of vehicles such as slower speeds at junctions and roundabouts.

A13.34 As part of the proposed development there is provision of a car park for Woodlands Church of England Primary School. The car park is considered to be small, with approximately 36 spaces and an area <2000m². Traffic flows are likely to be insignificant in comparison to local flows; therefore the car park has been scoped out of this assessment.

A13.35 The data used in the modelling assessment and the corresponding roads are shown in **Addendum Technical Appendix A13.0**.

A13.36 With reference to the criteria in **Table A13.1** and taking the traffic flows into consideration, the proposed development was considered to be 'Major'.

Stage 2: Air Quality Impact Assessment

Major Classified Proposals

A13.37 According to the draft West Yorkshire Air Quality and Emissions Technical Planning Guidance (WYLEG, 2014) [Ref A13.24], the scale and nature of a 'Major' development is such that a formal air quality assessment will be required to determine that impact on public health and the local environment. The air quality assessment should clearly establish the likely change in pollutant concentrations at relevant receptors resulting from the proposed development.

Scenarios

A13.38 The local air quality assessment was undertaken using ADMS Roads Version 4 detailed dispersion modelling software to predict concentrations of the road transport derived pollutants, NO₂, PM₁₀ and PM_{2.5} at selected existing sensitive receptors. The assessment of was undertaken for the following scenario:

- Base year, 2017;

- 2022 DM (DM, Do-Minimum), without the proposed development; and
- 2022 DS (DS, Do-Something), with the proposed development.

A13.39 The draft West Yorkshire Air Quality and Emissions Technical Planning Guidance (WYLEG, 2014) (RefA13.24) states that in addition to the above scenarios, a sensitivity test should be undertaken which assumes that there will be no reduction in traffic related emission factors from the base year to the future year. Our approach is confirmed in the following paragraphs.

Dispersion Modelling and Road Traffic Emissions

A13.40 This assessment has used the latest version of dispersion model software 'ADMS-Roads' (v4.0.1.0) to quantify pollution levels at selected receptors. ADMS-Roads is a modern dispersion model that has an extensive published track record of use in the UK for the assessment of local air quality impacts, including model validation and verification studies (CERC, 2015) (A13.28)

A13.41 The emission factors applied to the dispersion model were derived from the UK Emission Factor Toolkit v7.0. However, due to the uncertainty in the rate of year on year improvements in vehicle emissions technology, the assumption has been made that there are no improvements in vehicle emissions between the current year (2017) and the opening year of 2022. In other words, the vehicle fleet composition with respect to emission standards remains unchanged.

Conversion of NO_x to NO₂

A13.42 The proportion of NO₂ in NO_x varies greatly with location and time according to a number of factors including the amount of oxidant available and the distance from the emission source. NO_x concentrations are expected to decline in future years due to falling emissions, therefore NO₂ concentrations will not be limited as much by ozone and consequently it is likely that the NO₂/NO_x ratio will in the future increase. In addition, a trend has been noted in recent years whereby roadside NO₂ concentrations have been increasing at certain roadside monitoring sites, despite emissions of NO_x falling. The 'direct NO₂' phenomenon is having an increasingly marked effect at many urban locations throughout the UK and must be considered when undertaking modelling studies.

In this study modelled NO_x values were converted to NO₂ using version 5.1 of the 'NO_x to NO₂' calculator, released in June 2016, and available online at <http://lagm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc> (accessed October 2017) (RefA13.13). The year and region for which the modelling has been undertaken are specified and local factors, such as an appropriate factor of NO_x emitted as NO₂, are used in the calculation. The road type used was 'All UK traffic'.

Receptors

A13.43 Air quality receptors susceptible to changes in air quality typically include residential properties, schools, care homes, hospitals and designated ecological sites.

A13.44 Ten existing receptors were selected at which pollutant concentrations were modelled for the Scheme scenario described in paragraph 0. Receptors are presented in Figure A1 in **Addendum Technical Appendix A13.0** and in **Table A13.3**. The receptors were selected as those anticipated to experience the largest impacts based on the traffic data provided and include receptors located adjacent to Bradford Road, to the west of the M606, where the existing traffic flows are >10,000 and the development is anticipated to result in a change in AADT of >5%.

A13.45 No ecological receptors of concern with regards air quality were located near to the proposed site.

Table A13.3: Modelled Receptors

ID	Location	X	Y
1	Cliff Hollins Lane east	417630	427813
2	Cliff Hollins Lane west	417592	427804
3	Woodlands Primary School	417540	427966
4	Wyke Lane	417437	427815
5	Bradford Road, north of Mill Carr Road	417423	427852
6	Bradford Road, opposite Cross Street	417328	427896
7	Bradford Road, opposite St Andrew's Crescent	417527	427697
8	Bradford Road, south	417817	427129
9	Bradford Road, centre	417711	427294
10	Bradford Road, north	417622	427468

Meteorological Data

A13.46 The meteorological dataset used in the assessment was recorded at the Church Fenton meteorological station, which is approximately 25 km to the east of the site. This site is considered to be representative of regional meteorological conditions and sufficient to satisfy the requirements of this assessment.

Model Verification

A13.47 When using modelling techniques to predict concentrations, it is necessary to make a comparison between the modelling results and the monitoring data, to ensure that the model is performing in line with observed data. The accuracy of the future year modelling results are relative to the accuracy of the base year results, therefore greater confidence can be placed in the future year concentrations if good agreement is found for the base year.

A13.48 Kirklees Council operates an extensive network of automatic and passive monitoring techniques. Two sites (RS2 and DT41) are located on Bradford Road, south of Junction 26 (see **Addendum Technical Appendix A13.0**, Figure A3). However, due to the

complex nature of Junction 26, consisting of several slip roads onto and off of the M606 and M62, each at varying heights, it was not considered appropriate to use the monitoring data to generate a verification factor, particularly considering the locations of the modelled receptors.

A13.49 It was decided rather than relying on applying an arbitrary factor taken from other assessments the approach instead applied very conservative assumptions. (i.e. emissions rates which account for a limited improvement in vehicle emission standards up to 2022. In addition, hourly emissions rates considered to be constant over the 24 hour period).

Damage Costs

A13.50 The environmental damage cost associated with the development, due to traffic emissions' health and environmental impacts, was required to be estimated by the draft West Yorkshire Air Quality and Emissions Technical Planning Guidance (WYLEG, 2014) (RefA13.24). The guidance stipulates that the damage cost should help determine the amount (value) of mitigation that is expected to be spent on measures to reduce the impacts. The calculation utilises the Defra Emissions Factor Toolkit (Ref A13.11) to estimate the additional pollutant emissions from a proposed development and the Inter Government Department on Costs and Benefits (IGCB) Air Quality Damage Costs (Defra, 2015b) (RefA13.12) for the specific pollutant of interest, to calculate the resultant damage costs. The following calculation was used to determine the damage cost of the proposed development over a five year period for the pollutants NO_x and PM.

A13.51 Road Transport Emission Increase = Σ (Estimated trip rate for 5 years X Pollutant emission rate per 10 km per vehicle type X Damage Cost)

Stage 3: Mitigation and Compensation

A13.52 The outcome of Stage 2 identifies the damage cost of air emissions impacts associated with the development. Suggested mitigation measures are provided in the draft West Yorkshire Air Quality and Emissions Technical Planning Guidance (WYLEG, 2014) (RefA13.24).

Study Area

A13.53 The Site is located at the North Bierley decommissioned Wastewater Treatment Works and surrounding land located to the north of Junction 26 of the M62 and its intersection with the M606. The site is bounded by the M606 to the west, M62 to the south, Hanging Wood to the east and Cliff Hollins Lane to the north. A Location Plan can be found included in Chapter 1 of the ES. The area within 500 m of the Site could be affected by the Proposed Development so this area has been identified as the study area for local air quality. No designated ecological sites have been identified within 500 m of the site, therefore there are no ecological receptors which need to be considered as part of this assessment. Whilst Hanging Wood is a Kirklees Site of Wildlife Significance (SWS), SWS, in accordance with relevant guidance (IAQM, 2014 (Ref A13.19); IAQM, 2015 (RefA13.17), and WYLEG, 2014 (RefA13.24)) do not require consideration in terms of local air quality effects.

A13.54 **Addendum Technical Appendix A13.0**, Figure A1 shows the site location in the context of the surrounding road network.

Surveys / Method of Baseline Data Collation

Desk Study

A13.55 Local Air Quality Management (LAQM) reports and information provided by KMBC has been reviewed to summarise the baseline situation.

Site Visit / Other Assessment

A13.56 No monitoring surveys were carried out for this assessment.

Consultation Undertaken to Date

A13.57 Our approach has been consistent with what was agreed and done last time around, and consistent with West Yorkshire Air Quality and Emissions Technical Planning Guidance.

Significance Criteria

A13.58 Air quality impacts may be considered to be significant if a development leads to statistically impacting air quality criteria at existing sensitive receptors or if air quality objectives / EU limit values are predicted to be exceeded at proposed sensitive receptors. Updated guidance published by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) on land-use planning and development control (Ref.A13.17) suggests that a two-stage approach should be adopted to determine whether or not a proposed development will have a significant impact on local air quality. Firstly, qualitative descriptions are applied to the predicted impacts on local air quality at individual receptors, which is then followed by a professional judgement on the overall significance of the effects of any identified impacts. These two stages are described in more detail in the following sections

Long-Term Impact Descriptors

A13.59 In order to assess the potential impacts of a proposed development on local air quality EPUK and IAQM suggest assigning a description of the impact based on the magnitude of change as a percentage of a relevant Air Quality Assessment Level (AQAL). Account also needs to be taken of predicted pollutant concentrations and their relationship to the AQAL. In most assessments the AQAL will correspond to the Air Quality Objective / EU Limit Value for the pollutant(s) of concern summarises the impact descriptors derived from the guidance for annual mean NO₂ and PM₁₀ concentrations.

A13.60 Whilst the impact descriptors presented in the guidance are based on annual mean concentrations and changes in concentrations relative to the Air Quality Assessment Level, as a percentage, annual mean concentrations and changes in concentrations on a mass basis have been added to **Table A13.4** for ease of reference. It should be noted that the impact descriptors may be adverse or beneficial depending upon whether concentrations are predicted to increase or decrease.

Table A13.4: Air Quality Impact Descriptors for Sensitive Receptors (Annual Mean Concentrations)

Annual Mean Concentration at Receptor in Assessment Year		% Change in Concentration Relative to AQAL				
		0	1	2 – 5	6 – 10	>10
As % of AQAL	NO ₂ / PM ₁₀ (µg/m ³) ^a	≤0.2	0.2 – 0.6	0.6 – 2.2	2.2 – ≤4.0	>4.0
≤75%	≤30.2	Negligible	Negligible	Negligible	Minor	Moderate
76% - 94%	30.2 – 37.8	Negligible	Negligible	Minor	Moderate	Moderate
95% - 102%	37.8 – 41.0	Negligible	Minor	Moderate	Moderate	Substantial
103% - 109%	41.0 – 43.8	Negligible	Moderate	Moderate	Substantial	Substantial
≥110%	≥43.8	Negligible	Moderate	Substantial	Substantial	Substantial

Notes:
 AQAL = Air Quality Assessment Level, which will usually be an Air Quality Objective or EU Limit Value (e.g. for NO₂ / PM₁₀ the relevant AQAL is the annual mean air quality objective / EU Limit Value of 40 µg/m³).
^a The values below and to the right represent the concentrations proposed by the IAQM for assessment purposes with regard the annual mean NO₂ and PM₁₀ objective / EU Limit Value of 40 µg/m³.

Short-Term Impact Descriptors

A13.61 The EPUK and IAQM guidance indicates that changes in short-term (i.e. hourly or less) concentrations of less than 10% of the relevant AQAL are sufficiently small in magnitude to be regarded as having an insignificant effect. Furthermore, where such peak short term concentrations are in the range 10-20% of the relevant AQAL, EPUK and IAQM indicates this impact can be described as slight, those in the range 20-50% moderate and those above 50% as substantial. It should be noted that these impacts descriptors are applied without reference to background or baseline concentrations in the study area.

A13.62

Table A13.5 summarises the impact descriptors derived from the guidance for hourly mean NO₂ concentrations expressed as the 99.8th percentile.

Table A13.5: Air Quality Impact Descriptors for Sensitive Receptors (Hourly Mean Concentration)

Proposed Criteria as % of AQAL	Predicted 99.8 th Percentile Hourly Mean NO ₂ Process Contribution	Impact Descriptor
<10%	< 20 µg/m ³	Negligible
10 – 20%	20 – 40 µg/m ³	Minor
20 – 50%	40 – 100 µg/m ³	Moderate
>50%	> 100 µg/m ³	Substantial

Assessment of Significance

A13.63 The descriptors presented in **Table A13.4** and

Table A13.5 are ascribed to impacts likely to be experienced at individual sensitive receptor locations, however they are not, of themselves, a clear and unambiguous guide to reaching a conclusion on significance. The EPUK / IAQM guidance makes it clear that the assessment of significance of the overall effect should be based on professional judgement. Whilst it may be that there are 'minor', 'moderate' or 'substantial' impacts at one or more receptors, the overall effect may not necessarily therefore be judged as being significant in some circumstances. Impacts may also be adverse, beneficial or negligible.

A13.64 One of the relevant factors in the judgement of the overall significance of effect may relate to the potential for cumulative impacts, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a 'moderate' or 'substantial' impact may not have a significant effect if it is confined to a very small area.

A13.65 Where a single development can be judged in isolation, it is likely that a 'moderate' or 'substantial' impact will give rise to a significant effect and a 'negligible' or 'minor' impact will not have a significant effect, but such judgements are always more likely to be valid at the two extremes of impact severity.

A13.66 Any judgement on the overall significance of effect of a development will need to take into account such factors as:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts;
- the overall balance between the number of receptors experiencing adverse impacts and those experiencing beneficial impacts; and
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts

Assumptions and Limitations

A13.67 A future year of 2022 was chosen for the purposes of the operational phase assessment. Should the development be fully occupied prior to 2022 it is feasible that the impacts may be underestimated. However, this was accounted for through the sensitivity test by assuming no improvement in emissions. Beyond 2022 with or without the development emissions from road traffic sources are likely to get progressively smaller.

A13.68 No suitable monitoring data exists for the purposes of model verification, as described in the section titled. 'Model Verification'. Therefore, based on studies undertaken at AECOM for numerous projects an assumed verification factor was applied. It is deemed that this provided a robust approach that should not result in impacts being underrepresented.

A13.69 The assessment uses advanced dispersion modelling software to predict pollutant concentrations at sensitive receptor locations. The software uses algorithms to predict the dispersion of emissions from the source, to the receptor, as carried by the meteorological conditions included. Some of the potential error associated with dispersion modelling is accounted for within the dispersion model verification process.

A13.70 Emission standards of vehicles in 2017 (the base year) were assumed to represent 2013 and in 2022 assumed to be the same as 2017. Hence emissions will improve but not in the order of magnitude anticipated by projections included in the Emission Factor Toolkit. In addition, the average hourly emission rate for each link is assumed to be present for every hour over each 24 hour period. Both of these factors are likely to give a conservative outcome.

Baseline Conditions

Summary of Local Air Quality Management

A13.71 The Local Air Quality Management (LAQM) responsibilities in the vicinity of the proposed development site are undertaken by Kirklees Council. The proposed site is located in close proximity to Kirklees Council's northern border with Bradford Metropolitan District Council (BMDC). Kirklees Council has declared two Air Quality Management Areas (AQMAs), neither of which are near to or will be affected by the development. BMDC has declared four AQMAs for the annual mean NO₂ objective. The nearest (AQMA 1: At the junction of Manchester Road and Mayo Avenue, Bradford) is located approximately 3 km to the north west of the site and therefore is very unlikely to experience an impact owing to the proposed development.

Local Air Quality Monitoring

A13.72 Kirklees Council undertakes monitoring of NO₂ using continuous monitoring and passive diffusion tubes near to the proposed site, while BMDC undertakes no monitoring in the vicinity of the proposed site.

Nitrogen Dioxide

Continuous Monitoring

A13.73 Kirklees Council operates a network of six continuous monitors as well as a mobile trailer unit. The nearest to the proposed site is RS2 located approximately 360 m to the south of the proposed site next to Junction 26 of the M62 (**Addendum Technical Appendix A13.0**, Figure A3). According to **Table A13.6** (KC, 2016) (Ref A13.29) annual mean NO₂ concentrations were above the objective in 2010 and then significantly decreased in 2011. The trend was down up to 2014 where the annual mean increased in 2015 but well below the objective value.

Table A13.6: Continuous Monitored Concentrations

ID	Location	Type	Annual Mean NO ₂ Concentrations (µg/m ³)					
			2010	2011	2012	2013	2014	2015
RS2	Bradford Road	Roadside	47.2	37.7	37.4	32.4	33.1	35.7

Notes: Concentrations above the objective indicated in bold.

Passive Monitoring

A13.74 Kirklees Council operates an extensive network of diffusion tubes across the district. The nearest to the proposed site is DT68, located approximately 420 m to the south of the proposed site, on Bradford Road, Cleckheaton, near to the continuous monitor, RS2 (**Addendum Technical Appendix A13.0**, Figure A3). According to **Table A13.7**, the annual mean NO₂ concentration was 51 µg/m³ in 2011 and then as per the trend noted for RS2 there was a declining trend until 2015 where emissions started to increase one more.

Table A13.7: Monitored NO₂ Concentration

ID	Location	Type	Annual Mean NO ₂ Concentrations (µg/m ³)					
			2010	2011	2012	2013	2014	2015
DT68	Cleckheaton, Bradford Road	Roadside	62	51	44	42	43	45

Notes: Concentrations above the objective indicated in bold.

Particulate Matter

A13.75 Monitoring of PM₁₀ is undertaken at six sites across the district, the nearest of which to the proposed site is RS2, located on Bradford Road, south of the M62. According to **Table A13.8**, annual mean PM₁₀ concentrations have been stable between 2009 and 2013 and well below the objective.

Table A13.8: Monitored PM₁₀ concentrations

ID	Location	Type	Annual Mean PM ₁₀ Concentrations (µg/m ³)					
			2010	2011	2012	2013	2014	2015
RS2	Bradford Road	Roadside	19.1	18.6	19.1	19.1*	15.9	NA

* Note: 2013 data has been annualised

Background Concentrations

A13.76 A large number of sources of air pollutants exist which individually may not be significant, but collectively, over a large area, need to be considered. The concentrations calculated by the model due to vehicle emissions can then be added to these background concentrations to give the total concentration at a receptor.

Monitored Background Concentrations

A13.77 Kirklees Council currently undertakes monitoring at four background sites, the nearest of which to the proposed site are provided in **Table A13.9**. Of these, the nearest monitoring location to the proposed site is DT37, located approximately 2.8 km to the south west. Annual mean NO₂ concentrations recorded at this site were significantly higher than background sites elsewhere in the district and higher than many of the roadside sites. DT37 is located less than 80 m from the M62 and therefore concentrations at this site will be influenced by road traffic emissions. The site exceeded the annual mean NO₂ objective in 2010. DT75 is located approximately 4.2 km south east of the proposed site. Annual mean NO₂ concentrations at this site were well below the objective. The site was removed in November 2012.

Table A13.9: Background Monitored NO₂ Concentrations

ID	Location	Approximate Distance to Proposed Site (km)	Annual Mean NO ₂ Concentrations (µg/m ³)				
			2011	2012	2013	2014	2015
DT37	Hartshead, Highmoor Lane	2.8	37	36	31	N/A	36
DT75	Liversedge, Vernon Rd	4.2	26	25	N/A	N/A	N/A

Notes: *Prior to the 2014 Progress Report, diffusion tube DT37 was numbered DT49.

Mapped Background Concentrations

A13.78 Modelled estimations of background air quality concentrations are provided by Defra [Ref 13.13] for each 1 km square in the UK between 2010 and 2030. To avoid double counting, specific road sources must be discounted from the total background pollutant concentrations, to give 'adjusted' values (i.e. if those specific sources are included within the grid). Given the assumption that emission are unlikely to reduce in 2022 compared to 2017 then it's reasonable to assume that background emissions will remain equally

similar. Background concentrations extracted from Defra maps are shown in **Table A13.10**. These data were downloaded in October 2017.

Table A13.10: Background concentrations taken from Defra maps

Pollutant	2017/2022	
	Total from grid	Adjusted
NO _x	28.4	23.3
NO ₂	19.8	15.5
PM ₁₀	17.3	17.2
PM _{2.5}	11.3	11.2

Summary of background effects

A13.79 The 2017 and 2022 mapped background concentrations for the grid square 417500,427500 were considered to be the most appropriate background concentrations to use in this assessment. This is because the closest monitoring sites were situated in more urban environments and were likely to be influenced by local major roads. The contribution from modelled roads was removed from the mapped background concentrations to avoid double counting as outlined in Defra's LAQM.TG(16) (RefA13.9).

A13.80 As no background monitoring of PM₁₀ is undertaken near to the proposed site, the adjusted mapped background concentrations were applied to the model remains valid.

A13.81 The background concentrations used in the assessment are provided in **Table A13.11**.

Table A13.11: Background Pollutant Concentrations applied to the Assessment (µg/m³)

Pollutant	2017/2022
NO _x	23.3
NO ₂	15.5
PM ₁₀	17.2
PM _{2.5}	11.2

Predicted Significant Effects

A13.82 As discussed in the assessment methodology, and detailed in **Addendum Technical Appendix A13.0**, a four step process was followed to determine the risk of potential impacts during the construction phase.

STEP 1: Screen the Requirement for a more Detailed Assessment

A13.83 The proposed site is located at the decommissioned North Bierley Wastewater Treatment Works and surrounding arable land. The nearest sensitive receptors to the proposed site are the residential properties adjacent to the northern boundary of the site on Cliff Hollins Lane. These properties are located approximately 300 m from the proposed demolition works associated with the existing wastewater treatment works.

A13.84 Woodlands Primary School is located approximately 170 m from the proposed main site boundary and within 50m of the proposed car park.

A13.85 There are no designated ecological sites of concern with regards air quality, as defined by the IAQM Guidance (2014) (RefA13.19), located within 50 m of the site.

STEP 2: Assess the Risk of Dust Impacts

Demolition

A13.86 As part of the proposal, the buildings and structures associated with the decommissioned wastewater treatment works will be demolished. The volume of these buildings and structures is 25,288 m³ and therefore the dust emission class is considered to be 'Medium'.

Earthworks

A13.87 The residential and employment areas of the development site total approximately 13.2 hectares and therefore the magnitude of the dust emission class is considered to be 'Large'. The car park to be constructed is considered to be 'small'.

Construction

A13.88 The proposal comprises up to 35,284 sq m of employment space. The potential dust emission classification was considered to be 'Large'.

Track-out

A13.89 With regard to the criteria for the dust-generating potential of the surface material and the length of unpaved road, it is considered to be a conservative approach to classify the potential dust effects as 'Medium'.

A13.90 A summary of the dust emission magnitude for each activity is provided in **Table A13.12**.

Table A13.12: Summary of the Dust Emission Magnitude

Source	Dust Emission Classification
Demolition	Medium
Earthworks	Large
Construction	Large

Track-out	Medium
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STEP 2B: Define the Sensitivity of the Area

A13.91 The following were taken into consideration when determining the sensitivity of the area to dust soiling and health effects of PM₁₀:

- The site is located near to a residential area with dwellings located adjacent to the site and therefore the receptors are considered to be high sensitivity.
- The car park to be constructed is within 50m of Woodlands C. of E. Primary School and therefore the sensitivity of the area is considered to be high.
- There are < 10 properties within 20m of the site boundary and <10 properties within 350 of the proposed demolition works.
- The site is not within 50 m of a designated ecological site of concern with regards air quality.
- PM₁₀ monitoring undertaken near to the proposed site, recorded an annual mean concentration of 15.9 µg/m³ in 2014.

A13.92 Taking the above into consideration, in general the sensitivity of the site is Medium to dust soiling effects and Low for health effects. This excludes the proposed car park area, which is considered to be of high sensitivity to dust soiling effects due to its proximity to the school. The proposed demolition works are also considered an exception, as due to the distance of the nearest sensitive receptors, the sensitivity of the area is considered to be Low to dust soiling and to human health effects.

STEP 2C: Define Risk of Impacts

A13.93 Taking into consideration the conclusion from Steps 2A and 2B, the risk of dust impacts for each activity are provided in **Table A13.13**.

Table A13.13: Risk of Unmitigated Dust Impacts

Source	Dust Soiling	Human Health
Demolition	Medium	Low
Earthworks	Medium	Low
Construction	Medium	Low
Track Out	Low	Low

A13.94 Overall demolition and construction phase impacts may have a **minor to moderate adverse** effect without mitigation.

Effect during operational phase: long term

A13.95 Local air quality concentrations have been predicted for the following scenarios:

- Base year, 2017
- 2022 DM (Do-Minimum), without the proposed development; and
- 2022 DS (DS, Do-Something), with the proposed development

A13.96 In addition, in accordance with the draft West Yorkshire Air Quality and Emissions Technical Planning Guidance (WYLEG, 2014) (RefA13.24), the results of the assessment included a level of sensitivity whereby it was assumed that there will be no reduction in traffic related emission factors between the base year (2017) and the future year (2022)

Nitrogen Dioxide

A13.97 Annual mean concentrations of NO₂ were predicted at the selected receptor locations or the development proposal. The results are presented in **Table A13.14**. The impact of the development at the sensitive receptors is presented as the absolute change in annual mean NO₂ concentration. Impact descriptors are calculated as described in **Table A13.14**.

Table A13.14: Predicted Annual Mean NO₂ Concentrations (µg/m³)

Receptor ID	Annual Mean NO ₂ Concentration (µg/m ³)			Impact (µg/m ³)	Impact descriptor
	2017	2022DM	2022DS		
1 Cliff Hollins Lane east	24.1	23.4	24.0	0.6	Negligible
2 Cliff Hollins Lane west	28.7	28.3	28.6	0.3	Negligible
3 Woodlands Primary School	24.7	23.9	24.2	0.3	Negligible
4 Wyke Lane	27.6	24.8	25.3	0.5	Negligible
5 Bradford Road, north of Mill Carr Road	36.1	30.8	31.4	0.6	Negligible
6 Bradford Road, opposite Cross Street	30.7	26.4	26.7	0.3	Negligible
7 Bradford Road,	32.2	28.1	28.9	0.8	Negligible

Receptor ID		Annual Mean NO ₂ Concentration (µg/m ³)			Impact (µg/m ³)	Impact descriptor
		2017	2022DM	2022DS		
	opposite St Andrew's Crescent					
8	Bradford Road, south	26.9	23.9	24.3	0.4	Negligible
9	Bradford Road, centre	24.0	22.0	22.3	0.3	Negligible
10	Bradford Road, north	25.9	23.4	23.9	0.5	Negligible

A13.98 According to **Table A13.14**, 2022 do minimum the annual mean NO₂ concentrations are predicted to decrease at all modelled receptors (compared to the 2017 baseline) due to anticipated improvements to vehicle emission standards. Note that the base year emission factors represent a 2013 fleet and 2022 a 2017 fleet and so overall emissions are expected to improve in 2022 do minimum (even with the forecasted increase in traffic volumes) but to a lower order of magnitude than if the assessment were to assume fleet projections (and associated emission factors) in line with the EFT. This approach is very conservative to account for the recent evidence that vehicles underperform in real world driving conditions (A13.32). No exceedances of the annual mean objective were predicted at any of the receptors in 2022 with or without the development. For all receptors the development increases the annual mean NO₂ concentration. The highest concentration of 31.4 µg/m³ (with development) was predicted at a residential property located on Bradford Road, near to the junction with Mill Carr Hill Road, and a concentration of 28.9 µg/m³ was predicted at a residential property on Bradford Road, opposite St Andrew's Crescent. The reason for this is due to the proximity of these receptors to traffic emission sources on the Bradford Road and the M606. As a sense check the results were compared with the nearest monitoring data (RS2 and DT68 – Junction 26 of the M62). It is reasonable to assume that air quality at the sensitive receptors would be better than being monitored at RS2 and DT68, which has been confirmed. In addition, in the majority of assessments undertaken where a dominant emissions source is motorway based (as per this Scheme) modelling adjustment factors of near unity are common place. Any further arbitrary adjustment was therefore deemed to be overly conservative and unjustified in real terms.

A13.99 Comparisons between the DS and DM scenarios indicated that adverse impacts were predicted at all receptors. The largest impact, of 0.8 µg/m³, was predicted at receptor 7 on Bradford Road, opposite St. Andrews Crescent. As discussed earlier in this Chapter, a change in traffic flow of > 5% was predicted on this road, due to the proposed development. According to **Table A13.14** the impact at this receptor can be described as 'Negligible'. At all other sensitive receptors, the impacts were also described as 'Negligible'; **and not significant**.

A13.100 Pollutants PM₁₀ and PM_{2.5} were modelled at all sensitive receptors. All results in 2017 and 2022 with and without the proposed development were well below the annual average air quality objective of 40 µg/m³ and 25 µg/m³ for PM₁₀ and PM_{2.5} respectively. The full results for annual mean PM₁₀ are shown in **Table A13.15**. Noted that according to IAQM significance criteria all sensitive receptors were described as 'Negligible'. It's worth noting that the PM₁₀ results are very similar to monitoring site RS2 from 2010 to 2013 and above that in 2014 (no results were recorded in the 2015). This perhaps improves the level of confidence in the modelling and supports the argument that arbitrary adjustment should not be applied. The impacts at all receptors for PM_{2.5} were described as 'Negligible'; **and not significant**.

Table A13.15: Predicted Annual Mean PM₁₀ Concentrations (µg/m³)

Receptor ID		Annual Mean PM ₁₀ Concentration (µg/m ³)			Impact (µg/m ³)	Impact descriptor
		2017	2022DM	2022DS		
1	Cliff Hollins Lane east	18.1	18.2	18.3	0.1	Negligible
2	Cliff Hollins Lane west	18.6	18.8	18.9	0.1	Negligible
3	Woodlands Primary School	18.3	18.4	18.4	0.1	Negligible
4	Wyke Lane	18.7	18.7	18.8	0.1	Negligible
5	Bradford Road, north of Mill Carr Road	20.1	20.0	20.1	0.1	Negligible
6	Bradford Road, opposite Cross Street	19.2	19.2	19.2	0.0	Negligible
7	Bradford Road, opposite St Andrew's Crescent	19.5	19.5	19.7	0.2	Negligible
8	Bradford Road, south	18.6	18.6	18.7	0.1	Negligible
9	Bradford Road, centre	18.2	18.2	18.3	0.1	Negligible
10	Bradford Road, north	18.5	18.5	18.6	0.1	Negligible

Damage Costs

A13.101 In accordance with the draft West Yorkshire Air Quality and Emissions Technical Planning Guidance (WYLEG, 2014) (**Error! Reference source not found.**A13.24) and Defra's 2015 *Update in Valuing Changes in NO_x and NO₂ Emissions* [Ref A13.30], the damage costs associated with of the proposed development were calculated. The proposed development is anticipated to result in an additional 1,388 movements per day (refer to **Addendum Technical Appendix A13.0**, Table 12- Traffic data), of which approximately 26.5% will be HGV movements. Emissions of NO_x and PM₁₀ associated with the development movements were derived from the EFT (Ref A13.11), which determined that an additional 1,646 kg/year (1.65 tonnes/year) of NO_x and 173 kg/year (0.17 tonnes/year) of PM₁₀ would be released once the development is operational (i.e. in the opening year. This is based on each movement being 10 km.

A13.102 According to the Interdepartmental Group on Costs and Benefits- IGBG [Ref], the central average air quality damage cost per tonne of NO_x is £21,044 and per tonne of PM₁₀ is £58,128 based on 2015 prices. With reference to the additional NO_x and PM₁₀ emissions associated with the development, derived from the EFT, the central damage cost of the development was calculated over a five year period

Pollutant	Annual Emissions (kg/yr)	Annual Emissions (tonnes/yr)	IGBG damage costs per tonne (£)	Damage cost (tonne/yr)	Damage cost (tonne/5yr)
NO _x	1,646	1.65	£21,044	£33,981	£169,458
PM ₁₀	173	0.17	£58,125	£11,111	£55,555
Total					£225,014

Table A13.16: Central Air Quality Damage Costs

Pollutant	Annual Emissions (kg/yr)	Annual Emissions (tonnes/yr)	IGBG damage costs per tonne (£)	Damage cost (tonne/yr)	Damage cost (tonne/5yr)
NO _x	1,646	1.65	£21,044	£33,981	£169,458
PM ₁₀	173	0.17	£58,125	£11,111	£55,555
Total					£225,014

A13.103 The damage cost of the proposed development over a five year period was considered to be £225,014.

A13.104 IAQM significance criteria determined that the impact of the development was considered 'Negligible' for NO₂, PM₁₀, PM_{2.5}. Overall following IAQM guidelines the impacts are considered to be 'not significant'. This assessment takes into

consideration existing local air quality as well as the magnitude of change in pollutant concentrations due to the proposed development. In contrast, the assessment of the air quality damage costs associated with the proposed development determined that the cost of the development would be £225,014; however, this assessment is based on emissions not concentrations and fails to take into consideration existing air quality, the location, or the dispersion of pollutants.

Scope of Mitigation

Construction Phase:

A13.105 Determining appropriate mitigation measures corresponds to Step 3 of the assessment methodology.

A13.106 A number of mitigation measures can be adopted to reduce the production and/or dispersal of dust to lessen the nuisance and limit the human health impacts. Ideally dust should be controlled at the source as once airborne it is difficult to suppress.

A13.107 Appropriate mitigation measures are provided in the IAQM 'Guidance on the assessment of dust from demolition and construction' (IAQM, 2014) (A13.19). However, additional mitigation measures are provided in the following guidance documents:

- BRE (2003a): Guidance on the Control of Dust from Construction and Demolition Activities (Ref A13.4);
- BRE (2003b): Controlling Particulates, Vapours and Noise Pollution from Construction Sites (Ref A13.5); and,
- Greater London Councils (2014): The control of dust and emissions from construction and demolition: Supplementary Planning Guidance (Ref A13.18).

A13.108 According to the IAQM Guidance (IAQM, 2014) (Ref A13.19), the dust risk for each of the activities determined in Step 2C should be used to define the appropriate site specific mitigation measures to be adopted.

A13.109 Appropriate mitigation measures, taking into consideration the risk of dust impacts determined in Step 2C, are provided in **Table A13.17**. Mitigation should be implemented through a site-specific Construction Environmental Management Plan (CEMP); these tried and tested measures can be secured through the CEMP and standard planning conditions on any future planning permission. Contractors should also carry the 'Considerate Contractors' registration which is a measure typically included in the CEMP.

Table A13.17: Potential Site Operations and Methods of Controlling Dust

Activity	Possible Dust Control Methods
Communication	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. Display the name and contact details of person(s) accountable for

Activity	Possible Dust Control Methods
	air quality and dust issues on the site boundary. Display the head or regional office contact information.
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken. 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 off site and the action taken to resolve the situation in the log book.
Monitoring	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and windows sills within 100m of site boundary, with cleaning to be provided. Carry out regular site inspections, 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.
Preparing and maintaining the site	Plan site layout so that machinery and dust causing activities are located away from receptors as far as possible. Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles Avoid 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
Operating vehicle/machinery and sustainable travel	Ensure all vehicles switch off engines when stationary – no idling vehicles. Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable. Impose and signpost a maximum speed limit of 15mph on surfaced and 10mph on un-surfaced haul roads
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays.

Activity	Possible Dust Control Methods
	Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation Use enclosed chutes and conveyors and covered skips Minimise drop heights Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable
Waste Management	Avoid bonfires and burning of waste materials
Demolition	Soft strip inside buildings before demolition. Ensure effective water suppression is used during demolition works.
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.
Construction	Avoid scabbling, if possible Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems.
Track-out	Use water-assisted dust sweepers on access and local roads. Avoid dry sweeping large areas Ensure vehicles entering and leaving sites are covered to prevent escape of material during transport Inspect and record on-site haul routes for integrity and instigate necessary repairs on surfaces Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned Implement wheel wash facilities Access gates to be located at least 10 m from receptors where possible

Operational Phase Mitigation

A13.110 The assessment of the impact of the development upon pollutant concentrations at sensitive receptors concluded that any impacts would be 'not significant'. Nevertheless, following the draft West Yorkshire Air Quality and Emissions Technical Planning Guidance (WYLEG, 2014) (Ref A13.24), determining appropriate operational

phase mitigation measures corresponds to Stage 3 of the assessment methodology. According to the guidance the outcome of Stage 2 identifies the level of emissions impacts, in terms of damage costs, which should then be used to determine the level of mitigation required to negate the potential effects upon health and the local environment

A13.111 For 'Major' proposals, the pollution damage costs attributed to the proposal emission changes will determine the level of mitigation compensation required to negate the impact. The damage costs associated with the proposed development were calculated to be £225,014 in total, over five years.

A13.112 A Travel Plan (**Addendum Technical Appendix A11.0**) has been prepared for the development which aims to reduce the number of single occupancy car trips associated with the development, and encourage alternative and more sustainable means of travel. To achieve this, the following objectives have been identified:

- To minimise the number of single occupancy car trips to the site;
- To encourage the use of alternative modes of travel by promoting the benefits of these in terms of cost savings, health benefits etc;
- To encourage safe and viable alternatives to single occupancy car trips (wherever possible) for trips generated by the site;
- To enable the development to protect and enhance the environment; and
- To ensure the on-going development and implementation of sustainable travel practices in the longer term.

A13.113 The Travel Plan includes 18 measures to meet these objectives, including:

- End occupiers will be required to develop and implement bespoke unit Travel Plans and appoint Travel Plan responsibilities to assist with their delivery.
- The results of the surveys from each individual occupier shall be collated by the Travel Plan Coordinator, who will update the Travel Plan and Action Plan accordingly on an annual basis.
- The Travel Plan Coordinator will encourage occupiers to register with the West Yorkshire Travel Plan Network www.wytravelplan.com.
- All new employees will be provided with a new starter induction pack, detailing how they can travel to work by means other than the private car.
- The Travel Plan Coordinator will promote national and local sustainable travel events, including the Bike Week, Walk to Work Week and National Liftshare Day.
- The Travel Plan Coordinator will promote the benefits of walking in relation to general health and well-being and will promote walking to work for staff and residents identified as 'living close by'

- Consideration will be given in providing personal attack alarms to staff and residents as well as setting up a walking group with 'walking buddies'
- The site wide Travel Plan Coordinator will encourage the implementation of the Cycle 2 Work salary sacrifice scheme.
- The Travel Plan Coordinator will establish and chair a Bicycle User Group for employees and residents.
- Public Transport timetable information will be communicated to new staff and residents by the Travel Plan Coordinator and will be provided on the Induction Pack.
- The site wide Travel Plan Coordinator will encourage occupiers to offer discounted MetroCards to employees and residents.
- The site wide Travel Plan Coordinator will encourage all employees and residents to register with www.WYcarshare.com.
- 10% of parking will be reserved for car sharers for each unit.

A13.114 The draft West Yorkshire Air Quality and Emissions Technical Planning Guidance recommends a suite of mitigation which can be adopted, where appropriate, for major schemes to negate the impact. Several of these measures are already included in the Travel Plan discussed above, and so are considered to be designed mitigation. The Travel Plan will be conditioned on any future planning permission to secure its implementation and monitoring.

A13.115 At this stage the final use of the site has not been determined other than a broadly defined planning based characterisation. This assessment has indicated that the development will have an impact on air quality but that the impact will be 'Negligible'. Nevertheless damage costs have been calculated based on the additional annualised emissions which should be mitigated. It is proposed that At this stage the final use of the site has not been determined other than a broadly defined planning based characterisation. This assessment has indicated that the development will have an impact on air quality but that the impact will be 'Negligible'. Nevertheless damage costs have been calculated based on the additional annualised emissions which should be mitigated. Acknowledged in the West Yorkshire AQ and Emissions Technical Planning Guidance are the various default mitigation measures commensurate with schemes with different characteristics. This application specifically identifies measures included in the Draft Travel Plan (**Addendum Technical Appendix A11.1** which are aimed at increasing sustainable travel modes and reducing travel related emissions; user specific Travel Plans will be prepared for each unit on the site prior to occupation, and will reflect the overall requirements within the Draft Travel Plan. Once implemented in full, the measures identified within the Travel Plans to increase sustainable travel patterns will equate to the identified Damage Costs.

Residual Effect Assessment

Construction Phase

A13.116 Should effective dust mitigation measures be enforced and implemented within a Dust Management Plan and/or CEMP then the residual impact of the construction phase will be not significant for all the activities, with respect to dust soiling and PM10 effects

Operational Phase

A13.117 Taking account of uncertainties in air quality projections, the residual local air quality impacts of the proposed development are predicted to be '**Negligible**' and overall the effects are considered to be '**not significant**'.

A13.118 The degree to which the measures identified in the Travel Plan will reduce the calculated damage costs cannot readily be quantified, nevertheless, the amount (value) of the designed mitigation contained within the Travel Plan is significant and should be offset against the calculated damage cost. A summary of the construction and operational impacts are shown in **Table A13.18**.

Table A13.18: Summary of Residual Effects

Effect	Impact Area	Phase	Significance	Impact (Beneficial/ Adverse)	Period
Dust and emissions from demolition and construction related activities causing a nuisance and affecting public health	Local	Construction	Negligible	-	Short Term (temporary)
Increase in emissions due to development traffic	Local	Operational	Negligible	-	Long Term (permanent)

Cumulative effect assessment

A13.119 The inclusion of other committed development has not been requested by the Local Authority and therefore is not included in the traffic data provided for the air quality assessment. However, traffic data does assume a standard level of growth between now and 2022 – and therefore whilst specific committed development may not be accounted for, more general regional growth is accounted for.

A13.120 As no significant committed development is assumed, there is not expected to be a significant cumulative impact at the Proposed Development or surrounding area.

Conclusions

A13.121 An air quality impact assessment was undertaken for a development proposed for the former waste water treatment works at North Bierley near to junction 26 of the M62. The assessment considered the impact caused by both the construction and operation of the site. In terms of construction the development of the site will cause a certain 'low' to 'medium' level of dust soiling which would benefit from appropriate mitigation measures as provided in the IAQM 'Guidance on the assessment of dust from demolition and construction'. For the operational phase assessment the level of traffic activity, owing to the proposed development, was considered 'Negligible' at sensitive receptors for pollutants NO₂ and PM₁₀ and overall 'Not significant'. This assessment takes into consideration existing local air quality as well as the magnitude of change in pollutant concentrations due to the proposed development. In contrast, the assessment of the air quality damage costs associated with the proposed development determined that the cost of the development would be £225,014. Mitigation options for the operational impacts include implementing a travel plan and a vehicle activity survey to determine the baseline situation to inform a low emissions strategy.

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