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Network Rail

Oxford Corridor Phase 2 Capacity Improvement Scheme

Environmental Impact Assessment – Environmental Statement: Chapter 6 – Air Quality and Odour

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6. AIR QUALITY AND ODOUR

6.1 Introduction

6.1.1 This chapter of the Environmental Statement reports the potential effects resulting from the construction and operation of the Scheme on air quality. The assessment has taken the following approach:

- identification of relevant baseline conditions;
- details of relevant mitigation embedded within the Scheme and construction management measures;
- assessment of potential air quality effects from the Scheme;
- proposals for appropriate additional mitigation measures if possible; and
- conclusions on the likely significant residual effects of the Scheme for air quality.

6.1.2 A full description of the Scheme is given in Chapter 2 – Description of the Scheme.

6.1.3 The main pollutants of concern for air quality in the United Kingdom (UK) are associated with combustion emissions typically arising from road traffic and industry. These are primarily oxides of nitrogen (NOx), nitrogen dioxide (NO_2) and particulate matter. These are PM_{10} and $PM_{2.5}$, (particulate matter with an aerodynamic diameter of 10 microns or less and 2.5 microns or less, respectively). Air pollutants can affect human health and cause damage to sensitive plants and ecosystems.

6.1.4 Air quality also refers to dust, which could affect health or give rise to annoyance due to the soiling of surfaces through deposition. The term 'dust' refers to all particulate matter including all solid particles suspended in air or settled and deposited on a surface after having been suspended in air. This can be due to activities related to construction and earthworks. Dust includes the smaller-sized particles associated with potential health impacts (i.e. PM_{10} and $PM_{2.5}$) and the larger particles associated with causing annoyance or affecting sensitive vegetation through deposition on a surface.

6.1.5 The air quality assessment considers the following:

- fugitive dust emissions generated by demolition, earthworks, construction and trackout;
- emissions of odours from the excavation or disturbance of areas

containing ground contamination which could be odoriferous;

- exhaust emissions of pollutants to air from road vehicles (e.g. cars, vans, buses and lorries) on the local road network during construction and operation of the Scheme; and
- emissions from diesel trains during the operation of the Scheme.

6.1.6 This assessment has considered the potential air quality and dust impacts on the human populations of communities, and terrestrial and freshwater habitats and ecosystems which are near to the emission sources (e.g. roads which experience changes in traffic flows, construction areas or the station and rail tracks).

6.1.7 For human exposure, sensitive receptors (termed 'human receptors') include residential properties, schools and care homes. In addition, for the construction dust assessment, recreational areas and Public Rights of Way including footpaths have also been included.

6.1.8 For habitats and ecosystems, the sensitive receptors (termed 'ecological receptors') considered include the following:

- Special Areas of Conservation (SACs) and Special Protection Areas (SPAs);
- Ramsar sites;
- Sites of Special Scientific Interest (SSSIs);
- National Nature Reserves (NNRs) and Local Nature Reserves (LNRs);
- Local Wildlife Sites (LWSs), including Biological Notification Sites (BNS) and Sites of Importance for Nature Conservation (SINC) designations; and
- Ancient Woodlands.

6.1.9 This chapter is supported by the following figures within Volume 3:

- Figure 6.1 – NO_2 Monitoring Locations in Oxford and Botley;
- Figure 6.2 – Botley Air Quality Management Area, Background Map Data, PCM Links and Ecological Receptors; and
- Figure 6.3 – Dust Risk Assessment Study Areas, and Human Receptors.

6.1.10 This chapter is supported by the following appendices within Volume 4:

- Appendix 6.1 – Air Quality Baseline Report; and

- Appendix 6.2 – Dust Risk Assessment.

6.1.11 In addition, the conclusions of this assessment have been used within other topic assessments to consider whether there are additional effects on relevant receptors. For example, the implications of air quality and odour impacts on human health are addressed in Volume 2 – Chapter 12 – Human Health. The implications of air quality impacts on ecological receptors are addressed in Volume 4 – Appendix 4.2 – Habitats Regulations Assessment.

6.1.12 All technical terms used in this chapter are explained within Appendix 1.5 – Glossary and Acronyms.

6.2 Legislation, Policy and Guidance

6.2.1 The following section outlines the relevant national legislation, regional and local planning policies and guidance relevant to this assessment.

6.2.2 Table 6.1 sets out the relevant legislation for air quality; Table 6.2 sets out relevant planning policy for air quality whilst Table 6.3 provides a summary of relevant guidance for this air quality assessment.

6.2.3 The legislation, policies and guidance listed have been taken into account in the assessment of the likely significant effects on air quality as a result of the Scheme and the development of appropriate mitigation measures.

Table 6.1: Legislation relevant to air quality

Legislation	Description in relation to air quality	Relevance to the Scheme
Environment Act 1995, Part IV	The Act contains provisions for protecting air quality in the UK and for Local Air Quality Management (LAQM). It requires the UK government to produce a national Air Quality Strategy (AQS) which contains standards Air Quality Objectives (AQOs) and measures for improving ambient air quality. Local authorities are obliged to regularly and systematically review and assess air quality within their boundaries to achieve AQOs (a process termed Local Air Quality Management (LAQM)). Under the Act, where the air quality standards are not being met, local authorities must issue an order designating an Air Quality Management Area (AQMA). Whilst local authorities have a statutory duty to undertake LAQM, they are not obliged to ensure AQOs are met, instead, they are tasked with 'working towards' achieving AQOs.	The AQOs have been applied during the assessment of the Scheme as described in Section 6.3 and where relevant, this air quality assessment demonstrates the potential interaction with the LAQM process being undertaken by local authorities. This assessment has considered the AQMAs within the study areas. This is reported in Section 6.4 of this chapter.
The Air Quality (England) 2000 Regulations and The Air Quality (England) (Amendment) 2002 Regulations	These Regulations provide for the AQOs which are set out in the AQS, the latest version of which is the 2007 AQS (Department for Environment, Food and Rural Affairs (Defra, 2007).	These AQOs have been used as the basis of the assessment reported in this chapter to determine the impact of the Scheme on air quality and the significance of effects reported in Sections 6.6 and 6.8 of this chapter.
The Air Quality (Standards) Regulations 2010	The Regulations transpose the air quality EU Limit Values set out in Directive 2008/50/EC on ambient air quality and cleaner air for Europe, to UK law. Limit values are set for individual pollutants and are made up of a concentration value, an averaging time over which it is to be measured, the number of exceedances allowed per year, if any, and a date by which it must be achieved. The UK Government is legally required to ensure that air quality Limit Values are met in the 'shortest possible time'.	These EU Limit Values have been used as the basis of the assessment reported in this chapter to determine the impact of the Scheme on air quality in relation to the UK Government reporting on compliance with the EU Limit Values.
The Conservation of Habitats and Species Regulations 2017	These Regulations implement the provisions of the Habitats Directive (92/43/EEC) and the Wild Birds Directive (2009/147/EC). They provide for the designation and protection of European Designated Sites and species,	These legislative requirements have been considered in assessing air quality impacts from

Legislation	Description in relation to air quality	Relevance to the Scheme
	and the adaptation of planning and other controls for the protection of European Designated Sites.	the Scheme at those European Designated Sites within the study area (where appropriate). See Appendix 4.2 – Habitats Regulations Assessment within Volume 4.
Environmental Protection Act 1990	Part III of the Act provides statutory nuisance provisions for dust and odour.	Measures have been included within the Code of Construction Practice (CoCP) (Volume 4 – Appendix 2.1 to prevent a nuisance from dust and/or odour during construction.

Table 6.2: Planning policy relevant to air quality

Policy document	Description in relation to air quality	Relevance to the Scheme
The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2019)	The NPPF sets out the government's planning policies for England and how these are expected to be applied through the preparation and implementation of plans and the application of the policies in the NPPF. The NPPF introduces the presumption in favour of sustainable development in England, in relation to plan making and decision taking. Paragraph 170 of NPPF solely references how policies and decisions should enhance and contribute to the natural environment by: *"preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information."* Paragraph 181 states in relation to air quality 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 AQMAs and Clean Air Zones, and the cumulative impacts from individual sites on local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through*	The assessment reported in this chapter is part of the EIA process to identify whether there would be any likely significant effects on air quality associated with the construction and operation of the Scheme in accordance with the requirements of the NPPF. This assessment has concluded that there would be negligible impacts as described in Section 6.6 of this chapter.

Policy document	Description in relation to air quality	Relevance to the Scheme
	traffic and travel management, and green infrastructure provision and enhancement. Planning decisions should ensure that any new development in an AQMA or Clean Air Zone is consistent with the local air quality action plan." Paragraph 175 and 176 relate to habitats and biodiversity and principles to be followed when determining planning applications.	
The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS) (Defra, 2007)	Although not specific planning policy, the AQS provides an overview and outline of the UK government's and devolved administrations' ambient (outdoor) air quality policy. The strategy sets out the AQOs and the measures selected to achieve the desired improvements in air quality.	The air quality assessment uses the AQOs set out within the AQS as a basis of this assessment as described in Section 6.3 of this chapter.
Oxford Core Strategy 2026	The overarching strategy guiding developments in Oxford between 2011 and 2026. It sets out policies and proposals relating to many of the Council's priorities, including growth and regeneration in a way which protects key environmental assets. Policy CS14: Supporting City-wide Movement states that the City Council will work with its partners to improve air quality by implementing a Low Emissions Strategy and Low Emission Zone in the city centre. The supporting text for other policies (CS6 Northern Gateway and CS8 Summertown), refer to protecting the Oxford Meadows Special Area of Conservation (SAC) from increased air pollution.	A Zero Emission Zone is currently due to be introduced in the summer of 2021 (Oxford City Council, 2019). Operation of the Scheme is not expected to increase private car usage. Operational air quality effects were therefore scoped out of this assessment because effects are not likely to be significant (as per IAQM, 2017). See Section 6.6.

Table 6.3: Guidance relevant to air quality

Guidance Document	Description in relation to air quality
Oxford City Council (No date) Air Quality Planning Application Guidance	This guidance has been produced by Oxford City Council primarily to advise developers and consultants on the need, level of detail and required content of air quality assessments. It also provides guidance on emission mitigation requirements. It does not repeat existing policy and guidance but provides clarity on how to provide the correct information to comply with national and local policies.
Defra (2018) Local Air Quality Management – Technical Guidance (TG16).	This technical guidance is a guide for local authorities to follow whilst carrying out the LAQM process and includes detailed technical guidance on air quality screening, monitoring, modelling and assessment. It also provides guidance on where the AQOs apply.
Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) (2017) Land-Use Planning and Development Control: Planning for Air Quality, v1.2	This document contains advice on the need for an air quality assessment regarding traffic emissions and combustion plant, selection of modelling methodologies, how to describe air quality effects, and advice on determining the significance of air quality effects.
IAQM (2016) Guidance on the assessment of dust from demolition and construction, v1.1	This document contains guidance for undertaking a risk-based appraisal of dust from demolition and construction-related activities and assigning an appropriate level of dust control and mitigation. It includes recommended dust mitigation measures, monitoring and an approach for determining the significance of effects from dust emissions. It also includes advice on identifying the need to undertake an assessment of emissions to air from construction plant and machinery.
IAQM (2020) A guide to the assessment of air quality impacts on designated nature sites, v1.1.	This contains advice on the need for an air quality assessment regarding traffic emissions and combustion plant, specifically in relation to designated nature sites. The guidance includes advice on screening for nature sites, methodologies and a discussion of when further assessment is required from a project ecologist to determine if any significant air quality effects exist.
IAQM (2018) Guidance on the assessment of odour for planning, v1.1.	This document contains guidance for undertaking a risk-based assessment of odour emissions. It includes the selection of assessment methodologies, how to describe odour effects, and advice on determining the significance of odour effects.
Highways England (2019) Design Manual for Roads and Bridges (DMRB) LA 105 Air Quality.	This document provides guidance on the assessment of the impact highways schemes (i.e. motorway and all-purpose trunk roads) may have on local air quality.

6.3 Methodology

Introduction

6.3.1 This Section reports the consultation undertaken, defines the study area, temporal scope, the sources of baseline data, and the methodology and significance criteria. The limitations and assumptions of the study are also described.

Consultation

6.3.2 An overview of consultation undertaken on the Scheme is summarised in Chapter 4 – Approach to Environmental Assessment.

6.3.3 The EIA Scoping Opinion included a requirement for air quality to be included in the EIA and further direction on the content of the assessment. Consultation feedback related to the Scoping Report and the Scoping Opinion are summarised in Table 6.4. Full details can be found in Volume 4 – Appendix 1.1 – Scoping Opinion.

6.3.4 In relation to the air quality assessment there has been engagement with the following stakeholders:

- Oxford City Council; and
- Vale of White Horse District Council.

6.3.5 The methodology for this assessment has considered the feedback received and where appropriate the scope and method has been revised.

Table 6.4: Summary of EIA Scoping Report consultation responses for air quality scope and methodology

Consultee	Issues raised in response to the Scoping Report	Summary of the response to issues raised
Oxford City Council	August 2020 – Oxford City Council agreed that the areas identified in the Scoping Report were correct. However, it requested that a clear justification for scoping out train emissions should be provided. This should include clear demonstration that the criteria in sections 7.18 and 7.19 of the LAQM TG16 guidance aren't met. Additionally, for the impact of traffic emissions during the operational phase, Oxford City Council requested that Environmental Statement should clearly demonstrate that the expected increase in traffic is below the more stringent EPUK/IAQM criteria for light duty vehicle (LDV) and heavy duty vehicle (HDV) flows within an Air Quality Management Area EPUK/IAQM, 2017). January 2021 – Oxford City Council provided further comments regarding the justification for scoping out rail emissions. This included identifying which AQOs would apply within the study area, the nearest relevant exposure locations and determining the background concentrations to determine the need for further assessment as per the LAQM TG16 guidance. With regard to road traffic emissions during the operational phase, Oxford City Council noted that justification for not including an assessment should include appropriate reference to the relevant parts of the transport assessment that demonstrate that changes in traffic flows would be below the EPUK/IAQM criteria.	Justification for the scoping out of rail emissions and road traffic emissions are included within Section 6.6.

Study Area

6.3.6 This assessment has included a number of different types of potential air quality effects or emission sources, with consideration given at various, relevant locations.

6.3.7 As a result, different potential study areas were considered for:

- construction phase emissions of dust;
- construction phase potential odour emissions;
- construction and operation phase road traffic emissions for human receptors;
- construction and operation phase road traffic emissions for ecological receptors; and
- operation phase emissions from diesel trains.

6.3.8 These are described separately in this section. The study areas for those air quality effects that required specific assessment are provided in Volume 3 – Figure 6.3.

Construction Phase – Dust

6.3.9 Various proposed activities at construction sites could give rise to emissions of dust. There would be potential for dust nuisance at receptors near construction sites and construction access routes associated with the Scheme.

6.3.10 In accordance with IAQM dust guidance (IAQM, 2016), potential air quality impacts associated with construction dust were considered at sensitive human receptor locations extending up to 350m from the boundary of the construction area where potentially dust-causing activities would be carried out, including construction compounds. Potential impacts at distances greater than 350m would be likely to be less than those at locations closer to the Scheme, and any mitigation measures applied to protect sensitive receptors within 350m would reduce any possible impacts beyond 350m. The impacts of trackout (construction-related vehicles emitting exhaust particulate matter and re-suspending loose material on the road) have been determined up to 50m from the edge of the local access roads and within 200m of the respective site exits. Further information is provided in Volume 4 – Appendix 6.2 – Dust Risk Assessment.

6.3.11 In line with the IAQM dust guidance, the assessment has also considered ecological receptors up to 50m from the respective construction area boundary or construction access routes used by construction traffic up to 200m from site access points.

Construction Phase - Odour

6.3.12 The risk of potential releases of odorous substances has been based on a qualitative risk assessment which focused on the likely scale of effects, and the mitigation measures to prevent the odour emissions at the source, if required. In the IAQM odour guidance (IAQM, 2018), receptors are defined as users of adjacent land. Therefore, the study area for the assessment of emissions of odour has been limited to the closest adjacent land users to the construction area where there would be potential areas of contamination disturbed or excavated during the construction of the Scheme.

Construction Phase – Road Traffic Emissions

6.3.13 The geographical scope for the assessment of the changes in key pollutant concentrations (NO_x, NO_2, PM_{10} and $PM_{2.5}$) as a result of the construction of the Scheme, is up to 200m of 'affected roads' (as defined in paragraphs 6.3.14 and 6.3.15). This is based on the outputs of traffic modelling which extends from Park End Street to the east of the Oxford Station to the B4044 West Way and A420 where it connects to the A34 in the west. See Volume 2 – Chapter 13 – Traffic and Transport for further information on the traffic assessment and traffic modelling.

6.3.14 Roads on which changes to traffic could potentially affect human receptors were identified using the qualifying criteria published in Section 4 of the Oxford City Council Planning Application Guidance (Oxford City Council, no date) (this guidance is also the same as EPUK/IAQM air quality guidance (EPUK/IAQM, 2017)). The changes in road traffic flows between the peak construction year (2023) Do Minimum (DM; i.e. without the Scheme) and Do Something (DS; i.e. with the Scheme) scenarios were compared to the following criteria:

- the change in HDV flow is greater than 25 as an annual average daily traffic flow (AADT) within or adjacent to an AQMA or greater than 100 as an AADT elsewhere; and
- the change in light duty vehicle (LDV) flows is greater than 100 AADT within or adjacent to an AQMA or greater than 500 AADT elsewhere.

6.3.15 Roads on which changes to traffic could potentially affect ecological receptors were identified in accordance with the IAQM guidance on designated nature conservation sites (IAQM, 2020). This was based on changes in road traffic flows between the peak construction year 2023 DM and DS scenarios, as follows:

- the change in AADT of greater than 1,000; or
- the change in HDV flows of greater than 200 (as an AADT).

6.3.16 In accordance with the methodology, roads with changes in traffic flows less than the criteria do not require further assessment. This is because the change in concentrations of pollutants at receptors close to these roads would be negligible.

6.3.17 Based on these criteria, there were no affected roads identified. Therefore, no further assessment of road traffic emissions at human or ecological receptors within 200m of the local road network was required. On this basis,

a specific study area, other that the consideration of the traffic modelling extents, was not required to be identified for the air quality assessment.

Operation Phase – Road Traffic Emissions

6.3.18 Road traffic emissions were scoped out from the assessment, as the changes in road traffic flows during the operation phase would be less than the criteria defined in paragraphs 6.3.14 and 6.3.15. On this basis, a specific study area, was not required to be identified. However, consideration of this aspect is included within this chapter as the Scoping Opinion from Oxford City Council requested appropriate justification for scoping out (see Table 6.4).

Operation Phase – Diesel Train Emissions

6.3.19 Diesel train emissions were scoped out from the assessment. However, it is considered further within this chapter as the Oxford City Council Scoping Opinion requested appropriate justification for scoping out (see Table 6.4). On this basis, in line with the LAQM TG16 guidance, a study area was defined based on a distance of up to 15m or 30m from relevant railway tracks for stationary or moving diesel locomotives, respectively.

Temporal Scope

6.3.20 Baseline conditions are described using available data sources, including consideration of how this baseline may change from present day to the year of construction (i.e. the future baseline in the absence of the Scheme). This EIA was undertaken during the 2020/2021 global COVID-19 coronavirus pandemic. As a result of the pandemic it is considered that 2020 would not be a true baseline for this topic. This is due to the reduced use of road transportation and including public transport during the travelling restrictions. The result was large decreases in the air pollution levels at roadside and urban areas, compared to the normal situation. Therefore, the year 2019 has been used as a more representative year.

6.3.21 The temporal scope of this assessment was:

- baseline year: 2019;
- future baseline year (first full year of construction): 2023;
- future baseline year (first year of operation): 2025.

Baseline Data

6.3.22 The air quality baseline has been established using the following sources of information:

- Measurements of air pollutants (NO_2, PM_{10} and $PM_{2.5}$) carried out by Oxford City Council as part of the LAQM process.
- Relevant measurements of NO_2 carried out by an adjacent local authority (Vale of White Horse District Council) within which changes in traffic flows due to the Scheme construction may be assessed. The Vale of White Horse District Council lies to the west of Oxford City Council.
- An air quality monitoring survey carried out by Jacobs to supplement the measurements undertaken by Oxford City Council and other local authorities. This was initially scheduled to be conducted for the period January 2020 to June 2020. However, the survey was impacted by the response to the COVID-19 pandemic and only two months of data (January and February 2020) were recorded before the survey was suspended. The results of the survey were factored to represent an annual mean but were considered as indicative only.
- The survey was also intended to include two odour walkover surveys to characterise the background levels of odours in the vicinity of the Oxford Station. As these were not able to be undertaken, characterisation of existing odour levels has been based on a review of the odour complaints record held by Oxford City Council.
- Background mapping of air quality produced by Defra.
- Record of dust and odour complaints in the vicinity of the Oxford Station provided by Oxford City Council.

Assessment Methodologies

6.3.23 The assessment follows the general methodology outlined in the Scoping Report (Network Rail, 2020). With regard to the determination of the significance of air quality effects, the assessment methodology differs from that described in Chapter 4 – Approach to Environmental Assessment, as air quality significance is not solely determined from a matrix based on the sensitivity of the receptors and the magnitude of the impact. Defining a level of significance beyond either ‘significant’ or ‘not significant’ is not appropriate for air quality effects. The full details of how the significance of the air quality effects has been determined are set out in this chapter.

6.3.24 For this assessment, the criteria adopted for each of the following aspects are set out in this section:

- assessment of dust emissions from construction-related activities which could affect amenity, human health and sensitive ecological sites;
- assessment of odour emissions which could affect amenity;
- protection of human health based on the anticipated change in vehicle movements on the local road network and associated change in concentrations of pollutants at locations close to the road;
- protection of sensitive vegetation and ecosystems based on the anticipated change in vehicle movements on the local road network. Also associated change in concentrations of pollutants and deposition rates of nitrogen and acid at specific ecological receptors close to the road;
- protection of human health based on diesel locomotive emissions and associated concentrations of pollutants at locations close to the rail line; and
- assessment of Pollution Climate Mapping (PCM) compliance risk based on the likely change in concentrations of pollutants at relevant, reportable locations[1].

6.3.25 The process for defining significance is prescribed in accepted practice guidance documents developed by regulatory authorities and working groups. These comprise experienced air quality professionals, local authority officers and public healthcare bodies (IAQM, 2016 – applicable to construction dust, EPUK/IAQM, 2017 – applicable to air quality, IAQM, 2018 – applicable for odour and IAQM, 2020 – applicable to nature conservation areas). The Oxford City Council Planning Application Guidance – Air Quality is consistent with the relevant IAQM guidance document. The relevant guidance on this subject defines whether an air quality effect would be significant or not across the study areas as a whole, rather than at individual receptors such as residential properties. For specific sensitive ecological sites, the IAQM guidance (IAQM, 2020) provides advice on changes to air quality above which further consideration would be required by ecology specialists, rather than air quality specialists.

6.3.26 The level of value of a receptor is already incorporated within the specific methods prescribed in the standard good practice guidance documents for describing the impact at a particular receptor. This has then been used to ultimately define the significance of air quality effects. This is because the

[1] This includes qualifying features such as the nearest human receptors or public access within 15m of the edge of the road and a point 4m from the edge of the road in the same place as the qualifying feature for comparison to the PCM modelled point.

guidance is based on compliance with AQOs (which are specified in legislation) or the criteria themselves are different for receptors of different value. Where possible, a magnitude of change / impact descriptor has been specified for the air quality impact to help inform the determination of the significance.

Construction Phase - Dust

6.3.27 An assessment of potential impacts associated with the construction phase was undertaken in accordance with the recommendations in the Oxford City Council Planning Application Guidance – Air Quality (Oxford City Council, no date) and the IAQM guidance (IAQM, 2016). The assessment provides a qualitative risk-based appraisal with reference to the Scheme in relation to sensitive locations, the planned construction process and site characteristics.

6.3.28 Full details of the assessment methodology, including consideration of significance is provided in Volume 4 – Appendix 6.2 – Dust Risk Assessment. A summary is provided in Table 6.5.

Table 6.5: Methodology of IAQM dust assessment

Step	Methodology summary
Step 1	Screen the need for a detailed assessment.
Step 2a	Define the potential dust emission magnitudes for each activity.
Step 2b	Define the sensitivity of the area, which includes: receptor sensitivity based on type and location of receptor; and sensitivity of the study area to dust soiling, human health and ecological impacts based on the relative proximity and number of receptors and existing PM_{10} concentrations.
Step 2c	Define the risk of impacts, based on the dust emission magnitudes and sensitivity conclusions from Step 2a and Step 2b.
Step 3	Identify site-specific construction management measures (if required).
Step 4	Determine any residual significant effects.

6.3.29 The assessment of dust during construction has been carried out using a risk-based appraisal. This has taken into account the location of nearby sensitive locations in relation to the works associated with constructing the Scheme, and the planned type and scale of the respective construction-related activities. These assessments follow the process set out in the IAQM dust guidance (IAQM, 2016), as recommended by Oxford City Council Planning Application Guidance – Air Quality (Oxford City Council, no date). These guidance documents set out recommendations for dust control and mitigation based on the determined risk level, which have been adopted. The

methodology determines that the greater the risk associated with the construction of a particular development, the higher the level of mitigation, controls, management and monitoring required to avoid significant adverse effects.

6.3.30 The approach in step four of the IAQM dust guidance (IAQM, 2016) has been adopted to determine the significance of effects with regard to dust emissions. The guidance states the following:

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

Construction Phase – Odour

6.3.31 A risk-based qualitative assessment was undertaken to consider the potential for odour effects to occur based on the scale of the odorous emissions and distance to nearby sensitive areas. The assessment initially followed the approach as set out in the IAQM guidance on the assessment of odour for planning (IAQM, 2018).

6.3.32 The first step in that process was to determine the source odour potential based on the examples in Table 9 of the IAQM odour guidance (IAQM, 2018). This considered the magnitude of the odour release, taking into account any mitigation measures, how odorous the compounds are and the unpleasantness of the odour. Where odour sources were identified, these were taken forward for further assessment based on the following steps:

- Identification of the closest sensitive receptors;
- The pathway effectiveness is then estimated based on Table 9 of the IAQM odour guidance (IAQM, 2018), taking into account the effectiveness of the pollutant pathway as the transport mechanism for odour through the air to the closest sensitive receptors identified above;
- The next step using table 10 of the IAQM odour guidance (IAQM, 2018) is to combine the source odour potential and the pathway effectiveness to predict the risk of odour exposure at the receptor locations; and
- The final step is to estimate the impact, ranging from negligible to major adverse, of that odour on the exposed receptors, taking its sensitivity into account (see table 11 of the IAQM odour guidance (IAQM, 2018).

Construction Phase – Road Traffic Emissions

6.3.33 The air quality impact of vehicle exhaust emissions associated with the Scheme was assessed using the Oxford City Council Planning Application Guidance – Air Quality (Oxford City Council, no date) and the EPUK/IAQM air quality guidance (EPUK/IAQM, 2017). As discussed in previously, there are criteria available for identifying when changes in road vehicle movements in exceedance of these criteria may lead to changes in pollutant concentrations. These could impact on air quality and require specific assessment.

6.3.34 Based on the traffic model outputs, the changes in vehicle movements on the local road network during the first year of construction (scheduled to be end 2022) would be lower than the criteria. On this basis, there is no need for a detailed assessment (i.e. dispersion modelling of road traffic emissions at key human and ecological receptors close to the local road network) to be undertaken.

6.3.35 The traffic flows and traffic flow composition (i.e. the proportion of the flows which are LDVs and HDVs) used to determine the changes in vehicle movements were obtained from the outputs of the traffic modelling for the Scheme. The traffic data for the modelled road network included in the assessment are provided in Volume 4 – Appendix 13.1 – Transport Assessment.

Assessment Criteria for the Protection of Human Health

6.3.36 The assessment criteria for the protection of human health for the consideration of emissions of pollutants to air from road traffic and rail emissions were based on the AQOs. The AQOs are set at the same level as the EU Limit Values set out in the EU Ambient Air Quality Directive (2008/50/EC) discussed in Table 6.1. These have therefore been used as the threshold criteria in this assessment. The relevant AQOs are set out in Table 6.6.

Table 6.6: Relevant national AQOs

Pollutant	Concentration	Measured as	National AQO or EU Limit Value
Nitrogen dioxide (NO_2)	200µg/m^3	1-hour mean not to be exceeded more than 18 times per year	AQO and EU Limit Value
	40µg/m^3	Annual mean	AQO and EU Limit Value

Pollutant	Concentration	Measured as	National AQO or EU Limit Value
Oxides of Nitrogen (NOx) – vegetation and ecosystems	30µg/m^3	Annual mean	AQO and EU Limit Value
Particulate matter (PM_{10})	50µg/m^3	24-hour mean not to be exceeded more than 35 times per year	AQO and EU Limit Value
	40µg/m^3	Annual mean	AQO and EU Limit Value
Particulate matter ($PM_{2.5}$) exposure reduction[1]	25µg/m^3	Annual mean	EU Limit Value
	Work towards reducing emissions / concentrations of $PM_{2.5}$		EU Limit Value

Note 1: In England, for $PM_{2.5}$, there is an average exposure reduction target at a national level. For this assessment the EU Limit Value of 25µg/m^3 has been adopted as the AQO.

6.3.37 Another aspect is to consider potential non-compliance with the EU Limit Values. Compliance is initially determined by the UK Government via the national monitoring network and national model (the Pollution Climate Mapping (PCM) model). This is followed by more local scale modelling to assess actions to enable compliance, such as a Clean Air Zone. As noted, in Volume 4 – Appendix 6.1 – Baseline Air Quality Report, and shown in Volume 3 – Figure 6.2, there are two PCM links relatively close to the Scheme on which traffic flows may change due to the Scheme. One is Botley Road (PCM link ID 802027121) and the other is on the A34 at Botley (PCM link ID 802077436). The projected roadside annual mean NO_2 concentration in 2023 at these links are within the EU Limit value of 40 µg/m³. The assessment includes consideration of whether there is the potential for road traffic emissions associated with the Scheme construction or operation to affect compliance with the EU limit value for NO_2.

Determining Significance

6.3.38 The determination of the significance of the potential changes in concentrations of pollutants was primarily assessed on the basis of air quality guidance produced by the EPUK and the IAQM (EPUK/IAQM, 2017). This is consistent with the Oxford City Council Planning Application Guidance – Air Quality (Oxford City Council, no date).

6.3.39 The EPUK/IAQM air quality guidance (EPUK/IAQM, 2017) sets out an assessment framework for describing air quality impacts, whether adverse or beneficial, that can be used as a starting point to make a judgement of the

overall significance of effect. Although a quantitative method was not required for the assessment, the framework is described below for completeness and to assist with understanding the conclusions reached. An impact is the change in the concentration of an air pollutant, as experienced by a receptor, as the result of a new development. The guidance states the following:

'…the assessment may use its own set of criteria to define magnitude, but the important matter to be concluded is the likely significant effects of the impacts on air quality. There is, therefore, a two-stage process to be followed in the assessment:

- *A qualitative or quantitative description of the impacts on local air quality arising from the development; and*
- *A judgement on the overall significance of the effects of any impacts.'*

6.3.40 The impact descriptors for this assessment (in relation to changes to long-term (annual mean) concentrations) were based on the EPUK/IAQM air quality guidance (EPUK/IAQM, 2017) as set out in Table 6.7. Predicted increases are described as adverse (e.g. minor adverse impact) and decreases described as beneficial (e.g. minor beneficial impact). The impact descriptors are equivalent to the magnitude of change (Negligible, Low, Medium, High) as described in Chapter 4 – Approach to Environmental Impact Assessment, and the value of the receptor is inherent in the EPUK/IAQM methodology (EPUK/IAQM, 2017), as it is based on compliance with air quality standards derived from national legislation.

Table 6.7: Impact descriptors for individual receptors (long-term concentrations)

Long-term average concentration at receptor in assessment year [3]	Percentage change in concentration relative to AQO [1]			
	1% [2]	2–5%	6–10%	>10%
75% or less of AQO	Negligible	Negligible	Minor	Moderate
76% to 94% of AQO	Negligible	Minor	Moderate	Moderate
95% to 102% of AQO	Minor	Moderate	Moderate	Major
103% to 109% of AQO	Moderate	Moderate	Major	Major
110% or more of AQO	Moderate	Major	Major	Major

Note 1: table intended to be used by rounding the percentage change to whole numbers.
Note 2: any changes of 0% (i.e. less than 0.5%) are described as negligible.
Note 3: when defining the long-term average concentration as a percentage of the AQO, where there is a decrease in concentration the Do Minimum concentration should be used and where there is an increase in concentration the Do Something concentration should be used.

6.3.41 This approach was used as the initial basis for judging the overall significance of the effects of air quality at human receptors, which are made using professional judgement. The professional judgement used for this assessment included consideration of the following:

- the existing and future air quality in the absence of the Scheme;
- the extent of the population exposure to the impacts, for example, the description of the impacts at the receptors and number of properties affected by minor, moderate or major air quality effects; and
- other factors where relevant, such as the presence of an AQMA.

6.3.42 As discussed in the EPUK/IAQM air quality guidance (EPUK/IAQM, 2017), the judgement of a significant effect occurring is based on the overall balance of impacts across the study area. As noted in the guidance, it is more difficult to identify the overall significance of the air quality effects in the intermediate region where there are both beneficial and adverse impacts across the study area.

Matters Scoped Out of the Assessment

6.3.43 The matters that have been scoped out of this topic assessment, in accordance with the Scoping Opinion (see Volume 4 – Appendix 1.1) are:

- construction phase emissions from site equipment, vehicles and machinery;
- operational phase emissions from rail sources for air quality and odour; and
- operational phase road traffic emissions.

6.3.44 These matters have been scoped out on the basis that they would not be likely to result in a significant effect on air quality. However, further justification for not considering rail emissions and road traffic emissions in detail and for concluding a not significant effect is included within Section 6.6 of this chapter, based on the Scoping Opinion responses from Oxford City Council as discussed in Table 6.4.

Limitations and Assumptions

6.3.45 Limitations and assumptions for air quality comprise the following matters:

6.3.46 The dust risk assessments were undertaken on the basis that all activities would be carried out adjacent to the boundary of the construction area (i.e.

the red line boundary). This would overestimate the risk associated with some of the activities, and a higher level of risk may have been specified as a result. Therefore, this approach is considered to represent a precautionary assessment.

6.4 Baseline Conditions

Characterisation of the Environmental Baseline

6.4.1 The following sub-sections aim to establish the baseline air quality conditions in the vicinity of Oxford Station, the closest areas of the city centre and the local road network where changes in vehicle flows could potentially occur during the Scheme construction. A more detailed assessment of baseline conditions is provided in Volume 4 – Appendix 6.1.

6.4.2 The Scheme is located within the administrative boundary of Oxford City Council and there is potential for construction phase local air quality effects to arise within the adjacent local authority area (governed by Vale of White Horse District Council). For completeness, the baseline conditions have been established for relevant areas close to the Scheme or close to the local road network anticipated to be used during construction within both local authorities.

Oxford City Council

Local Air Quality Management

6.4.3 Oxford City Council declared a city-wide Air Quality Management Area (AQMA), the 'City of Oxford AQMA', in 2010 based on identified exceedances of the annual mean AQO for NO_2 of 40 µg/m^3. Following declaration of the AQMA, Oxford City Council adopted an Air Quality Action Plan (AQAP) in 2013 to improve air quality and achieve compliance with the annual mean AQO for NO_2 within the AQMA. Since its declaration in 2010, the maximum annual mean NO_2 concentrations recorded within the AQMA have reduced to 53 µg/m^3 in 2019. This is indicative of improvements in air quality, though the highest concentrations remain above the AQO of 40 µg/m^3.

Monitoring Data

6.4.4 As part of the LAQM process, Oxford City Council undertakes measurements of NO_2 and particulates (PM_{10} and $PM_{2.5}$) at several locations within Oxford using both automatic monitoring stations (CM1, CM2 and CM3) and passive diffusion tubes. Details of pollutant concentrations measured by Oxford City

Council are provided in Volume 4 – Appendix 6.1 – Baseline Air Quality and the monitoring locations are shown in are shown in Volume 3 – Figure 6.1.

6.4.5 Despite improvements in NO_2 concentrations since 2010, there are several locations within Oxford where the annual mean AQO of 40 µg/m^3 is still exceeded, predominantly in the city centre, and not in the immediate vicinity of the Oxford Station.

6.4.6 A key part of the air quality study area is Botley Road (A420) which lies to the south and west of the Oxford Station and could experience changes in traffic flows due to the construction of the Scheme. Oxford City Council undertakes monitoring at several locations close to Botley Road and in the vicinity of Oxford Station. Annual mean NO_2 concentrations ranged from 24µg/m^3 to 34µg/m^3 (tubes DT33, DT35, DT36 and DT84). Concentrations to the east of the Oxford Station ranged from 27 µg/m^3 to 32 µg/m^3 (tubes DT30, DT31, DT32 and DT44). Full details of these results can be found in Volume 4 – Appendix 6.1 – Baseline Air Quality Report – Table A3.3.

6.4.7 In 2019, there were three exceedances of the 1-hour mean AQO value of 200 µg/m^3 for NO_2 recorded at CM1, and two exceedances recorded at CM2. The AQO permits 18 exceedances of the AQO value of 200 µg/m^3 per calendar year. No annual mean concentrations exceeded 60 µg/m^3, which is the annual mean value set out in Defra guidance where exceedances of the 1-hour mean AQO could occur (Defra, 2018). Therefore, there is a very low likelihood of the one-hour mean AQO for NO_2 being exceeded within Oxford.

6.4.8 Measurements of PM_{10} in 2019 were below the annual mean AQO of 40µg/m^3, with CM2 and CM3 recording values of 19µg/m^3 and 14µg/m^3, respectively. Monitored PM_{10} concentrations were compliant with the 24-hour mean AQO in 2019. The latest monitored annual mean $PM_{2.5}$ concentration of 9µg/m^3, recorded at CM3, is below the annual mean AQO of 25 µg/m^3 by a substantial margin.

Air Quality Trends

6.4.9 Long term measurements of annual mean NO_2 concentrations by Oxford City Council indicate a notable downward trend since 2010. This is indicative of significant improvements in concentrations at roadside and kerbside locations in particular (as shown in Plates A3.2 and A3.3 of Volume 4 – Appendix 6.1 – Baseline Air Quality Report). However, it should be noted that reduction rates have appeared to stabilise for the most recent years, with 2019 concentrations recording a general increase on those recorded in 2018. Oxford City Council attributed the increases in 2019 to meteorological

differences, including extraordinarily cold and stable conditions in January/February, April and November 2019.

Vale of White Horse District Council

6.4.10 The Scheme is located to the east of the northern part of the Vale of White Horse District Council authority area. However, the western end of the A420 Botley Road intersects with the boundary between Oxford City Council and Vale of White Horse District Council. The junction of the A34 and A420 also lies within the Vale of White Horse District Council area.

Local Air Quality Management

6.4.11 As part of the LAQM process, Vale of White Horse District Council also undertakes an annual review of air quality. The latest available LAQM report (Vale of White Horse District Council, 2019), containing data for the 2018 calendar year, was reviewed to understand the existing air quality situation in the vicinity of the road network which could experience changes in traffic flows. A selection of monitoring data for the 2019 calendar year was also provided by Vale of White Horse District Council (Vale of White Horse District Council, 2020).

6.4.12 The annual mean air quality objective for NO_2 of 40 µg/m^3 was identified by Vale of White Horse District Council to be exceeded in an area of Botley close to the A34 Southern By-Pass Road (approximately 0.8km to the south of the A34/A420 junction) due to road traffic emissions. The Botley AQMA was declared in 2008 and is currently subject to a district-wide AQAP published in 2015 (Vale of White Horse District Council, 2015). Since its declaration in 2008, the maximum annual mean NO_2 concentrations recorded within the AQMA have reduced from 58.8 µg/m^3 to 51 µg/m^3 in 2019. This is indicative of a slight improvement in air quality over this 11-year period.

Monitoring Data

6.4.13 As part of the LAQM process, Vale of White Horse District Council undertakes measurements of NO_2 at several locations in Botley. Details of pollutant concentrations are provided in Volume 4 – Appendix 6.1 – Baseline Air Quality Report and the monitoring locations are shown in are shown in Volume 3 – Figure 6.1. Although Vale of White Horse District Council undertakes monitoring at a number of other locations within its area (i.e. Marcham, Abingdon, Wantage and Faringdon), the data discussed below relates only to the measurements at Botley. This is because of its proximity to the Scheme and potential for changes in road traffic during the construction phase to affect an existing AQMA. Air quality at other locations within Vale of

White Horse District Council, or in other nearby local authorities, where existing air pollution levels are elevated are not anticipated to be adversely affected by road traffic emissions associated with the Scheme. They are therefore not within the air quality study area. Vale of White Horse District Council do not undertake monitoring of PM_{10} or $PM_{2.5}$ within their administrative boundary.

6.4.14 Data recorded in 2019 for NO_2 (Vale of White Horse District Council, 2020) indicate that an exceedance of the annual mean AQO of 40 µg/m^3 was recorded at three of the diffusion tube monitoring locations within the Botley AQMA (S21, S25 and S30). The diffusion tube locations do not always represent the concentrations at the nearest relevant exposure location (for example, when the diffusion tube is closer to the road than the façade of nearby houses) and the measurements are distance corrected by the local authority.

Air Quality Trends

6.4.15 There has been a relatively flat trend in NO_2 concentrations observed between 2013 and 2018 in the Vale of White Horse District Council area (Vale of White Horse District Council, 2019) as shown in Plate A4.1 of Volume 4 – Appendix 6.1 – Baseline Air Quality Report.

Supplementary Monitoring Survey

6.4.16 A specific NO_2 diffusion tube monitoring survey was commenced at 12 locations in January 2020 to inform the EIA process and to supplement the data recorded by Oxford City Council. Full details of the survey are provided in Section 5 of Volume 4 – Appendix 6.1 – Baseline Air Quality Report. Results showed no exceedances of the annual mean AQO for NO_2.

Dust and Odour Complaints

6.4.17 Oxford City Council was contacted to obtain details of any dust and odour complaints made in the last three years in the vicinity of the Oxford Station. Oxford City Council confirmed there were no dust or odour complaints or issues relating specifically to Oxford Station during the last three years (Oxford City Council, 2021a). However, complaints relating to diesel exhaust fumes were raised by residents living close to the up-carriage sidings to the west of William Lucy Way and the main line and down carriage sidings close to Roger Dudman Way approximately 500m or more to the north of the station. The complaints from residents at William Lucy Way related to idling engine(s) on the carriageway sidings during shutdown and start-up activities.

According to Oxford City Council, the complaints from the residents at Roger Dudman Way related to idling engine(s) on the main down tracks.

6.4.18 During the last three years, Oxford City Council have received fewer than eight complaints from residents. It should be noted that complaints relating to activities at the up-carriage sidings were considered as part of a statutory nuisance investigation into noise and fumes. Oxford City Council reported that this investigation has not concluded due to the changing nature of noise and fumes emissions as the carriageway sidings and their usage has changed (Oxford City Council, 2021a).

Future Baseline

6.4.19 As already noted, annual mean NO_2 concentrations in Oxford have shown a decreasing trend since 2010, although the reduction rates have appeared to stabilise for the most recent years. A flatter trend has been observed for NO_2 concentrations in the Botley area. However, it is likely that the future concentrations in the first year of the construction phase (2022) and first year of operation (2025) would be slightly lower than the 2019 concentrations presented in this chapter. This is due to the continuing replacement of older vehicles with newer more efficient and lower emitting vehicles and increased uptake of low emission (i.e. hybrid) and zero emission (i.e. electric) vehicles. The future ban on new petrol and diesel cars by 2030 will increasingly influence the availability, cost and resulting uptake of electric vehicles over the next 5 years. However, it is possible that by 2022, and potentially by 2025, there may still be some roadside locations in Oxford and Botley which exceed the annual mean AQO for NO_2 of 40 µg/m^3.

6.4.20 Concentrations of PM_{10} and $PM_{2.5}$ in Oxford have reduced slightly over the last 8 years. It is likely that concentrations will remain similar or slightly lower than those reported for 2019. The concentrations would remain well below the relevant AQOs at all locations in Oxford and Botley.

6.4.21 No changes to the existing baseline in terms of dust or odour emissions is anticipated between the existing conditions reported here and the future years (2022 and 2025).

Identification of Sensitive Receptors

6.4.22 For the assessment of dust during the construction phase, the following air quality sensitive receptors have been identified within the study area as described in Section 6.3:

- 3,941 high sensitivity human receptors (such as residential dwellings,

schools or nursing homes) within 350m of the Scheme, which includes an estimated 1,100 pupils and staff from nearby learning and educational establishments;

- 252 medium sensitivity human receptors (such as offices or parks); and
- 126 low sensitivity human receptors (such as public footpaths or playing fields) within 350m which includes the Thames Path National Trail.

6.4.23 The study area and receptors are shown in Volume 3 – Figure 6.3.

6.4.24 There are no relevant ecological receptors identified within 50m of the Scheme boundary or within 50m of the local road network, up to 200m from the site exit(s). Therefore, ecological receptors are not considered further in the assessment of construction dust.

6.4.25 No assessment at specific local human and ecological receptor locations was required for the other aspects (i.e. odour emissions, road traffic and rail emissions) so no further identification of sensitive receptors was required. However, as noted in Paragraph 6.3.37, there are two nearby PCM links at Botley Road (PCM link ID 802027121) and the A34 at Botley (PCM link ID 802077436). These are considered in Section 6.6.

6.4.26 In addition, the presence of a European Designated Site, the Oxford Meadows SAC, situated adjacent to the A34 requires specific consideration. This is required to support the Habitats Regulations Assessment reported in Volume 4 – Appendix 4.2. The location of the Oxford Meadows SAC (and other relevant ecological receptors within 200m of the key local road network links) is shown in Volume 3 – Figure 6.2.

6.5 Design and Best Practice Measures

<u>Design</u>

6.5.1 The Scheme has been designed, as far as possible, to avoid and reduce impacts and effects on air quality and odour through the process of design-development considering good design principles. Embedded mitigation is defined within the DMRB as

'*Design measures which are integrated into a project for the purpose of minimising environmental effects.'*

The embedded mitigation is reported as part of the Scheme description in Chapter 2 – Description of the Scheme.

6.5.2 The assessment of whether significant effects would be likely to occur has been based on the Scheme as described in Chapter 2 – Description of the Scheme and taken account of measures embedded within the design as described in Chapter 4 – Approach to Environmental Assessment.

6.5.3 The relevant measures embedded in the design of the Scheme for this air quality assessment are listed in Table 6.8.

Table 6.8: Summary of design measures for this assessment

Measure	Outcome / Benefit
Enhanced access arrangements (including new western entrance) and provision for cycling and walking.	Reduces the use of private car travel to the station and areas close to the station, encourages uptake of active travel and makes station more accessible for Persons with Reduced Mobility (PRM).
Vibro piling used throughout site.	Allows for quicker less intrusive pile installation. Less removal of soil, meaning less risk of disturbing contaminated soils and associated risk of emitting odours which could affect amenity at nearby sensitive locations.
Design avoids works in identified historical landfills or within the Down Carriage siding compound.	Reduces likelihood of excavating into contaminated land meaning less risk of disturbing contaminated soils and associated risk of emitting odours which could affect amenity at nearby sensitive locations.
Improved capacity at Oxford Station increasing journeys by rail.	Reduces the number of journeys by car and associated congestion and air quality issues.
Provision of a dual pedestrian cycleway on both sides of the Botley Road under Botley Road Bridge.	Removes pedestrians and cyclists from traffic under the Botley Road Bridge. Encourages sustainable modes of travel and reduces potential for road accidents.
Provision of new footpath along the length of Roger Dudman Way connecting to the Sheepwash Bridge.	Provides a safe route for pedestrians, also reducing the need to drive.
Provision of additional bike stands on the western entrance forecourt.	The new facilities promote sustainable transport use. This aligns with Oxford County Council policy and supports carbon reduction targets within the city.

6.5.4 The adoption of the embedded mitigation measures reported in Table 6.8 would reduce the potential environmental effects on air quality. The design and objectives of the Scheme would actively promote sustainable transport modes such as travel by train, bike and on foot. This would encourage a reduction in travel by car with consequent improvements in air quality.

Construction Management Measures

6.5.5 The Scheme would be constructed in accordance with a Code of Construction Practice (CoCP), which is submitted as part of the Environmental Statement (Appendix 2.1). The CoCP sets out the principles for environmental

mitigation, which would then be used as the basis for the Construction Environmental Management Plan (CEMP).

6.5.6 The CEMP would outline measures to be put in place to ensure that air quality does not deteriorate during the construction phase of the Scheme. In particular, the CEMP would detail pollution prevention and control measures for air quality and dust, including for potentially contaminated emissions.

6.5.7 This air quality assessment has identified management measures which would be required to control air quality effects during the construction phase (see Table 6.9). Some of these measures are also presented within the geology and soils mitigation measures.

Table 6.9: Summary of construction management measures

Measure	Outcome / Benefit
Robust dust management and control measures to be implemented during construction. Measures are set out in the CoCP and would be included in the CEMP. In summary, these include, but not limited to, the following: • Procedure for recording and responding to dust complaints • Appropriate surveys and visual inspections of the site (including the site boundary) and works to increase compliance with dust management measures and effectiveness of the mitigation measures and dust controls • Site layout and activities to be as far as reasonably practicable from nearby sensitive locations • Comprehensive measures and working methods to prevent and reduce dust emissions at their source • Management of earthworks and stockpiles of materials • Measures for controlling dust emissions during demolition and construction activities • Measures for controlling dust emissions from vehicles travelling within the site and on the local road network • Development of action plans and contingency plans for adverse weather conditions / breakdown of dust suppression equipment • Mechanism for stakeholder liaison and performance review	Control the potential adverse effects of dust emissions during construction and the residual air quality effect with regard to affecting amenity or human health would be not significant.
Measures within the CoCP to include strategy for identifying and managing suspected contaminated ground during the construction works and, if these are found to contain odourous contamination such as hydrocarbons and volatile organic compounds, implementing appropriate controls to reduce odour emissions during excavation and movement of the material	Implements appropriate controls to reduce the uncontrolled release of odours from areas of ground contamination which may be disturbed or excavated during the construction phase.
Watching briefs, risk assessments and method statements to be produced. Control measures for working in or near to land affected by contamination to be implemented by the Main Contractor(s).	

Measure	Outcome / Benefit
Stockpiles of known or suspected contaminated materials to be segregated depending on the source of the material and nature of the contamination. If odourous, then stockpiles to be covered until transported off site for disposal/treatment.	
Ground gas monitoring along north portion of Roger Dudman Way.	Assesses gas migration from the Down Carriage sidings compound and the Walton Well Road Allotments Historical Landfill. This would give early warning of potential contamination or ground gases which could be odorous if disturbed and exposed to the air and allow suitable management of odours.
Where practicable, construction materials would be delivered to the site by rail and construction waste would be exported by rail.	Transport of construction and waste materials by rail reduces road traffic, particularly HDV movements on the local road network. This would reduce impacts to traffic during construction. It would also limit traffic emissions within the Oxford City AQMA and nearby Botley AQMA on the A34.

6.6 Assessment of Air Quality Effects

Construction Phase

Dust

6.6.1 A dust risk assessment has been carried out for the Scheme. The methodology, levels of risk and mitigation measures proposed are presented within Volume 4 – Appendix 6.2 – Dust Risk Assessment. This section of the air quality chapter summarises the Dust Risk Assessment.

6.6.2 The dust risk assessment has identified that there are potentially sensitive human receptors located near to the Scheme. The sensitivity of the area, (which takes into consideration the number and distance of human receptors from the Scheme and baseline conditions), is summarised as being low to medium sensitivity with respect to emissions of PM_{10} and $PM_{2.5}$. The area is high sensitivity with respect to changes in dust deposition rates and associated impacts on amenity.

6.6.3 The scale of the activities associated with the construction of the Scheme has been used to assess the dust emission magnitude for the different types of potential dust generating activities (categorised into demolition, earthworks, construction and trackout). Prior to good practice mitigation measures being implemented, demolition activities are considered pose a low magnitude of risk and earthworks, construction and trackout activities are considered a medium magnitude of risk.

6.6.4 Following the IAQM guidance (IAQM, 2016), when combining the sensitivity of the area and the dust emission magnitudes for potential dust soiling effects, there is predicted to a medium risk from demolition, earthworks, construction and trackout activities. This is because there is the potential for infrequent short-term episodes when baseline dust deposition rates could be increased by an amount that residents could perceive.

6.6.5 For human health effects, the proposed demolition, earthworks, construction and trackout activities are predicted to be a low to medium risk. This is because there is limited potential for emissions of PM_{10} to increase baseline concentrations to a value that is above the AQO set for the protection of human health.

6.6.6 The dust risks summarised above for each activity were used to identify the recommended level of good practice mitigation. The recommended construction management mitigation measures taken forward from the dust risk assessment would be included in the air quality management strategies

set out in the CoCP (see Volume 4 – Appendix 2.1) and are summarised in Table 6.9.

6.6.7 It is considered that there are no dust-generating activities proposed that could not be managed using normal good practices (IAQM, 2016) so as to prevent significant effects at any off-site receptor including those closest receptors within 20m of the Scheme red line boundary.

6.6.8 IAQM guidance (IAQM, 2016) notes that with the application of good practice mitigation measures of the type available for use on the Scheme, the environmental effect would not be significant at any off-site receptor. IAQM guidance (IAQM, 2016) also notes, however, that even with a rigorous package of measures taken forward from this assessment and included as part of the CEMP and implemented by the contractor, occasional impacts may occur. The CoCP therefore provides a framework by which the level of mitigation is adapted to respond proactively to the changing risk of dust emissions, so that significant impacts are prevented.

Odour

6.6.9 To determine the potential risk of odours being released during the construction works, information on the location and nature of any contaminated land within the Scheme red line boundary was obtained from Volume 2 – Chapter 7 – Geology and Soils; and the supporting information in Volume 4 – Appendix 7.1 – Geology Baseline Conditions; Volume 4 – Appendix 7.2 – Preliminary Risk Assessment; and Volume 3 – Figure 7.2.

6.6.10 In summary, there are some areas of ground within the Scheme that have been identified as potentially containing contamination. These are predominantly areas of made ground which could contain contamination. For example, borehole logs within made ground at the new Platform 5 and subway area recorded odours of hydrocarbons. Similar observations of hydrocarbon odours were recorded for borehole logs at the area of the Botley Road Bridge widening. There were also records at boreholes within the Becket Street station car park and to the south of the car park, close to the proposed Temporary Co-operative Childcare. As no or limited environmental testing has been carried out at these areas, the presence or scale of contamination has not been determined. As noted in Volume 2 – Chapter 7 – Geology and Soils, ground investigation is recommended before undertaking excavation works to establish presence and levels of contaminants in soil and groundwater.

6.6.11 Outside the red line boundary, some areas to the north of the Sheepwash Bridge on Roger Dudman Way and at the Down Carriage Sidings have been identified to contain contamination associated with hydrocarbons from historical fuel and oil leaks/spills. There are also three historical landfills within 500m of the red line boundary (Rewley Road Historical Landfill, Walton Well Road Allotments Historical Landfill and Eagle Iron Works Historical Landfill). Excavation works are not planned within these areas, the closest works would be at Sheepwash Bridge. Mitigation would be adopted during the works as indicated in Section 7.5 of Volume 2 – Chapter 7 – Geology and Soils. There is therefore a low risk that contamination present at the Down Carriage Sidings and Roger Dudman Way would be mobilised and potential ground gases to come to the surface.

6.6.12 Given the uncertainty in the location, scale and precise nature of the contamination within the red line boundary, and where excavation of the soils and made ground would take place, it is not possible to define an odour source potential in accordance with the IAQM guidance (IAQM, 2018). Construction management measures have been proposed to manage the potential for odour emissions and discovery of contaminated land during the construction phase (see those set out in Table 6.9 and also see Table 7.10 of Chapter 7 – Geology and Soils).

6.6.13 As a worst-case scenario, it has been assumed that there is a Low source odour potential. This would equate to a minor adverse effect at nearby sensitive human locations such as residential properties or school / educational facilities in line with the IAQM guidance (IAQM, 2018). This is assuming that the pathway effectiveness would be high. That means that any human receptors exposed to the odours would be very close to the site and located downwind of the prevailing wind direction (ie to the north east and east of the construction areas) and their sensitivity would be high (e.g. residential or educational uses).

6.6.14 On the above basis, the potential for odour effects during construction is not significant, based on a worst-case approach which resulted in a minor adverse effect. However, should the proposed ground investigation works identify areas of contamination that would be disturbed, the proposed construction management measures would prevent significant effects occurring.

Road Traffic Emissions

6.6.15 Engine exhaust emissions from HDVs and LDVs associated with the construction of the Scheme have the potential to affect local air quality. Based

on the information provided in Volume 2 – Chapter 13 – Traffic and Transport, the expected greatest number of construction vehicle movements would not exceed 6 HDVs or 40 LDVs on any road links as an AADT. Although the road links are within the Oxford City AQMA, the change in vehicle flows does not exceed the criteria for identifying when an assessment would be required (i.e. a change of 25 AADT for HDVs and 100 AADT for LDVs). Therefore, the associated change in pollutant concentrations (i.e. NO_2, PM_{10} and $PM_{2.5}$) at locations close to the road network would be negligible.

6.6.16 On this basis, the effects from construction road traffic on air quality are not considered to represent a significant effect on human receptors adjacent to the local road network.

6.6.17 On this same basis, the road traffic flow changes on the A34 at the location of the Oxford Meadows SAC, would be well below those criteria stated in Section 6.3 (i.e. a maximum of an increase of 10 LDV and 6 HDV movements as an AADT is well below the criteria of 1,000 and 200, respectively). On this basis, the change in NOx concentrations or nitrogen and acid deposition rates at the Oxford Meadows SAC (and any other ecological receptors close to the local road network) would be negligible and represents a not significant effect.

6.6.18 Given the negligible changes in annual mean NO_2 concentrations, there would be no EU Limit Value compliance issue at the two nearby PCM links on Botley Road and the A34 at Botley.

<u>Operational Phase</u>

Road Traffic Emissions

6.6.19 During the operational phase, there is not expected to be an increase in vehicle movements on the local road network above the screening criteria set out in the Oxford City Council Planning Application Guidance (Oxford City Council, no date) and EPUK/IAQM air quality guidance (EPUK/IAQM, 2017) (as set out in and Paragraph 6.3.14).

6.6.20 The Scheme would not make any major capacity changes to the existing highways or any changes to the existing station car parking capacity. Oxford City Council has advised that any trip additional demand is likely to be met via walking, cycling or public transport rather than by car (Oxford City Council, 2021b). Given that there would be no change to car parking capacity or existing highways as a result of the Scheme, Oxford City Council has confirmed that traffic modelling or future assessment of road traffic is not required (Oxford City Council, 2021b). The changes in LDV and HDVs during operation would, therefore, be less than the screening criteria and would

result in a negligible impact with regard to concentrations of NO_2, PM_{10} and $PM_{2.5}$ at all roadside locations.

6.6.21 On this basis, the changes in road traffic during the operation phase on air quality are not considered to represent a significant effect on human receptors adjacent to the local road network.

6.6.22 On this same basis, the change in NOx concentrations or nitrogen and acid deposition rates at any ecological receptors close to the local road network (e.g. including the Oxford Meadows SAC adjacent to the A34), would also be negligible, and not significant.

6.6.23 Given the negligible changes in annual mean NO_2 concentrations, there would be no EU Limit Value compliance issue at the two nearby PCM links on Botley Road and the A34 at Botley.

Diesel Train Emissions

6.6.24 The operation of the Scheme is anticipated to use diesel rolling stock in the short to medium term, with the potential for the line to be electrified in the future. The line is not identified as heavily trafficked by diesel passenger trains in the Defra LAQM TG16 guidance (Defra, 2018). It is therefore not highlighted as a rail line adjacent to which there are potential air quality concerns. Operation of the Scheme would not alter this categorisation and would result in no material change to emissions from the line.

6.6.25 According to Defra LAQM TG16, diesel locomotives can give rise to high short term NO_2 and SO_2 concentrations near railway stations. It states that local authorities should base their assessment on identifying locations where diesel or steam locomotives are regularly stationary for periods of 15 minutes or more or if there is relevant exposure within 15m of the locomotives. Furthermore, for moving diesel locomotives, there is a need to determine relevant exposure within 30m of relevant railway tracks, where the background annual mean NO_2 concentration is above 25 $\mu g/m^3$. Box 1-1 of the LAQM TG16 guidance indicates that only the 1-hour mean NO_2 AQO would apply at locations within the station.

6.6.26 There are approximately 40 residential properties on Abbey Road and Cripley Road immediately south of the Sheepwash Bridge which would be within 30m of the new line servicing Platform 5. There are also approximately 55 residential units which are currently within 30m of the existing line to the south of the station (Cherwell House on Osney Lane). The new line to service Platform 5 would bring the main line closer to these properties. In terms of stationary locomotives, there are properties on Roger Dudman Way (Castle

Mill apartment blocks) approximately 600m to the north of the station that are currently within 15m of the down carriage sidings.

6.6.27 Based on the Defra background mapping (Defra, 2020), the annual mean background NO_2 concentration in these areas is less than 25 $\mu g/m^3$ (a predicted value of 18.6 $\mu g/m^3$ in 2023). Furthermore, two monitoring locations to the west of the station reported in Volume 4 – Appendix 6.1 (locations D7 and D8) recorded concentrations of 14.1 $\mu g/m^3$ and 13.1 $\mu g/m^3$, respectively (albeit with a relatively high uncertainty due to the short duration of the survey).

6.6.28 The Scheme is anticipated to result in no changes to the operation of the up-carriage sidings (those to the east) compared to current operations. The Scheme is anticipated to make a small difference to the operation of the down carriage sidings (closest to Roger Dudman Way). Once the Scheme is operational, fewer trains would access those sidings during the daytime and wait before returning south. Therefore, the Scheme would be likely to reduce air emissions at locations on Roger Dudman Way and other residential roads close to the sidings.

6.6.29 Given the above, it is concluded that the Scheme would not lead to exceedances of the relevant AQOs and there would not be a significant negative effect on air quality with regard to diesel train emissions.

6.7 Additional Mitigation Measures

6.7.1 There are no significant effects identified for air quality or odour due to the application of embedded design mitigation and best practice measures outlined in Section 6.5. Therefore, additional mitigation measures would not be required.

6.8 Summary of Residual Air Quality and Odour Effects

6.8.1 The assessment of effects in Section 6.6 takes into account the application of both embedded mitigation and good practice measures. The assessment concluded that there would be no significant effects and additional mitigation would not be required. Therefore, no significant residual air quality or odour effects are predicted.

6.8.2 Table 6.10 summarises the residual likely effects of the Scheme for air quality and odour.

Table 6.10: Residual effects

Potential Effect	Receptor(s)	Likely effect without additional mitigation	Additional Mitigation Measure(s)	Residual Effects
Construction				
Impacts on amenity and human health from construction dust	Human locations	Not significant	None required	Not Significant
Impact on amenity from odour emissions	Human locations	Not significant	None required	Not Significant
Increase in pollutant concentrations from road traffic emissions impacting human health or causing damage to vegetation	Human locations	Not significant	None required	Not Significant
	Ecological locations	Not significant	None required	Not Significant
Operation				
Increase in pollutant concentrations from road traffic emissions impacting human health or causing damage to vegetation	Human locations	Not significant	None required	Not Significant
	Ecological locations	Not significant	None required	Not Significant
Increase in pollutant concentrations from rail emissions impacting human health	Human locations	Not significant	None required	Not Significant

6.9 Conclusions

6.9.1 This chapter reports the effects on air quality and odour as a result of the Scheme.

6.9.2 Through the implementation of design and construction management measures, as described in Section 6.5, this has resulted in the reduction or avoidance of impacts on air quality and odour. These measures include comprehensive dust management and control measures. Network Rail has also committed to use the rail network for the delivery and removal of construction materials where practicable, which would reduce vehicle movements on the local road network, within an AQMA.

6.9.3 Following the assessment of air quality effects by the Scheme, no additional mitigation measures (see Section 6.7) would be required to be incorporated into the Scheme to manage or reduce potential effects. There would be no likely residual significant adverse effects on air quality as a result of the Scheme.

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