5. Air Quality

5.1 Introduction

5.1.1 This chapter of the Environmental Statement (ES) reports the findings of an assessment of the likely significant effects on air quality as a result of the proposed A40 Smart Corridor (hereafter referred to as the 'proposed development') in Oxfordshire.

5.1.2 The chapter covers a quantitative air quality assessment of public exposure and ecological sensitive receptors during operation, with a focus on nitrogen dioxide (NO_2), nitrogen oxides (NO_x) and particulates ($PM_{2.5}$ and PM_{10}). These are the pollutants that are most likely to give rise to pollutant levels near or above air quality objectives due to vehicle emissions. The assessment considers the impact of particulate matter ($PM_{2.5}$ and PM_{10}) and dust during the construction phase qualitatively. All other pollutants are scoped out of the assessment.

5.1.3 The potential for effect interactions on a single receptor ('in-combination effects') and combined cumulative Air Quality effects ('cumulative effects') are discussed in *ES Volume I Chapter 16: Effects Interactions*.

5.2 Legislation and Planning Policy Context

5.2.1 This assessment has been undertaken taking into account relevant legislation and guidance set out in national, regional and local planning policy (summarised in the sections below). The legislation and policy requirements have informed the preparation of this ES chapter.

Legislation

European Union Ambient Air Quality Directive

5.2.2 The Clean Air for Europe (Ref 5-1) programme revisited the management of air quality within the European Union (EU) and replaced much of the existing air quality legislation with a single legal act called Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe (Ref 5-2). This Directive repealed and replaced the EU Framework Directive 96/62/EC on Ambient Air Quality Assessment and Management and its associated Daughter Directives 1999/30/EC (Ref 5-3), 2000/69/EC (Ref 5-4), 2002/3/EC (Ref 5-5), relating to limit values for ambient air pollutants and the Council Decision 97/101/EC (Ref 5-6) which established a reciprocal exchange of information and data within Member States.

5.2.3 Directive 2008/50/EC is transcribed into UK legislation by the Air Quality Standards Regulations 2010, which came into force on 11th June 2010 and as amended in 2016 (Ref 5-7). This sets binding limit values or objectives on pollutants with the aim of avoiding, preventing or reducing harmful effects on human health and on the environment.

5.2.4 Air pollution limits set by the EU remain in UK law post Brexit, as EU legislation that applied directly or indirectly to the UK before 11.00 p.m. on 31 December 2020 has been retained in UK law as a form of domestic legislation known as 'retained EU legislation'. This is set out in sections 2 and 3 of the European Union (Withdrawal) Act 2018 (c. 16) (Ref 5-8). Section 4 of the Withdrawal Act 2018 ensures that any remaining EU rights and obligations, including directly effective rights within EU treaties, continue to be recognised and available in domestic law after exit. However, the EU will no longer have a role in enforcement.

National Air Quality Strategy (AQS)

5.2.5 The UK AQS was initially published in 2000 under the requirements of the Environment Act 1995 (Ref 5-9). A further revision of the AQS (Ref 5-10) set objective values to help local authorities manage local air quality improvements in accordance with the EU Air Quality Framework Directive. Some of these objective values have been laid out within the Air Quality (England) Regulations 2000 (Ref 5-11) and later amendments (Ref 5-12).

5.2.6 The AQS objective values have been set down in regulation for the purposes of local air quality management (LAQM). Under the LAQM regime, local authorities have a duty to carry out regular assessments of air quality against the AQS objective values and if it is unlikely that the AQS objective values will be met in the given timescale, they must designate an AQMA and prepare an Air Quality Action Plan (AQAP) with the aim of achieving the objective values. The boundary of an AQMA is set by the local authority to define the geographical area that is to be subject to the management measures to be set out in a subsequent action plan. It is not unusual for the boundary of an AQMA to include within it relevant locations where air quality is not at risk of exceeding an AQS objective.

5.2.7 The AQS objective values for the pollutants of relevance to this assessment are presented in Table 5-1.

Table 5-1: Key National Air Quality Strategy Objectives

Pollutant	Averaging Period	Value	Maximum Permitted Exceedances	Target Date
Nitrogen Dioxide (NO_2)	Annual Mean	40µg/m^3	N/A	31/12/2005
	Hourly Mean	200µg/m^3	18 times per year	31/12/2005
Particulate Matter (PM_{10})	Annual Mean	40µg/m^3	N/A	31/12/2004
	Daily Mean	50µg/m^3	35 times per year	31/12/2004
Fine Particulate Matter ($PM_{2.5}$)	Annual Mean	25µg/m^3	N/A	2020
Nitrogen Oxides (NOx) for ecosystems	Annual Mean	40µg/m^3	N/A	31/12/2000

5.2.8 The principal air quality legislation within the United Kingdom is the 2010 Air Quality Standards Regulations (as amended 2016) (Ref 5-13), which transposes relevant EU Air Quality Directives into national legislation.

Clean Air Strategy

5.2.9 In 2019, the UK government released its Clean Air Strategy 2019 (Ref 5-14), which is part of its 25 Year Environment Plan. In recent years, air quality management has primarily focused on NO_2, and its principal source in the UK, i.e. road traffic. However, the Clean Air Strategy broadens the focus to other areas, including domestic emissions from wood burning stoves and from agriculture. This shift in emphasis is part of a longer-term goal to reduce the levels of $PM_{2.5}$ in the air to below the World Health Organisation (WHO) guideline level, which is far lower than the AQS objective value.

5.2.10 The Clean Air Strategy included the provision of a clear effective guidance on how AQMAs, Clean Air Zones (CAZ) and Smoke Control Areas interrelate and how they can be used by local government to tackle pollution. The UK Clean Air Strategy sets the following reduction target:

- Nitrogen oxides (NOx) - reduce emissions against the 2005 baseline by 55% by 2020 and by 73% by 2030.
- $PM_{2.5}$ - reduce emissions against the 2005 baseline by 30% by 2020 and 46% by 2030.

5.2.11 It is noted within the Clean Air Strategy document that the "current legislative framework has not driven sufficient action at a local level". New legislation will seek to shift the focus towards prevention of exceedances rather than tackling pollution when limits have been surpassed. The shift of focus encourages more of a proactive rather than reactive policy framework at regional and local levels on air quality.

National Planning Policy and Guidance

National Planning Policy Framework

5.2.12 At a national level, the UK Government published the National Planning Policy Framework (NPPF) in 2012. The NPPF supersedes previous national planning policy guidance (PPGs) and planning policy statements (PPSs). The NPPF summarises in a single document the Government planning policies for England, and how these are expected to be applied. The NPPF was updated in July 2021 (Ref 5-16), superseding the previous version published in March 2012 and revised in February 2019.

5.2.13 Air quality is considered as an important element of the natural environment within the NPPF. On conserving and enhancing the natural environment, Paragraph 174 states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by: …

e) 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 or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality …"

5.2.14 Air quality in the UK has been managed through the Local Air Quality Management regime using national objectives. Paragraph 186 of the NPPF states that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. … Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

5.2.15 Annex 2 of the NPPF provides the flowing definition of AQMAs: "*Areas designated by local authorities because they are not likely to achieve national air quality objectives by the relevant deadlines*".

5.2.16 Also, Paragraph 105 of the NPPF states the following:

"*The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions and improve air quality and public health".*

National Planning Practice Guidance

5.2.17 The Planning Practice Guidance (PPG) (Ref 5-17) was published on the 6 March 2014 to provide more in-depth guidance to the NPPF. The PPG aims to make planning guidance more accessible, and to ensure that the guidance is kept up to date. As such, the PPG was amended in July 2017 to reflect the updated EIA Regulations, and further updated in 2019.

5.2.18 When deciding whether air quality is relevant to a planning application, the PPG states that the following criteria may be required to be taken into consideration:

"the 'baseline' local air quality, including what would happen to air quality in the absence of the development;

whether the proposed development could significantly change air quality during the construction and operational phases (and the consequences of this for public health and biodiversity); and

whether occupiers or users of the development could experience poor living conditions or health due to poor air quality."

5.2.19 On how detailed an air quality assessment needs to be, the PPG states:

"Assessments should be proportionate to the nature and scale of the development proposed and the level of concern about air quality... Mitigation options where necessary will be locationally specific, will depend on the proposed development and should be proportionate to the likely impact. It is important therefore that local planning authorities work with applicants to consider appropriate mitigation so as to ensure the new development is appropriate for its location and unacceptable risks are prevented."

A Green Future

5.2.20 The 25 Year Environment Plan, published in January 2018, sets out the actions the UK Government will take to help the natural world regain and retain good health (Ref 5-15). This references several actions that are being taken to improve air quality, most notably the publication of the Clean Air Strategy (referenced earlier) and tighter controls on Medium Combustion Plant. Emphasis is also placed on the 'Future of Mobility', in the establishment of flexible regulatory framework to encourage new modes of transport and encouraging opportunities to move toward zero emission transport.

5.2.21 The 25 Year Environment Plan reinforces the demand for high environmental standards for all new build development. Resilient buildings and infrastructure will more readily adapt to a changing climate, and by extension have a lesser impact on local air quality.

Local Planning Policy and Guidance

West Oxfordshire Local Plan 2011-2031, adopted 2018

5.2.22 At the time of writing, the development plan for Eynsham currently consists of The West Oxfordshire Local Plan (Ref 5-18). This was adopted on 27th September 2018 and sets out the overall planning framework for the district from 2011 to 2031.

5.2.23 Matters of relevance to the Air Quality assessment include:

- Policy EH8 (Environmental Protection) focuses on Air Quality and states that: “The air quality within West Oxfordshire will be managed and improved in line with National Air Quality Standards, the principles of best practice and the Air Quality Management Area Action Plans for Witney and Chipping Norton. Where appropriate, developments will need to be supported by an air quality assessment”.
- Policy OS3 (Prudent use of natural resources) states that: “minimising waste and making adequate provision for the re-use and recycling of waste; and causing no deterioration and, where possible, achieving improvements in water or air quality”.
- Policy T1 (Sustainable Transport) states that: “Priority will be given to locating new development in areas with convenient access to a good range of services and facilities and where the need to travel by private car can be minimised, due to opportunities for walking, cycling and the use of public transport, particularly where this would help to reduce traffic congestion on the routes around Oxford and the Air Quality Management Areas at Witney and Chipping Norton”.
- Policy T4 (Parking Provision) considers air quality when “The Council will work with partners to provide, maintain and manage an appropriate amount of off-street public car parking, particularly to support our town and village centres and to address issues of congestion and air quality”.
- Policy EH3 (Biodiversity and Geodiversity) aims to protect and enhance biodiversity by “requiring a Habitats Regulations Assessment to be undertaken of any development proposal that is likely to have a significant adverse effect, either alone or in combination, on the Oxford Meadows SAC, particularly in relation to air quality and nitrogen oxide emissions and deposition”.

Cherwell Local Plan 2011-2031, adopted 2016

5.2.24 The Adopted Cherwell Local Plan 2011-2031 (Part 1) (Ref 5-19) contains strategic planning policies for the development and the use of land. It was adopted in 2020

5.2.25 CDC’s development plan also includes saved policies from the 1996 Cherwell Local Plan (Ref 5-21) that were saved in 2007. Matters of relevance to the Air Quality assessment include:

- Policy ESD10 (Protection and Enhancement of Biodiversity and the Natural Environment) that states; “Air quality assessments will also be required for development proposals that would be

likely to have a significantly adverse impact on biodiversity by generating an increase in air pollution".

Oxford City Council Local Plan 2016-2036, adopted 2020

5.2.26 The Adopted Oxford City Council Local Plan 2016-2036 (Ref 5-20) contains strategic planning policies for the development and the use of land. It was adopted in 2020 and sets out the overall planning framework for the city from 2016 to 2036. Matters of relevance to the air quality assessment include:

- Policy S1: Presumption in favour of sustainable development
- Policy RE1: Sustainable design and construction
- Policy RE6: Air quality
- Policy G7: Protection of existing Green Infrastructure features
- Policy M2: Assessing and managing development
- Policy M4: Provision of electric charging points

West Oxfordshire Design Guide, 2016

5.2.27 Alongside the Local Plan, the West Oxfordshire Design Guide 2016 (Ref 5-22) contains a detailed analysis of both natural and man-made aspects of the District and detailed design advice. It was adopted by WODC in April 2016, and is a Supplementary Planning Document (SPD), so is a material consideration in planning decisions. Matters of relevance to the air quality assessment include:

- Policy EH2 (Biodiversity) states; "requiring a Habitats Regulation Assessment to be undertaken of any development proposal that is likely to have a significant adverse effect, either alone or in combination, on the Oxford Meadows SAC, particularly in relation to air quality and nitrogen oxide emissions and deposition".

Eynsham Neighbourhood Plan 2018-2031, adopted 2020

5.2.28 A Neighbourhood Plan has been adopted for Eynsham (Ref 5-23), which runs from 2018 until 2031 to align with the end dates of the West Oxfordshire Local Plan 2031. There are no policies of relevance to the air quality assessment within this document.

Other Relevant Policy, Standards and Guidance

Design Manual for Roads and Bridges (DMRB) LA 105 Air Quality

5.2.29 The Highways England guidance *DMRB LA 105 Air quality* (Ref 5-24) outlines the methodology typically used for the dust emission and air quality modelling assessments for motorway and trunk road schemes. This recommends that modelling is limited to 200m from the Affected Road Network (ARN) and includes guidance on how all sensitive receptors (public exposure and designated ecological habitats) within 0-50m, 50-100m and 100-200m of all construction activity should be identified. This guidance also outlines the criteria for traffic screening, gap analysis, compliance risk assessment and provides advice on the evaluation of significance.

Local Air Quality Management Technical Guidance

5.2.30 Local Air Quality Management Technical Guidance, LAQM (TG16) (Ref 5-25) from Defra provides guidance to support local authorities in carrying out their duties under the Environment Act 1995 and subsequent regulations. In order to provide consistency with all UK local authorities own work on air quality, the guiding principles for air quality assessments, as set out in the latest LAQM guidance and associated tools have been utilised in this assessment.

5.3 Consultation

5.3.1 Discussions with Environmental Health Officers at WODC and Oxford City Council were conducted to confirm the timing for an additional baseline monitoring survey. Due to restrictions imposed as a result of the Covid-19 pandemic, both local authorities requested to delay the start of the baseline monitoring surveys until mid-March/April 2021 when restrictions started to ease.

5.3.2 The EIA Scoping Report for the proposed development was submitted in March 2021 and the EIA Scoping Opinion was received April 2021; these documents are provided in *ES Volume II Appendix 2-A and 2-B*. A summary of the air quality related responses is included in Table 5-2.

Table 5-2: Comments raised in Scoping Opinion

Comments Raised	*Response Provided in the ES / Planning Application*
CDC - Environmental Protection - The air quality effects of the proposed development should be considered both in terms of the likely effect on human health as well as ecology. In addition, dust from the construction phase could also have an impact on the air quality on the local area. Therefore, Air Quality should be scoped into the EIA.	An air quality assessment of construction and operational impacts is to be conducted as outlined in Section 5.4 Assessment Methodology.
Public Health England - Clearly identify any omissions, uncertainties and dependencies.	These are outlined in the Limitations and Assumptions section.
Public Health England - Consideration of impacts on existing areas of poor air quality e.g. existing or proposed local authority Air Quality Management Areas (AQMAs)	The operational phase local air quality assessment (Section 5.4) considers impacts at selected receptors within AQMAs within the study area.
Public Health England - Modelling using appropriate meteorological data (i.e. come from the nearest suitable meteorological station and include a range of years and worst-case conditions).	It is standard best practice to conduct modelling of a highways scheme using a single year's worth of meteorological data for the same year as the baseline verification year. Through this approach, a correction factor(s) is developed between the baseline model outputs and the baseline ambient monitoring. This correction factor is then applied to all model outputs for the baseline and future scenarios. As outlined in Section 5.4, hourly meteorological data from a local site at RAF Benson is proposed for 2018, the baseline year for this assessment. Several years' worth of data are typically only used for industrial applications, which is not applicable to the proposed development. This approach is utilised in industrial applications to consider the change in peak concentrations from stacks in different meteorological conditions.
Modelling taking into account local topography, congestion and acceleration.	Based on *DMRB LA105 Air quality*, the operational phase local air quality assessment (section 5.4) takes accounts variations in speed and congestion within the speed banding process. In this approach, a series of speed bands are used to describe vehicle emissions including in heavy and light congestion, free flow and high speed conditions. Topography such as presence of street canyons or steep gradients are considered as part of the model setup and the performance of the model is reviewed during the model verification process. Within the study area for the proposed development, no canyon locations or steep gradients have been identified.
Evaluation of the public health benefits of development options which reduce air pollution – even below limit values – as pollutants such as nitrogen dioxide and particulate matter show no threshold below which health effects do not occur.	Based on *DMRB LA105 Air quality* guidance, the operational phase local air quality assessment (section 5.4) of significance for human health considers public exposure locations that have concentrations above the thresholds and have a difference of more than 1% of the threshold (i.e. 0.4 micrograms ($\mu g/m^3$). Therefore, any sensitive location that is below this threshold is not considered further in the air quality assessment. Separately, the *ES Volume I Chapter 13* includes a population and human assessment, which use methodology in the Oxfordshire HIA toolkit. This toolkit covers a range of considerations as part of this assessment including air pollution caused by traffic during construction and operation, but it does not go into detail to analyse benefits as this is not required under Oxfordshire guidance.

Comments Raised	*Response Provided in the ES / Planning Application*
Natural England - The assessment should take account of risks of air pollution on sensitive habitats.	Section 5.4 outlines the methodology for considering impacts on designated ecological sites sensitive to nitrogen.
WODC – Environmental Health – The specific committed developments should be included within the scope of the cumulative effects assessment and agreed in advance with the Planning Officer, in consultation with WODC.	This information is provided in *ES Volume I Chapter 16: Cumulative Effects*.

5.4 Assessment Methodology

5.4.1 This section presents the following:

- Information sources that have been consulted throughout the preparation of this chapter;
- The methodology behind the assessment of air quality effects, including the criteria for the determination of sensitivity of receptor and magnitude of change from the existing of 'baseline' condition;
- An explanation as to how the identification and assessment of potential air quality effects has been reached; and
- The significance criteria and terminology for the assessment of air quality residual effects.

5.4.2 The detailed plans that define the proposed development have been reviewed and form the basis of the assessment of likely significant effects on air quality.

5.4.3 This air quality assessment has been undertaken based on the following guidance:

- *DMRB LA 105 Air quality* (Ref 5-24); and
- Defra's LAQM Technical Guidance (LAQM.TG (16)) (Ref 5-25).

5.4.4 Following *DMRB LA 105 Air quality*, a detailed level of assessment is required due to the size of the proposed development and the risk potential of the project and that there are receptors within 50m of roads triggering the traffic screening criteria (see paragraph 5.4.15).

Methodology for Determining Baseline Conditions and Sensitive Receptors

5.4.5 This section presents the methodology used to assess the potential effects on air quality during the construction phase and the operational phase of the proposed development.

5.4.6 This section explains the methods used to assess the potential effect of:

- Fugitive emissions of particulate matter from the construction activities;
- Traffic associated with the construction activities representing peak activities; and
- Emissions from vehicles in the operational phase of the proposed development.

5.4.7 The methods used to determine the significance of effects associated with air quality impacts are described in the 'Significance Criteria' sub-section of this report.

5.4.8 Public exposure receptors potentially sensitive to air quality have been identified through review of mapping and aerial photography of the area surrounding the proposed development, whereas, designated ecological receptors have been identified using nationally and locally assigned ecological site shapefiles in GIS, the Air Pollution Information System (APIS) (Ref 5-25) and the Ancient Tree Inventory (Ref 5-27). More information on the sensitive receptors is provided in n Section 5.5 of this ES chapter.

Methodology for Determining Construction Effects

Construction Phase Dust Assessment

5.4.9 The potential impacts from construction dust emissions generated during the construction phase of the proposed development follow *DMRB LA 105 Air quality*, i.e. to consider sensitive receptors within bandings up to 200m of where construction activity and identify these in a constraints plan. The locations of any sensitive receptors such as housing, schools, hospitals or special ecological sites within 200m of the red line boundary were identified such that mitigation measures to reduce dust emissions can be applied.

5.4.10 To determine whether the proposed development has a large or small construction dust risk potential the following tables (Table 5-3 and Table 5-4) as presented in *DMRB LA 105 Air quality* have been followed.

Table 5-3: Construction dust risk potential

Risk	Examples of types of projects
Large	Large smart motorway projects, bypass and major motorway junction improvements.
Small	Junction congestion relief project i.e. small junction improvements, signalling changes. short smart motorway projects.

Table 5-4: Receiving environment sensitivity to construction dust

Construction dust risk potential	Distance from construction activities		
	0-50m	50- 100m	100-200m
Large	High	High	Low
Small	High	Low	Low

5.4.11 Mitigation measures that can be included in a Construction Environmental Management Plan (CEMP) for the proposed development have been identified where required. Mitigation measures are based on those presented in the Institute of Air Quality Management (IAQM) guidance on the assessment of demolition and construction dust (Ref 5-28).

Construction Phase Local Air Quality Assessment

5.4.12 Construction phase traffic emissions follows *DMRB LA 105 Air quality* to consider the impact of construction activities on vehicle movements. The anticipated construction programme is due to last from August 2023 to February 2025, a period of longer than two years. Limited traffic predictions during the construction phase are available at this point to conduct a quantitative assessment and no traffic management plan or construction traffic routes have been specified at this stage. Is expected that the majority of the heavy duty vehicle (HDV) movements will be along the A40 with a temporary speed limit during works. Methodology for Determining Operational Effects.

Operational Phase Local Air Quality Assessment

5.4.13 The operational phase local air quality impact assessment considers the impact of pollutant concentrations on sensitive receptors within 200m of the ARN once the proposed development is complete and operational.

5.4.14 The ARN is defined by applying the traffic scoping criteria to all roads within the traffic reliability area (TRA) (i.e. the area within which traffic data is considered to be suitable for use in environmental assessments by the traffic assessment). The traffic scoping criteria are change based (determined under two-way road traffic conditions), where the change is based on the difference in opening year traffic data between the Do-Minimum (DM; without the proposed development) and Do-Something (DS; with the

proposed development). If one or more of the following criteria are met, then the road is considered to be part of the ARN:

- Road alignment changed by 5m or more; or
- Daily traffic flows will change by 1,000 annual average daily traffic (AADT) or more; or
- HDV flows will change by 200 AADT or more; or
- A change in speed band.

5.4.15 The final local air quality ARN has taken account of the extent of reliable coverage of the traffic model but has excluded road sections where there are no receptors within 200m of the road.

5.4.16 Representative sensitive receptors were selected within 200m of the ARN and then all roads in the TRA within 200m of the receptors were included in the modelled road network. The air quality study area is described in more detail in Section 5.5.

5.4.17 As the baseline year of the traffic model was 2018, air quality model predictions for the same baseline year were made for verification purposes. Base year results have been compared with the results of representative air quality monitoring and model adjustment factors have been determined and applied.

5.4.18 Model predictions have also been made for the DM and DS for the 2024 opening year. On the basis of these predictions, the change in NO_2 and PM_{10} at public exposure receptors as a result of the proposed development has been established. The assessment of $PM_{2.5}$ is not a requirement of *DMRB LA 105 Air quality*. This is because the UK currently meets its legal requirements for the achievement of the $PM_{2.5}$ air quality thresholds. The assessment has utilised the modelling of PM_{10} to demonstrate that the proposed development does not impact on the $PM_{2.5}$ air quality objective (i.e. 25 µg/m³).

5.4.19 For designated ecological sites sensitive to nitrogen deposition within 200m of the ARN, the effect of the proposed development on air quality has been considered in line with *DMRB LA 105 Air quality*. Comparison of results has been made against the NOx objective value and the Critical Loads for nitrogen deposition (the latter varies according to designation). The implications for designated sites have been considered separately to the air quality assessment as part of the biodiversity assessment (refer to *ES Volume I Chapter 6: Biodiversity*).

5.4.20 The outputs of the air quality modelling have informed the compliance risk assessment and the operational phase local air quality assessment (impact of the proposed development on human and designated sites) to determine whether the proposed development leads to a significant air quality effect.

5.4.21 A key element of the operational phase local air quality assessment is the rate of improvement in air quality over time as cleaner vehicles enter the national vehicle fleet. The methodology outlined within *DMRB LA 105 Air quality* on the assessment of future NOx and NO_2 projections has been considered for this assessment. The method considers Defra's advice on long term trends (LTT) related to roadside NO_2 concentrations which suggests that there is a gap between current projected vehicle emission reductions and projections on the annual rate of improvements in ambient air quality as previously published in Defra's technical guidance and observed trends.

5.4.22 The methodology, known as 'Gap Analysis', involves the application of adjustment factors which take into consideration the assumed roadside rates of reduction in NOx and NO_2 by Defra's modelling tools compared to observed roadside monitoring trend i.e. the gap between the predicted reductions and those observed. The adjusted results from this Gap Analysis have been presented here using the LTT_{E6} projection. These results are considered to present a realistic worst-case scenario, as only a portion of the full anticipated improvements in air quality by Defra guidance are assumed to occur in the Gap Analysis results by the future opening year.

5.4.23 Results have been presented in tabular format showing air quality concentrations at discrete representative sensitive receptors, together with interpretative text. Concentration values have been reported to no more than one decimal place.

Traffic Data

5.4.24 Traffic Data have been provided for the following scenarios:

- 2018 Baseline – existing situation;

- 2024 DM – future base without the proposed development traffic and with future committed developments; and
- 2024 DS – future base with the proposed development traffic and future committed developments.

Road Modelling and Vehicle Emissions Factors

5.4.25 This operational phase local air quality assessment has used the latest version dispersion modelling software 'ADMS-Roads' version 5.0.0.1. 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. Details of general model conditions set up in ADMS-Roads are provided in *ES Volume II Appendix 5-A*.

5.4.26 Predicted results from an air quality dispersion model may differ from measured concentrations for a number of reasons, including uncertainties associated with traffic flows and emissions factors, meteorology and limitations inherent to the modelling software. In light of this, and in accordance with advice in LAQM.TG(16) for roads-based air quality assessments, it is best-practice to perform a comparison of modelled results with local monitoring data to minimise these modelling uncertainties. This provides a verification factor, by which the output of the ADMS-Roads model is adjusted, to gain greater confidence in the final results. The verification of the modelling output was carried out as prescribed in Chapter 7 of LAQM.TG(16) and presented in *ES Volume II Appendix 5-A* and is summarised below.

5.4.27 Existing NO_2 monitoring data from eight WODC monitoring sites (site codes; NAS 1, 2, 3, 4, 5, 6, 7, 10 and 12) and the six scheme specific monitoring sites along the A40 were used in the model verification for the baseline year of 2018.

5.4.28 The ARN was divided into two zones, with the verification factors as below;

- WODC diffusion tubes provided an adjustment factor of 1.19 with an uncertainty value; root mean square error (RMSE) of 5.7µg/m^3. This was used to adjust road links within Witney; and
- AECOM scheme specific diffusion tubes provided an adjustment factor of 1.95 with an RMSE of 5.3µg/m^3, which was applied to the remainder of the ARN.

Sensitivity of receptor

5.4.29 There are two types of receptors that are considered in the local operational air quality assessment:

- Public Exposure Receptors - these are sensitive locations where relevant exposure for the air quality criteria being assessed could occur, e.g. residential properties or schools. These locations are defined by LAQM.TG(16); and
- designated ecological habitats such as SSSIs (Site of Special Scientific Interest), SACs (Special Area of Conservation), SPAs (Special Protection Area) and sites listed under the Convention on Wetlands and Wildfowl (Ramsar), local nature reserves, local wildlife sites, nature improvement areas, ancient woodland and veteran trees.

5.4.30 The AQS objectives (as set out in the Air Quality Standards Regulations 2010) have been set at concentrations that provide protection to all members of society, including more vulnerable groups such as the very young, elderly or unwell. As such the sensitivity of receptors was considered when setting the objectives and therefore no additional subdivision of public exposure receptors on the basis of building or location type is necessary.

Public Exposure Receptors

5.4.31 Sensitive receptors were chosen to represent locations where pollutant concentrations are expected to be highest (those closest to the road, and those close to junctions) and where changes due to the proposed development are expected to be greatest. Model predictions are made at 1.5m height to be representative of public exposure.

5.4.32 Receptor point locations were identified using Ordnance Survey Mastermap (Ref 5-31), Ordnance Survey Addressbase Plus (Ref 5-32), and Google Earth (Ref 5-33) mapping and imagery.

5.4.33 Predictions of total pollutant concentrations at receptors were calculated by combining the verified modelled road pollutant contributions with background concentrations. Background concentrations are those from many sources not explicitly modelled that individually may not be significant, but collectively, over a large area, need to be considered. Details of how background concentrations have been derived and used in this assessment are provided in *ES Volume II Appendix 5-A*.

5.4.34 The following post-processing methods were applied to the dispersion model outputs:

- Adjustment factors derived via model were applied to bring modelled concentrations into line with monitored concentrations.
- Road contribution NO_X concentrations as outputted by ADMS-Roads were converted to NO_2 concentrations using Defra's NO_X to NO_2 Calculator (Ref 5-34) for comparison against the air quality objectives for NO_2.
- Highways England LTT_{E6} projection factors were applied to the modelled DM and DS NO_2 concentrations to account for the observed gap between projected vehicle emission reductions and the estimated annual rate of improvement in annual mean NO_2 concentrations.

5.4.35 The modelled annual average pollutant concentrations are presented in *ES Volume II Appendix 5-B*. These were compared against the relevant objective values to identify any predicted exceedances.

5.4.36 Where a receptor is predicted to experience concentrations of NO_2 below the objective values in both the DM and the DS scenario, it does not inform the judgement of significance.

5.4.37 Where annual mean concentrations of NO_2 at receptors are predicted to exceed the annual mean objective of 40µg/m^3 in the DM and/or DS scenario, magnitude of change descriptors are applied in line with *DMRB LA 105 Air quality* as shown below.

- **Large** – where the change in concentration of NO_2 between DM and DS is greater than 4.0µg/m^3 (>10% of the objective).
- **Medium** – where the change in concentration of NO_2 between DM and DS is greater than 2.0µg/m^3 but less than or equal to 4.0µg/m^3 (5-10% of the objective); or
- **Small** – where the change in concentration of NO_2 between DM and DS is greater than 0.4µg/m^3 but less than or equal to 2.0µg/m^3 (1-5% of the objective);
- **Imperceptible** – where the change in concentration of NO_2 between DM and DS is less than or equal to 0.4µg/m^3 (≤1% of the objective).

5.4.38 Receptors can reside within more than one magnitude of change category, e.g. a receptor with a greater than 4µg/m^3 change also resides within the medium and small categories to ensure the aggregated number of properties are compared to the guideline bands.

5.4.39 Where necessary, the number of receptors assigned to 'small', 'medium' and 'large' change descriptors have been determined, for both a worsening and an improvement in air quality. This is illustrated in Table 5-5 which defines guideline bands that indicate a significant effect. Where the total number of receptors are greater than the upper guideline band in any of the magnitude categories the project shall trigger a significant air quality effect. Where the total number of receptors are smaller than the lower guideline band in any of the magnitude categories the project is unlikely to trigger a significant air quality effect.

5.4.40 As set out in *DMRB LA 105 Air quality*, annual mean PM_{10} concentrations are presented for the base year to demonstrate that pollutant concentrations are well below the objective value and therefore there is no risk of exceedance of these thresholds due to the proposed development.

Table 5-5: Guideline band for the number of properties informing a judgement of significant air quality effects

Magnitude of change in annual mean NO_2 ($\mu g/m^3$)	Total number of receptors with:	
	Worsening of an air quality objective already above the objective or the creation of a new exceedance	Improvement of an air quality objective already above the objective or the removal of an existing exceedance
Large (>4)	1 to 10	1 to 10
Medium (>2)	10 to 30	10 to 30
Small (>0.4)	30 to 60	30 to 60

5.4.41 Where the total number of receptors falls within the guideline bands above in any of the magnitude categories (Large, Medium or Small), the following criteria is considered to inform the judgement of significance:

- the absolute concentration at each receptor i.e. is the modelled concentration greater than 40µg/m^3 or 60µg/m^3;
- how many receptors are there in each of the magnitude of change criteria i.e. does the project create more worsening than improvements; and
- the magnitude of change in concentration at each receptor, e.g. a modelled change in concentration of 1.8µg/m^3 would carry more weight than a change of 0.6µg/m^3 despite both falling within the 'small' magnitude of change category.

Designated ecological sites

5.4.42 As well as impacts on public exposure receptors, some air pollutants also have an effect on vegetation. Concentrations of pollutants in air and deposition of particles can damage vegetation directly or affect plant health and productivity. Deposition of pollutants to the ground and vegetation can alter the characteristics of the soil, affecting the pH and nitrogen availability that can then affect plant health, productivity and species composition. Increased greenhouse gas emissions on a global scale can affect the global climate, such that the ability of existing species to tolerate local conditions can change.

5.4.43 Internationally, nationally and locally designated sites of ecological conservation importance on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity (known as designated sites) are also considered in the operational phase local air quality assessment.

5.4.44 The pollutant of most concern for sensitive vegetation near roads is NO_X with a set level of 30µg/m^3 (annual mean) forming the critical level for designated ecological sites. Furthermore, critical loads for the deposition of nitrogen (N) representing the exposure below which there should be no significant harmful effects on sensitive elements of the ecosystem have been established for certain habitats and are expressed in deposition units of kg N ha/year.

5.4.45 At each designated site, annual mean NO_x concentrations were predicted along a transect, at 10m intervals up to 200m from the ARN. For each point along the transect, the road NO_x concentrations have been predicted for the baseline year, DM and DS in the opening year. The road NO_x concentration is converted to road NO_2 concentrations and then converted to dry nutrient N deposition rate (kg N/ha/yr) using conversion rates outlined in the DMRB LA 105. The habitat of each ecological receptor was identified using APIS and Multi-Agency Geographic Information for the Countryside (MAGIC) (Ref 5-35). The road N deposition rate is added to background N deposition rates derived from APIS to determine total N deposition rates. These rates have then been compared to the critical loads for each designated site.

5.4.46 The process for assessing the significance of air quality effects at designated ecological sites from *DMRB LA 105 Air quality* was followed. This states that if the total nitrogen deposition rate is under the

critical load for the designated site in both DM and DS scenarios, or the change in total nitrogen deposition rate is less than 1% of the critical load, the effect is not significant. If these criteria are not met, further ecological assessment is required to determine whether the air quality effect is significant; these details are provided in the *ES Volume I Chapter 6: Biodiversity*.

Compliance risk assessment

5.4.47 A compliance risk assessment was carried out in accordance with *DMRB LA 105 Air quality* to evaluate the effect of the proposed development on the UK's ability to comply with the Air Quality Directive.

5.4.48 All road links which are part of Defra's 2018 pollution climate mapping (PCM) model (Ref 5-36) and within the ARN were identified. Receptors were chosen alongside the links in question in the following locations:

- at 'qualifying features' at worst-case exposure within 15m of the running lanes of a road/kerbside (but not within 25m of a junction), for example footpaths that run parallel to the road; and
- at 'validation points' 4m from the road edge at a height of 2m, for comparison with PCM modelled concentrations.

5.4.49 The concentrations of NO_2 at these points were modelled in the same manner as for public exposure receptors with the exception that Highways England LTT_{E6} projection factors are not applied to the modelled concentrations. This is to ensure the compliance risk assessment is consistent with Defra's reporting on compliance with the EU Limit Values.

5.4.50 The concentrations of NO_2 predicted by the air quality model at the validation points in the DM scenario were compared to the PCM modelled concentrations for the opening year, 2024. Where there are significant differences between the two (i.e. greater than 10%) then the model is reviewed to ensure that the outputs of the project traffic and air quality modelling are robust.

5.4.51 *DMRB LA 105 Air quality* indicates that the compliance risk assessment can conclude there is no risk to the UK's reported ability to comply with the Air Quality Directive in the shortest timescale possible where:

- there are no modelled exceedances of the air quality thresholds for any PCM link; or
- there are modelled exceedances of the air quality thresholds for any PCM link, but the change in annual mean NO_2 concentrations between the DM and DS is less than or equal to +/-0.4µg/m^3.

5.4.52 If these criteria are not met, further assessment is required to evaluate the compliance risk, including comparison to the maximum PCM modelled concentrations within the reporting zone.

Overall significance determination

5.4.53 The overall significance of the proposed development with respect to air quality is determined for the construction phase and the operation phase.

5.4.54 In each case, the assessment of significance is informed by:

- the effects on human health (as determined by the significance of the local air quality assessment for public exposure receptors);
- the effects on designated habitats (as determined by the significance of the local air quality assessment for designated ecological sites); and
- the outcomes of the compliance risk assessment.

Limitations and Assumptions

5.4.55 The following limitations and assumptions are relevant to the air quality assessment:

- Model verification has been carried out to minimise, where possible, uncertainties in the modelling and adjustment of the model output has been undertaken to account for local factors unable to be represented in the modelling. *ES Volume II Appendix 5-A* provides further details on model verification.

- The air quality modelling uses a traffic dataset consisting of the most likely forecast traffic flows. Uncertainty associated with traffic data has been minimised by using validated traffic models.
- The use of the latest version of the Defra background concentrations and tools available when the assessment was undertaken has also minimised the uncertainty associated with the air quality predictions presented.
- Uncertainties associated with vehicle emissions data have been minimised by using the speed-band emission factors described within *DMRB LA 105 Air quality*, which is based on version 10.1 of Defra's Emissions Factors Toolkit (EFT). Speed bands are assigned on a link by link basis as informed by the pivoted speeds provided by the appointed traffic consultant.
- The forecasting method used to predict future NO_2 concentrations is the gap analysis methodology as described in *DMRB LA 105 Air quality*. The gap analysis is the application of adjustment factors that take into consideration the assumed roadside rates of reduction in NO_X and NO_2 by Defra's modelling tools compared to observed roadside trends. This prediction methodology is more conservative than the projections used by Defra.
- The construction air quality assessment is based on the construction information that is currently available. As with all construction air quality assessments, the exact details of construction activities will not be known before a specific contractor is appointed to complete the works. Once appointed, the contractor would determine their exact construction methods and programme during the detailed design stage.

5.5 Study Area

5.5.1 The study area for the air quality assessment has been determined and finalised by the traffic and air quality competent experts.

5.5.2 For the construction phase dust assessment, all sensitive receptors (human and designated habitats) within 0–50 m, 50–100 m and 100–200 m of all construction activity within the proposed development boundary has been identified on a constraints plan (refer to Figure 5-3 in *ES Volume II Appendix 5-B*) in line with the general approaches outlined within *DMRB LA 105 Air quality*.

5.5.3 In line with the general approaches within *DMRB LA 105 Air quality,* the study area for the operational phase local air quality assessment focuses on 200m either side of road carriageway centrelines of the local air quality ARN. This is because the effect of pollutants from road traffic reduces with distance from the point of release, and beyond 200m these pollutants are likely to have reduced to a concentration equivalent to background concentrations.

5.6 Baseline Conditions

5.6.1 The air quality baseline informs the air quality assessment by gathering information including local monitoring data, local air quality management reports, PCM model data and Defra background concentrations (Ref 5-30) as outlined in *DMRB LA 105 Air quality* (Ref 5-24). The air quality baseline is presented below for the proposed development as a whole.

5.6.2 Baseline air quality monitoring data for close to the proposed development have been gathered from the following sources:

- WODC 2021 Annual Status Report (ASR) (for 2015 to 2020 monitoring information) (Ref 5-37);
- Oxford City Council 2021 and 2020 ASR (for 2015 to 2020 monitoring information) (Ref 5-38 and Ref 5-39 respectively);
- CDC 2020 ASR (for 2015 to 2019 monitoring information) (Ref 5-40);
- AECOM scheme monitoring in 2017/2018 for verification and 2021 for recent context.

5.6.3 There are two designated AQMAs close to the proposed development:

- Witney AQMA (Ref 5-37), approximately 2.5km west of the A40 Dualling section, declared by WODC in 2005 for exceedances of the AQS objective for annual mean NO_2 concentrations; and

- City of Oxford AQMA (Ref 5-38) which covers 150m of the eastern end of the A40 Duke's Cut element of the proposed development, and was declared by OCC in 2010 for exceedances of the AQS objective for annual mean NO_2 concentrations.

5.6.4 Annual mean background concentrations for the local operational air quality assessment study area have been obtained from Defra modelled background data based from 1km x 1km grid squares. The background concentrations are used in local modelling assessments to represent sources not explicitly modelled. The baseline traffic data for the proposed development is for 2018 and to align with this the baseline, background pollutant concentrations have been taken for 2018. Future background concentrations for the opening year of 2024 were used for the proposed development modelling (Ref 5-30).

5.6.5 Table 5-6 shows that the background concentrations for 2018 and 2024 are well below the relevant annual AQS objectives.

Table 5-6: Gridded background concentrations, 2018 and 2024

Local Authority	Grid Square (X, Y)	2018			2024		
		NO_X ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	NO_X ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
WODC	432500, 209500	9.9	7.7	14.5	7.9	6.2	13.3
WODC	433500, 208500	9.8	7.6	14.9	7.9	6.2	13.7
WODC	434500, 208500	11.3	8.7	15.1	9.2	7.2	13.9
WODC	434500, 209500	11.7	9.0	15.4	9.4	7.3	14.1
WODC	435500, 210500	11.6	8.9	15.1	9.4	7.3	13.8
WODC	435500, 209500	12.5	9.6	14.9	10.1	7.8	13.6
WODC	435500, 208500	12.1	9.2	15.4	9.6	7.5	14.2
WODC	435500, 207500	10.5	8.1	14.9	8.4	6.6	13.8
WODC	436500, 208500	10.9	8.4	16.0	8.7	6.8	14.8
WODC	436500, 209500	11.7	9.0	14.8	9.4	7.3	13.6
WODC	437500, 209500	10.8	8.3	15.1	8.5	6.7	13.9
WODC	438500, 210500	10.2	7.9	14.9	8.1	6.3	13.8
WODC	439500, 210500	10.2	7.9	15.6	8.0	6.3	14.5
WODC	440500, 210500	10.3	8.0	15.7	8.2	6.4	14.5
WODC	441500, 210500	10.5	8.1	15.5	8.3	6.5	14.4
WODC	437500, 210500	10.9	8.4	15.5	8.8	6.9	14.3
WODC	437500, 211500	10.0	7.8	15.1	8.0	6.3	13.9
WODC	438500, 211500	10.0	7.7	14.4	8.0	6.3	13.2
WODC	438500, 212500	10.0	7.7	14.1	8.0	6.3	12.9
WODC	439500, 212500	10.0	7.7	13.9	8.0	6.3	12.7
WODC	439500, 213500	9.8	7.6	13.6	7.8	6.2	12.5
WODC	440500, 213500	10.1	7.8	14.2	8.1	6.3	13.1
WODC	441500, 214500	10.4	8.0	14.2	8.3	6.5	13.0
WODC	442500, 214500	10.6	8.2	14.8	8.5	6.7	13.6
WODC	443500, 214500	11.9	9.1	15.1	9.8	7.6	13.8
WODC	444500, 214500	10.9	8.4	14.7	8.8	6.8	13.5
WODC	445500, 214500	12.0	9.2	15.0	9.6	7.5	13.8
WODC	443500, 213500	10.6	8.2	14.6	8.5	6.7	13.5
WODC	443500, 212500	10.4	8.1	14.7	8.4	6.6	13.5
WODC	443500, 211500	10.8	8.3	14.3	8.6	6.8	13.1
WODC	443500, 210500	11.3	8.7	15.3	9.0	7.0	14.1
WODC	441500, 212500	10.3	8.0	14.1	8.3	6.5	12.9
WODC	441500, 211500	10.3	8.0	14.7	8.3	6.5	13.6
WODC	442500, 210500	10.8	8.3	14.3	8.6	6.7	13.1
WODC	442500, 209500	11.4	8.8	15.1	9.2	7.2	13.9
WODC	443500, 209500	12.9	9.8	15.0	10.4	8.0	13.8

Local Authority	Grid Square (X, Y)	2018			2024		
		NO_X ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	NO_X ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
WODC	442500, 208500	12.6	9.6	15.7	10.3	8.0	14.5
WODC	441500, 207500	11.1	8.5	15.0	8.9	7.0	13.8
WODC	441500, 206500	12.8	9.7	15.0	10.7	8.2	13.8
WODC	444500, 210500	11.7	9.0	15.6	9.3	7.3	14.4
WODC	445500, 210500	13.1	10.0	14.9	10.6	8.2	13.7
WODC	446500, 210500	14.1	10.6	15.3	11.3	8.7	14.1
CDC	447500, 210500	16.4	12.2	14.9	13.2	10.0	13.7
CDC	448500, 210500	18.8	13.7	16.4	14.9	11.1	15.2
CDC	449500, 211500	16.6	12.4	17.8	12.6	9.6	16.6
OCC	449500, 210500	17.2	12.8	17.4	13.1	10.0	16.2
OCC	450500, 209500	17.7	13.1	15.4	14.1	10.7	14.1
OCC	450500, 208500	18.7	13.7	15.2	15.1	11.3	13.9
Objective Value		**n/a**	**40**	**40**	**n/a**	**40**	**40**

5.6.6 During 2019 and 2020, OCC had 71 NO_2 passive diffusion tube locations and three automatic monitoring locations which monitor NOx, NO_2, particulates (PM_{10} and $PM_{2.5}$) and ozone (O_3). WODC and CDC had no automatic monitoring locations but had 27 and 42 NO_2 passive diffusion tube locations respectively in 2019. Over the last five to six years, measured annual mean concentrations across these three authorities have had a general overall decreasing trend despite fluctuations between years.

5.6.7 The closest local authority automatic monitoring station is around 2.5km from the modelled road network. There is therefore no PM_{10} monitoring data available within the air quality study area. There are 22 NO_2 diffusion tube locations within 200m of the modelled road network.

5.6.8 Recent NO_2 concentrations at these sites are shown in Table 5-7. Of these sites, in recent years, NAS1, NAS2 and NAS3 exceeded the AQS annual mean objective of 40µg/m^3 in 2018 and NAS1, NAS3, DT71 and DT84 exceeded in 2019. All of these are located in an AQMA. There were recorded exceedances of any air quality objective in West Oxfordshire or Oxford City in 2020.

Table 5-7: Annual mean NO_2 concentrations from selected local authority monitoring sites

Local Authority	Site ID	Grid Reference (X,Y)	Monitoring Type	Site Type	2020 (%) Data Capture	NO_2 Annual Mean Concentration					
						2015	2016	2017	2018	2019	2020
WODC	NAS1	435860, 210285	DT	Roadside	92	**51.9**	**55.7**	**49.9**	**48.2**	**44.8**	36.8
WODC	NAS2	435821, 210243	DT	Roadside	92	-	-	**40.6**	**40.5**	37.1	27.5
WODC	NAS3	435849, 210280	DT	Roadside	92	**42.6**	**51.5**	**43.9**	**41.8**	**41.9**	32.2
WODC	NAS4	435682, 210195	DT	Roadside	92	35.5	33.8	34.4	31.9	33.9	26.2
WODC	NAS5	435897, 210324	DT	Roadside	92	-	-	33.9	35.5	33.1	25.9
WODC	NAS6	435940, 210351	DT	Roadside	92	-	-	33.9	34.4	35.5	26.6
WODC	NAS7	435946, 210326	DT	Roadside	92	-	-	35.8	34.5	34.3	27.0
WODC	NAS8	439304, 210260	DT	Roadside	84	-	-	-	-	31.4	23.9

Local Authority	Site ID	Grid Reference (X,Y)	Monitoring Type	Site Type	2020 (%) Data Capture	NO_2 Annual Mean Concentration 2015	2016	2017	2018	2019	2020
WODC	NAS9	440082, 210435	DT	Roadside	92	-	-	-	-	18.7	14.9
WODC	NAS10	444812, 214669	DT	Roadside	92	30.3	32.0	28.9	27.5	27.0	19.7
WODC	NAS11	445216, 214389	DT	Back-ground	92	9.9	12.5	10.4	10.0	9.0	7.5
WODC	NAS12	444904, 214946	DT	Roadside	84	19.8	24	19.9	17.6	16.6	12.3
WODC	NAS13	444732, 216696	DT	Roadside	34	-	-	-	-	22.3	19.2
WODC	NAS14	444324, 216868	DT	Roadside	92	-	-	-	-	14.5	10.4
WODC	NAS15	444199, 217343	DT	Back-ground	83	-	-	11.0	10.2	22.3	9.1
WODC	NAS40	442753, 209913	DT	Roadside	83	-	-	-	-	18.3	14.6
WODC	NAS41	443658, 210015	DT	Roadside	92	-	-	-	-	16.3	14.1
Oxford City Council	DT27	449824, 210198	DT	Roadside	100		34	29	29	29	22
Oxford City Council	DT28	449856, 210162	DT	Roadside	100		32	26	27	26	22
Oxford City Council	DT29	449530, 210734	DT	Roadside	100		36	28	25	26	20
Oxford City Council	DT71	449617, 210216	DT	Roadside	100			**41**	38	**40**	28
Oxford City Council	DT83	449681, 210263	DT	Roadside	100		-	-	-	**40**	30

Note 1: Numbers in bold exceed the annual mean AQS objective of 40µg/m^3. Note 2: "DT" = diffusion tube, "-" = not measured.

5.6.9 To supplement the local authority monitoring sites, previous scheme-specific monitoring conducted for the Eynsham Park & Ride and Bus Lane Scheme during 2017-2018 was used in the assessment as this includes sites on the A40 itself as well as one site (DT4) selected to provide local background data. The locations and concentrations for these tubes, annualised and bias adjusted for 2017 and 2018, are given in Table 5-8. Site DT6, which exceeded the AQS annual mean objective of 40µg/m^3 in 2017, is within the Oxford City AQMA.

Table 5-8: Annual mean NO_2 concentrations from AECOM site specific diffusion tube sites, 2017-2018

Site ID	Grid Reference (X, Y)	NO_2 Annual Mean Concentration 2017 (µg/m^3)	NO_2 Annual Mean Concentration 2018 (µg/m^3)
DT1	440826, 210392	30.9	29.3
DT2	442390, 210018	20.5	19.4

Site ID	Grid Reference (X, Y)	NO_2 Annual Mean Concentration 2017 (µg/m^3)	NO_2 Annual Mean Concentration 2018 (µg/m^3)
DT3	443311, 209997	15.2	14.4
DT4	443524, 209633	11.6	11.0
DT5	445069, 210385	23.2	22.0
DT6	449259, 210340	**40.2**	38.1

Note1: Numbers in bold exceed the annual mean AQS objective of 40µg/m^3. Note 2: 2017 data bias adjustment factor of 0.88 and annualisation factor of 1.1. 2018 data bias adjustment factor of 0.88 and annualisation factor of 1.05. Automatic monitors used were: Oxford St Ebbes, Reading New Town and London Hillingdon.

5.6.10 Further scheme-specific monitoring was carried out in 2021 to provide supplementary information to inform the assessment and provide an indication of the current baseline conditions rather than for verification given the difference in baseline years. The locations and annualised and bias adjusted NO_2 concentrations to 2020 are shown in Table 5-9.

Table 5-9: Locations for AECOM site specific diffusion tube sites, 2020

Site ID	Grid Reference (X, Y)	Location	Type	NO_2 Annual Mean Concentration 2020 (µg/m^3)
SC1	437534, 209534	Whitehouse Farm	Roadside Site	37.4
SC2	436609, 209277	Barnyard Gate Farm	Roadside Site	24.3
SC3	436834, 209967	The Evenlode Pub	Roadside Site	37.8
SC4	436994, 209043	A40 Cassington	Roadside Site	20.9
SC5	436367, 208719	BP Petrol Station	Roadside Site	35.5
SC6	437679, 209054	Barnyard Gate Country Lane	Background Site	7.8

*note: 6 months data collected in 2021, annualised and bias adjusted to 2020. Note that the annualisation factor is high due to the impact of Covid-19 in 2020 so data should be treated with caution.

5.6.11 The diffusion tube monitoring locations from both AECOM and the local authority networks are indicated in Figure 5-1 in *ES Volume II Appendix 5-B.* These diffusion tube networks provide air quality monitoring data within the air quality study area for the proposed development. This includes locations within AQMAs and along some PCM links.

5.6.12 Compliance risks have been considered in accordance with *DMRB LA 105 Air quality* to establish whether the proposed development would influence the UK's ability to comply with the Air Quality Directive.

5.6.13 There are a number of road links in the Defra's PCM network that are located within the ARN, including roads on the outskirts of Oxford and within and close to Witney. All PCM links are already expected to have annual mean NO_2 concentrations that comply with the EU Limit Value (see Table 5-10). It is noted that the PCM links are for NO_2 only.

Table 5-10: Summary of PCM modelled NO_2 concentrations in the base year and opening year

PCM Link Census ID	Road Name	Annual Mean NO_2 Concentrations (µg/m^3) in 2018	Annual Mean NO_2 Concentrations (µg/m^3) in 2024
7658	A4144	21.7	15.7
7878	A415	18.9	13.7
77524	A4095	20.3	14.5
17037	A4095	13.4	9.9

Public Exposure Receptors

5.6.14 Residential properties and schools in close proximity to the site are primarily clustered around Witney, Eynsham, Long Hanborough and the outskirts of the City of Oxford. However, there are additional isolated farm buildings, including residential properties, located along the A40. There are residential

properties located in close proximity to the proposed development and surrounding road network which could be affected by changes in air quality. These include properties in and around Witney, Eynsham, Oxford and along the A40, as well as local schools (such as; Lynams School, Hanborough Manor CE School, Queen Emma's Primary School, Macnamaras House St Edwards School, Apsley House St Edwards School, Northern House School, William Fletcher Primary School, LVS Oxford SEN School, Bladon CoE Primary School and Madley Brook CP School) as well as care homes and hospitals (Witney Community Hospital, John Radcliffe Hospital and Warneford Hospital).

5.6.15 The air quality assessment considered a total of 96 selected public exposure receptors (33 receptors across the wider network as shown in Table 5-11 with 63 additional receptors in the Witney AQMA as given in Table 5-12) which included a point on existing residential and school buildings. These locations are shown in Figure 5-2 in *ES Volume II Appendix 5-B.*

Table 5-11: Designated Public Exposure Receptors within the Operational Phase Local Air Quality Study Area

ID	X	Y	Class Type	Name	Local Authority	Figure (and sheet)
R1	434862	209474	Residential	183A Queen Emma's Dyke	WODC	5-2 sheet 1
R2	435430	208573	Residential	1 Lakeside	WODC	5-2 sheet 1
R3	442727	209931	Residential	142C Spareacre Lane	WODC	5-2 sheet 1
R4	442378	210145	Residential	Evenlode Farm	WODC	5-2 sheet 1
R5	440835	210440	Residential	Barnard Gate Farm	WODC	5-2 sheet 1
R6	439258	210269	Residential	Whitehouse Farm	WODC	5-2 sheet 1
R7	443515	210045	Residential	Wytham View	WODC	5-2 sheet 1
R8	445077	210377	Residential	2 Eynsham Road	WODC	5-2 sheet 1
R9	441601	214187	Residential	3A Witney Road	WODC	5-2 sheet 1
R10	450292	209430	Education	Lynams School	Oxford City Council	5-2 sheet 1
R11	434862	208691	Education	Little Treasures Academy	WODC	5-2 sheet 1
R12	442639	214303	Residential	131A Main Road	WODC	5-2 sheet 1
R13	442084	214088	Education	Hanborough Manor CE School	WODC	5-2 sheet 1
R14	450581	208953	Education	Macnamaras House St Edwards School	Oxford City Council	5-2 sheet 1
R15	450504	208962	Education	Apsley House St Edwards School	Oxford City Council	5-2 sheet 1
R16	450563	209082	Education	Northern House School	Oxford City Council	5-2 sheet 1
R17	436699	208958	Residential	3 Eton Close	WODC	5-2 sheet 1
R18	449382	210719	Residential	Red Barn Farm	Oxford City Council	5-2 sheet 1
R19	435809	210252	Residential	7 Bridge Street, Witney	WODC	5-2 sheet 1

ID	X	Y	Class Type	Name	Local Authority	Figure (and sheet)
R20	445379	210600	Residential	1A Mill Lane	WODC	5-2 sheet 1
R21	449134	211185	Residential	Loop Farm	CDC	5-2 sheet 1
R22	444879	214906	Education	Bladon CoE Primary School	WODC	5-2 sheet 1
R23	436160	210223	Residential	Newland House Residential Care Home	WODC	5-2 sheet 1
R24	436887	210543	Education	Madley Brook CP School	WODC	5-2 sheet 1
R25	444743	213695	Residential	Burleigh Lodge	WODC	5-2 sheet 1
R26	426834	211038	Residential	Burford Nursing Home	WODC	5-2 sheet 1
R27	443014	219078	Residential	The New Cottage	WODC	5-2 sheet 1
R28	437283	210458	Residential	23 Larkspur Grove	WODC	5-2 sheet 1
R29	441939	213762	Residential	79 Church Road	WODC	5-2 sheet 1
R30	435843	210291	Residential	21 Bridge Street	WODC	5-2 sheet 1
R31	435840	210270	Residential	18 Bridge Street	WODC	5-2 sheet 1
R32	441075	213319	Residential	Wroslyn Road	WODC	5-2 sheet 1
R33	435233	208000	Residential	Beanhill Close	WODC	5-2 sheet 1

5.6.16 To make a judgement of significant effects, modelling was conducted at 63 additional public exposure receptors within the Witney AQMA, namely within the High Street, Bridge Street and some receptors on surrounding roads Newland, Woodgreen, B4022 and Mill Street.

5.6.17 These locations are shown in Figure 5-2 in *ES Volume II Appendix 5-B* and details are provided in Table 5-12 below.

Table 5-12: Additional Witney AQMA Human Receptors

ID	X	Y	Class Type	Street Canyon[1]?	Local Authority	Figure (and sheet)
W1	435738	210189	Residential	N	WODC	5-2 sheet 2
W2	435755	210086	Residential	N	WODC	5-2 sheet 2
W3	435809	210252	Residential	Y	WODC	5-2 sheet 2
W4	435818	210264	Residential	Y	WODC	5-2 sheet 2
W5	435726	210067	Residential	N	WODC	5-2 sheet 2
W6	435738	210087	Residential	N	WODC	5-2 sheet 2
W7	435862	210311	Residential	Y	WODC	5-2 sheet 2
W8	435841	210272	Residential	Y	WODC	5-2 sheet 2

[1] A street canyon is typically a road edged by tall buildings on both sides.

ID	X	Y	Class Type	Street Canyon[1]?	Local Authority	Figure (and sheet)
W9	435838	210268	Residential	Y	WODC	5-2 sheet 2
W10	435865	210298	Residential	Y	WODC	5-2 sheet 2
W11	435866	210314	Residential	Y	WODC	5-2 sheet 2
W12	435826	210274	Residential	Y	WODC	5-2 sheet 2
W13	435847	210278	Residential	Y	WODC	5-2 sheet 2
W14	435851	210283	Residential	Y	WODC	5-2 sheet 2
W15	435971	210383	Residential	N	WODC	5-2 sheet 2
W16	435739	210180	Residential	N	WODC	5-2 sheet 2
W17	435747	210125	Residential	N	WODC	5-2 sheet 2
W18	435737	210078	Residential	N	WODC	5-2 sheet 2
W19	435850	210299	Residential	N	WODC	5-2 sheet 2
W20	435742	210166	Residential	Y	WODC	5-2 sheet 2
W21	435821	210243	Residential	Y	WODC	5-2 sheet 2
W22	435792	210209	Residential	Y	WODC	5-2 sheet 2
W23	435908	210332	Residential	Y	WODC	5-2 sheet 2
W24	435871	210318	Residential	Y	WODC	5-2 sheet 2
W25	435939	210361	Residential	N	WODC	5-2 sheet 2
W26	435722	210059	Residential	N	WODC	5-2 sheet 2
W27	435747	210118	Residential	N	WODC	5-2 sheet 2
W28	435882	210313	Residential	Y	WODC	5-2 sheet 2
W29	435815	210236	Residential	Y	WODC	5-2 sheet 2
W30	435900	210368	Residential	N	WODC	5-2 sheet 2
W31	435859	210292	Residential	Y	WODC	5-2 sheet 2
W32	435717	210049	Residential	N	WODC	5-2 sheet 2
W33	435855	210287	Residential	Y	WODC	5-2 sheet 2
W34	435843	210291	Residential	Y	WODC	5-2 sheet 2
W35	435853	210303	Residential	Y	WODC	5-2 sheet 2
W36	435911	210369	Residential	N	WODC	5-2 sheet 2
W37	435835	210282	Residential	Y	WODC	5-2 sheet 2
W38	435962	210344	Residential	N	WODC	5-2 sheet 2
W39	435830	210278	Residential	Y	WODC	5-2 sheet 2
W40	435783	210199	Residential	Y	WODC	5-2 sheet 2
W41	435763	210159	Residential	N	WODC	5-2 sheet 2
W42	435805	210247	Residential	Y	WODC	5-2 sheet 2
W43	435757	210092	Residential	N	WODC	5-2 sheet 2
W44	435737	210083	Residential	N	WODC	5-2 sheet 2
W45	435835	210264	Residential	Y	WODC	5-2 sheet 2
W46	435813	210257	Residential	Y	WODC	5-2 sheet 2
W47	435921	210356	Residential	N	WODC	5-2 sheet 2
W48	435949	210331	Residential	N	WODC	5-2 sheet 2
W49	435857	210307	Residential	Y	WODC	5-2 sheet 2

ID	X	Y	Class Type	Street Canyon[1]?	Local Authority	Figure (and sheet)
W50	435732	210038	Residential	N	WODC	5-2 sheet 2
W51	435717	210049	Residential	N	WODC	5-2 sheet 2
W52	435788	210227	Residential	Y	WODC	5-2 sheet 2
W53	435759	210096	Residential	N	WODC	5-2 sheet 2
W54	435870	210317	Residential	Y	WODC	5-2 sheet 2
W55	435804	210222	Residential	Y	WODC	5-2 sheet 2
W56	435955	210361	Residential	N	WODC	5-2 sheet 2
W57	435796	210236	Residential	Y	WODC	5-2 sheet 2
W58	435753	210078	Residential	N	WODC	5-2 sheet 2
W59	435827	210253	Residential	Y	WODC	5-2 sheet 2
W60	435959	210347	Residential	N	WODC	5-2 sheet 2
W61	435880	210324	Residential	Y	WODC	5-2 sheet 2
W62	435980	210388	Residential	N	WODC	5-2 sheet 2
W63	435984	210392	Residential	N	WODC	5-2 sheet 2

Ecological Receptors

5.6.18 There are SACs, SSSIs, ancient woodlands and locally designated sites located within 200m of the ARN as well as ancient and veteran trees. In total, 19 designated ecological sites and 4 veteran trees were assessed, as shown in Figure 5-3 sheet 3 in *ES Volume II Appendix 5-B* and in Table 5-13.

5.6.19 It is noted that some SSSIs overlap with the Oxford Meadows SAC. This includes the Pixey and Yarnton Meads SSSI and the Cassington Meadows SSSI. However, of these, only Cassington Meadows SSSI and Oxford Meadows SAC lie within 200m of the ARN, therefore, only these two have been modelled.

5.6.20 The authors of *ES Volume I Chapter 6: Biodiversity* confirmed that all these sites are sensitive to nitrogen deposition and therefore were considered in the operational phase local air quality assessment.

Table 5-13: Designated Ecological Sites within the Operational Phase Local Air Quality Study Area

Site ID	Site Name	Designation	Habitat type (EUNIS code)	Critical load (kg N/ha/yr)	Background Nitrogen deposition (kg N/ha/yr)	Deposition conversion rate (kg N/ha/yr)
T1	Pedunculate Oak	Ancient Tree	Pedunculate Oak	10	29.54	0.29
T2	Crack Willow	Veteran Tree	Crack Willow	10	40.18	0.29
T3	Beech	Veteran Tree	Beech	10	33.32	0.29
T4	Pedunculate Oak	Ancient Tree	Pedunculate Oak	10	29.54	0.29
E1	Oxford Meadows & Oxey Mead & Pixey & Yarnton woods	SAC / SSSI	Low and medium altitude hay meadows	20	22.40	0.14
E2	Eynsham Wood	LWS- Woodland Trust Reserve	Young broadleaved, mixed and yew woodland	10	29.54	0.29
E3	Cassington Meadows	SSSI	Low and medium altitude hay meadows	20	22.40	0.14
E4	Blenheim Park	SSSI	Flood plain grazing marsh, wood	15	29.66	0.29

Site ID	Site Name	Designation	Habitat type (EUNIS code)	Critical load (kg N/ha/yr)	Background Nitrogen deposition (kg N/ha/yr)	Deposition conversion rate (kg N/ha/yr)
E5	Pinsley Wood Ancient Woodland & LWS	Ancient Woodland / LWS	Broadleaved, mixed and yew woodland	10	29.54	0.29
E6	Witney Lake and Meadows	LWS	Acid grassland (as most sensitive)	5	15.68	0.14
E7	Lower Windrush Valley	LWS	Acid grassland (as most sensitive)	5	15.68	0.14
E8	Burleigh Wood Ancient Woodland	Ancient Woodland	Broadleaved, mixed and yew woodland	10	29.54	0.29
E9	Bladon Heath	Ancient Woodland	Broadleaved, mixed and yew woodland	10	29.54	0.29
E10	Grimes Meadow and Little Grimes & Lower Windrush Valley	LWS/Conservation Target Area (CTA)	Acid grassland (as most sensitive)	5	18.62	0.14
E11	Langell Common & Lower Windrush Valley	LWS	Acid grassland (as most sensitive)	5	18.62	0.14
E12	Upper Windrush	CTA	Acid grassland (as most sensitive)	5	17.08	0.14
E13	Meadows west of the Oxford Canal	LWS	Acid grassland (as most sensitive)	5	22.40	0.14
E14	Lower Cherwell Valley	LWS	Acid grassland (as most sensitive)	5	22.40	0.14
E15	Peartree Hill Verges	LWS	Acid grassland (as most sensitive)	5	22.40	0.14
E16	Meadows east of Cassington to Yarton Pits	LWS	Acid grassland (as most sensitive)	5	22.40	0.14
E17	Canalside Meadow-Oxford Canal Marsh	LWS	Acid grassland (as most sensitive)	5	22.40	0.14
E18	Oxford Meadows SAC & Pixey & Yarnton Woods SSSI	SAC/SSSI	Low and medium altitude hay meadows	20	22.40	0.14
E19	Long Hanborough Gravel Pit	SSSI	Acid grassland (as most sensitive)	5	16.80	0.14

Future Baseline

5.6.21 Three 'other developments' have been identified through the preparation of the long list for the cumulative assessment (please refer to *ES Volume I Chapter 16: Cumulative Effects* for details). These four developments will be completed and operational prior to construction of the proposed development starting. These are:

- Application 15/03148/OUT: Residential development of up to 160 dwellings (means of access only);
- Application 17/00609/FUL: Demolition of existing Dutch barns and erection of 10 dwellings together with associated works and formation of vehicular access; and
- Application 16/02369: Extension to existing manufacturing building, erection of two storey manufacturing and office building, two storey research and development building and two storey office building.

5.6.22 Application 15/03148/OUT, Application 16/02369 and Application 17/00609/FUL are included within the forecast developments in the Oxfordshire Strategic Model (OSM), and therefore have been inherently considered as part of the assessment reported in this report.

5.7 Environmental Design and Management

Proposed development design

5.7.1 Environmental considerations have been accounted for during the development of the proposed development, to avoid and reduce potential impacts upon nearby sensitive receptors.

5.7.2 No specific air quality mitigation measures have been incorporated into the design. However, the design aims to maintain or increase the distances between properties and traffic, where possible, and reduces speed limits below the national speed limit to reduce emissions, thus reducing the risks of air quality impacts.

Construction

5.7.3 The proposed development would be subject to measures and procedures as defined within the CEMP. These would include a range of Best Practicable Means (BPM) associated with mitigating potential environmental impacts. The measures detailed within the CEMP is developed by the selected construction contractor which would be implemented for the duration of the construction phase.

5.7.4 The CEMP would include a range of industry standard good practice construction phase dust mitigation measures required during all works undertaken based on the level of construction dust risk at sensitive receptors.

Operation

5.7.5 Significant air quality impacts are not anticipated with the operation of the proposed development and therefore specific air quality mitigation is not considered to be required.

5.8 Assessment of Effects and Significance

Effects during Construction

5.8.1 The proposed development has the potential to affect air quality during construction, in the following ways:

- by increased emissions of dust during construction of the proposed development from dust-generating activities on site;
- by emissions associated with NRMM undertaking construction works; and
- by changes in vehicle activity (flows, speeds and composition) during construction, as a result of temporary traffic management measures and/or additional vehicles travelling to and from the construction site transporting materials, plant and labour.

5.8.2 The types of activities with the potential to generate dust during the construction phase include:

- movement of vehicles;
- enabling works (e.g. verge clearance);
- earthworks;
- minor demolition (e.g. concrete bases and footings);
- excavation and installation of drains and communication ducts;
- construction of retaining walls etc;
- surfacing works;

- central reserve works;
- installation of verge furniture and planting of vegetation; and
- stock piling and storage of materials.

5.8.3 As the proposed development comprises a relatively large road improvement scheme, the construction dust risk potential is considered to be **Large**.

5.8.4 There is potential for adverse effects during the construction of the proposed development in relation to construction dust and plant equipment (e.g. NRMM). However, any impacts on public exposure and ecological receptors related to air quality would be temporary (i.e. during the period of the construction works only).

5.8.5 There are a number of sensitive receptors located within 200m of the site boundary. For a large scheme, sensitivity to potential dust effects is considered to be high for receptors located within 100m of the construction activity and low for receptors located between 100m and 200m. As there are around 1,500 properties and seven designated ecological sites within 100m of the red line boundary, the sensitivity for the proposed development is **High**.

5.8.6 The potential dust effects could be suitably minimised by the application of industry standard mitigation measures and a specific dust management plan, therefore it is anticipated that construction dust would result in a **not significant effect**.

5.8.7 There is potential for adverse effects during construction as a result of construction traffic, predominantly from Heavy Goods Vehicle (HGV) movements. As construction compounds are expected to located along the A40, with access direct from the A40, this would be the primary route for such vehicles. Insufficient information is available on the traffic management during construction traffic to be able to assess the effects during the construction programme.

Effects Once the Proposed Development is Complete and Operational

5.8.8 The proposed development has the potential to affect air quality during operation (positively or negatively), in the following ways:

- by causing changes in vehicle activity (flows, speeds and composition) as a result of the proposed development in proximity to air quality sensitive receptors; and
- by causing changes in the separation distances between road sources of emissions and air quality sensitive receptors.

5.8.9 The proposed development forms part of OCC's wider investment strategy for the A40 between Witney and Duke's Cut, which aims to improve travel times and journey reliability along the A40 corridor, support housing development, stimulate economic growth, improve safety and reduce environmental impacts such as noise and air pollution.

Summary of Overall Effects (Pre-Mitigation) of the Proposed Development

5.8.10 Predicted baseline annual mean NO_2 and PM_{10} concentrations attributable to the proposed development operation were made at 96 public exposure receptors. Opening year NO_2 concentrations were also predicted with and without the proposed development including the changes in concentrations at receptors. NO_x concentrations and nitrogen deposition rates were predicted at 12 ecological habitats across transects and at 4 veteran or ancient trees.

5.8.11 A summary of the results at these selected representative public exposure receptors in key areas are provided in Table 5-14 and a full set of results are presented at all modelled receptor locations in *ES Volume II Appendix 5-B*. Predicted NO_2 concentrations and changes in concentration with the proposed development are presented in Figure 5-4 in *ES Volume II Appendix 5-B.*

Table 5-14: Selected Results of Annual Mean NO_2 Concentrations in Main Areas

Area	Receptor ID	2018 Base NO_2 ($\mu g/m^3$)	LTT_{E6} 2024 DM NO_2 ($\mu g/m^3$)	LTT_{E6} 2024 DS NO_2 ($\mu g/m^3$)	LTT_{E6} 2024 NO_2 Change ($\mu g/m^3$)
Witney	W10	**53.1**	**41.5**	**42.7**	+1.1
A40 (Burford)	R26	28.4	24.8	25.6	+0.8
A40 (Barnard Gate)	R6	35.0	29.6	16.9	-12.7
A40 (Eynsham)	R7	17.6	14.9	15.1	+0.2
A40 (Cassington)	R8	20.2	17.1	18.7	+1.6
Woodcote Roundabout	R18	24.8	22.1	22.3	+0.1
Bladon	R22	16.1	14.1	14.3	+0.1
A44 (Woodstock)	R27	17.9	16.1	16.1	-0.1

Note: Numbers in bold exceed the annual mean AQS objective of $40\mu g/m^3$

5.8.12 Annual mean concentrations of PM_{10} are predicted to be below the annual mean objective at all receptors in the base year with a maximum concentration of $19.9\mu g/m^3$ close to the A40. Consequently, $PM_{2.5}$ concentrations, as a subset of the PM_{10} size fraction, will also be below the annual mean objective of $25\mu g/m^3$. Therefore, these pollutants did not need to be assessed further.

5.8.13 Annual mean concentrations of NO_2 from the original 33 receptors are predicted to be below the annual mean objective at all receptors in the opening year with and without the proposed development, except for R31 within the Witney AQMA.

5.8.14 A further assessment was conducted within the Witney AQMA to make a judgement of the significance of these air quality effects. Modelling was conducted at all relevant buildings within the Witney AQMA; a total of 63 additional receptors.

5.8.15 Annual mean NO_2 concentrations are predicted to be above the objective value with and without the proposed development at a total of five receptors within Witney AQMA in the opening year, with the highest concentration at W10 of $42.7\mu g/m^3$ with the proposed development. 13 receptors in Witney are predicted to experience a small worsening of an air quality objective with five receptors predicted to have a concentration already above the objective and eight receptors are predicted to have a new exceedance with the proposed development. Concentrations at all other receptors were below the annual mean objective.

5.8.16 These increases in NO_2 concentrations are due to a predicted increase in HDVs with the proposed development that re-route through the Witney AQMA via A4095 Burford Road/Bridge Street to avoid congestion and longer journey times on the A40.

5.8.17 In line with the *DMRB LA 105 Air Quality* the significance of impact has been determined against the guideline bands reported in Table 5 5. According to *DMRB LA 105 Air quality*, where the total number of receptors exceeding the NO_2 annual mean concentration standard are less than the lower guideline band for all the six magnitude of change categories, the project is unlikely to trigger a significant air quality effect for human health.

5.8.18 In this study, only one magnitude class is represented (i.e. small magnitude) since the maximum change in concentration predicted in Witney is $1.1\mu g/m^3$. This means that in order to trigger a significant air quality effect, at least 30 receptors should experience a small negative impact. Since the model predicts

that only 13 receptors would experience a small negative impact, it can be concluded that the proposed development will not cause a significant effect on air quality.

5.8.19 In addition, improvements of the Jubilee Way/Oxford Hill junction to optimise the signals and increase capacity are planned before the opening of the proposed development, which would be delivered separately from the proposed development. It is understood from the competent expert for traffic for the proposed development that that this will result in HGVs re-routing from the A40 using the Shores Green junction rather than through the Witney AQMA to access the A40 from the A4095.

5.8.20 A sensitivity test was conducted to consider the impact of the optimisation. The sensitivity test forecast a small reduction of 22 HDV a day in Bridge Street. This resulted in a small reduction in predicted annual mean NO_2 concentrations in the Witney AQMA but that there were still increases due to the proposed development. Full details of the results of this test are provided in *ES Volume II Appendix 5-C.*

5.8.21 A compliance risk assessment has been undertaken for the four PCM links within the ARN. Concentrations were not predicted to exceed the EU Limit Value with or without the proposed development. Therefore, the results of the compliance risk assessment show that there is no reported risk to compliance.

5.8.22 Annual mean NOx concentrations are predicted to be above the annual mean value of 30µg/m^3 at many habitats close to affected routes, and the lower boundary of the nitrogen deposition critical load is exceeded at all ecological habitats, across all transects.

5.8.23 At the Oxford Meadows SAC (receptor E1), there is the potential for a significant effect as the nitrogen deposition rate is 0.2 kg N/ha/yr up to 20m from the edge of the SAC. However, the dose due to the proposed development is imperceptible (i.e. 1% of the critical load or below) throughout the transect and is effectively zero by 50m into the SAC. Further information is provided in *ES Volume I Chapter 6: Biodiversity* and *ES Volume II Appendix 6-Q*.

Effects without the Western Roundabout

5.8.24 The effects of the proposed Western Roundabout not being delivered as part of the proposed development are discussed qualitatively in this section. The Western Roundabout is designed to give access to the Salt Cross Garden Village west of Eynsham and results in a reduction of speed on approach to the roundabout, thereby increasing pollutant emissions. However, as there are no sensitive public exposure or ecological habitats close to the proposed roundabout, there will be no changes to the results of the air quality assessment if this roundabout is not delivered.

Effects without the Eynsham Underpass

5.8.25 The proposed development includes the installation of a pedestrian underpass between the A40 to link Old Witney Road with the south eastern corner of the Eynsham Park and Ride. The A40 would need to be raised to facilitate this. If the height of the A40 was to be altered, there would be no change to the traffic flow or speed, so it is likely that there would be a negligible change to air quality at receptors close to the A40. Modelled concentrations to the east of the Park and Ride close to the A40 are predicted to be well below the objective value in the opening year.

5.9 Mitigation and Monitoring

5.9.1 Based on the assessment, this section outlines the mitigation measures proposed that are over-and-above the environmental design and management measures described previously. Where appropriate, future monitoring and/ or environmental design and management measures required to verify the predictions and/ or fine tune mitigation measures, or ensure potential effects are adequately controlled, are also outlined.

Mitigation and Monitoring during Construction

5.9.2 The CEMP would include a range of industry standard good practice construction phase dust mitigation measures required during all works undertaken based on the level of construction dust risk at sensitive receptors. This includes measures focused on preparing and maintaining the site such as screens, vegetating stockpiles, specifying the type of machinery used, surfacing of haul routes, wheel washing,

as well as specific or additional measures within a Dust Management Plan, potentially including dust monitoring. Adoption of these mitigation measures have the potential to reduce the magnitude of impacts, so they are not significant.

5.9.3 Monitoring of particulates or dust may be required close to dusty activities during construction as part of the CEMP (to be defined in the Dust Management Plan).

Mitigation Once the proposed development is Complete and Operational

5.9.4 There are small changes at 13 receptor locations with concentrations above the air quality objective value. Based on *DMRB LA 105 Air quality*, a conclusion of no significant air quality impacts is made with the operation of the proposed development. Therefore, specific air quality monitoring or mitigation is not considered to be required.

5.10 Residual Effects and Conclusions

5.10.1 There are no residual effects resulting from the proposed development as summarised in Table 5-15 below.

Table 5-15: Air Quality Summary of Potential Effects

Description of Effect	*Sensitivity of Receptor*	*Nature of Effect / Geographic Scale*	*Magnitude of Impact*	*Initial Classification of Effect (with embedded mitigation)*	*Additional Mitigation*	*Residual Effect Significance*
Construction						
Effect of dust pollution on local residents from demolition and construction activities	High	. Temporary (Short Term) and Local	Large	Not Significant	CEMP and Dust Management Plan	Not Significant
Complete and Operational						
Effect of operational emissions	High	Permanent and Local	Small changes at 13 receptors above air quality objective	Not Significant	None	Not Significant

Overall Summary of the Residual Effects of the proposed development

5.10.2 There are no residual effects of the proposed development.

Likely Significant Environmental Effects

5.10.3 There are no likely significant environmental effects of the proposed development.

5.11 References

Ref 5-1 European Union (2001) Clean Air for Europe (CAFE) Programme: Towards a Thematic Strategy for Air Quality. Available at: https://www.eea.europa.eu/themes/air/links/research-projects/clean-air-for-europe-programme-cafe

Ref 5-2 Council of the European Union, (2008); Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe. Available at: https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:32008L0050

Ref 5-3 Council of European Communities, (1999); First Daughter Directive on Limit Values for Sulphur Dioxide, Nitrogen Dioxide and Oxides of Nitrogen, Particulate Matter and Lead in Ambient Air, 1999/30/EC. Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31999L0030

Ref 5-4 Council of European Communities, (2000); Second Daughter Directive on Limit Values for Benzene and Carbon Monoxide in Ambient Air, 2000/69/EC. Available at: http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:32000L0069

Ref 5-5 Council of European Communities, (2002); Third Daughter Directive on Ozone in Ambient Air, 2002/3/EC. Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32002L0003

Ref 5-6 Council of the European Union, (1997); Directive 97/101/EC: Council Decision of 27 January 1997 establishing a reciprocal exchange of information and data from networks and individual stations measuring ambient air pollution within the Member States. Available at: http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A31997D0101

Ref 5-7 H.M. Government, (2016), Air Quality Standards Regulations 2010. Available at: http://www.legislation.gov.uk/uksi/2010/1001/contents/made

Ref 5-8 H.M. Government, (2018), European Union (Withdrawal) Act 2018.

Ref 5-9 H.M. Government (1995). The Environment Act.

Ref 5-10 Department for Environment Food and Rural Affairs (Defra) (2007), The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Volume 1

Ref 5-11 H.M. Government (2000), The Air Quality (England) Regulations 2000 UK Statutory Instrument No. 928, The Stationery Office. Available at: https://www.legislation.gov.uk/uksi/2000/928/contents/made

Ref 5-12 H.M. Government (2002), The Air Quality (England) Regulations 2002, Statutory Instrument No. 3043, The Stationery Office. Available at: https://www.legislation.gov.uk/uksi/2002/3043/contents/made

Ref 5-13 H.M. Government (2010), The Air Quality Standards Regulations. Statutory Instrument No. 1001, The Stationery Office. Available at: https://www.legislation.gov.uk/uksi/2010/1001/contents/made

Ref 5-14 Department for Environment Food and Rural Affairs (Defra) (2019), Clean Air Strategy.

Ref 5-15 H. M. Government, (2018); A Green Future: Our 25 Year Plan to Improve the Environment.

Ref 5-16 Ministry of Housing, Communities and Local Government (MCHLG) (2021) National Planning Policy Framework (NPPF). Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004408/NPPF_JULY_2021.pdf

Ref 5-17 Department for Communities and Local Government (DCLG) (2017) Planning Practice Guidance

Ref 5-18 West Oxfordshire District Council, (2018); West Oxfordshire Local Plan 2031. Available at: https://www.westoxon.gov.uk/media/feyjmpen/local-plan.pdf

Ref 5-19 North Oxfordshire District Council, (2011); Cherwell Local Plan 2011-2031. Available at: https://www.cherwell.gov.uk/info/83/local-plans/376/adopted-cherwell-local-plan-2011-2031-part-1

Ref 5-20 Oxford City Council, (2020); Oxford City Council Local Plan 2016-2036. Available at: https://www.oxford.gov.uk/downloads/file/7380/adopted_oxford_local_plan_2036

Ref 5-21 North Oxfordshire District Council; (1996); Cherwell Local Plan 1996. Available at: https://www.cherwell.gov.uk/info/83/local-plans/373/adopted-local-plan-1996-november-1996

Ref 5-22 West Oxfordshire District Council, (2018); West Oxfordshire Design Guide. Available at: https://www.westoxon.gov.uk/planning-and-building/planning-policy/supplementary-planning-documents/

Ref 5-23 West Oxfordshire District Council, (2018); Eynsham Neighbourhood Plan. Available at: https://www.westoxon.gov.uk/planning-and-building/planning-policy/neighbourhood-planning/made-neighbourhood-plans/

Ref 5-24 Highways England, (2019), DMRB, Sustainability & Environment Appraisal, LA 105: Air Quality

Ref 5-25 Department for Environment, Food and Rural Affairs (Defra) (2016) Local Air Quality Management Technical Guidance (TG16).UK

Ref 5-26 Centre for Ecology and Hydrology (2016) Air Pollution Information System (APIS). Available at: http://www.apis.ac.uk/

Ref 5-27 Woodland Trust (2021) Ancient Tree Inventory. Available at: https://ati.woodlandtrust.org.uk/

Ref 5-28 IAQM (2014) Assessment of dust from demolition and construction. Available at: https://iaqm.co.uk/guidance/

Ref 5-29 Highways England (2020) IAN185-13 Speed Band Emission Factor Toolkit (IAN) version 3.1.

Ref 5-30 Department of Environment, Food and Rural Affairs (2018) 2018-based background maps for NO_X, NO_2, and PM_{10}, available online at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

Ref 5-31 Ordnance Survey (2020) Mastermap

Ref 5-32 Ordnance Survey (2020) Addressbase

Ref 5-33 Google (2020) Google Earth

Ref 5-34 Department for Environment Food and Rural Affairs (Defra) (2020); NO_x to NO_2 calculator Version 8.1 (March 2020). https://laqm.defra.gov.uk/documents/Updated_NOx_from_NO2_Calculator_fno2_v8.1.pdf

Ref 5-35 MAGIC (2020) Multi-Agency Geographic Information for the Countryside. Available at: https://magic.defra.gov.uk/home.htm

Ref 5-36 Department of Environment, Food and Rural Affairs (2019) Defra PCM mapping, available online at: https://uk-air.defra.gov.uk/library/no2ten/2019-no2-pm-projections-from-2017-data

Ref 5-37 West Oxfordshire District Council (2021) 2020 Air Quality Annual Status Report (ASR)

Ref 5-38 Oxford City Council (2021) 2020 Air Quality Annual Status Report (ASR)

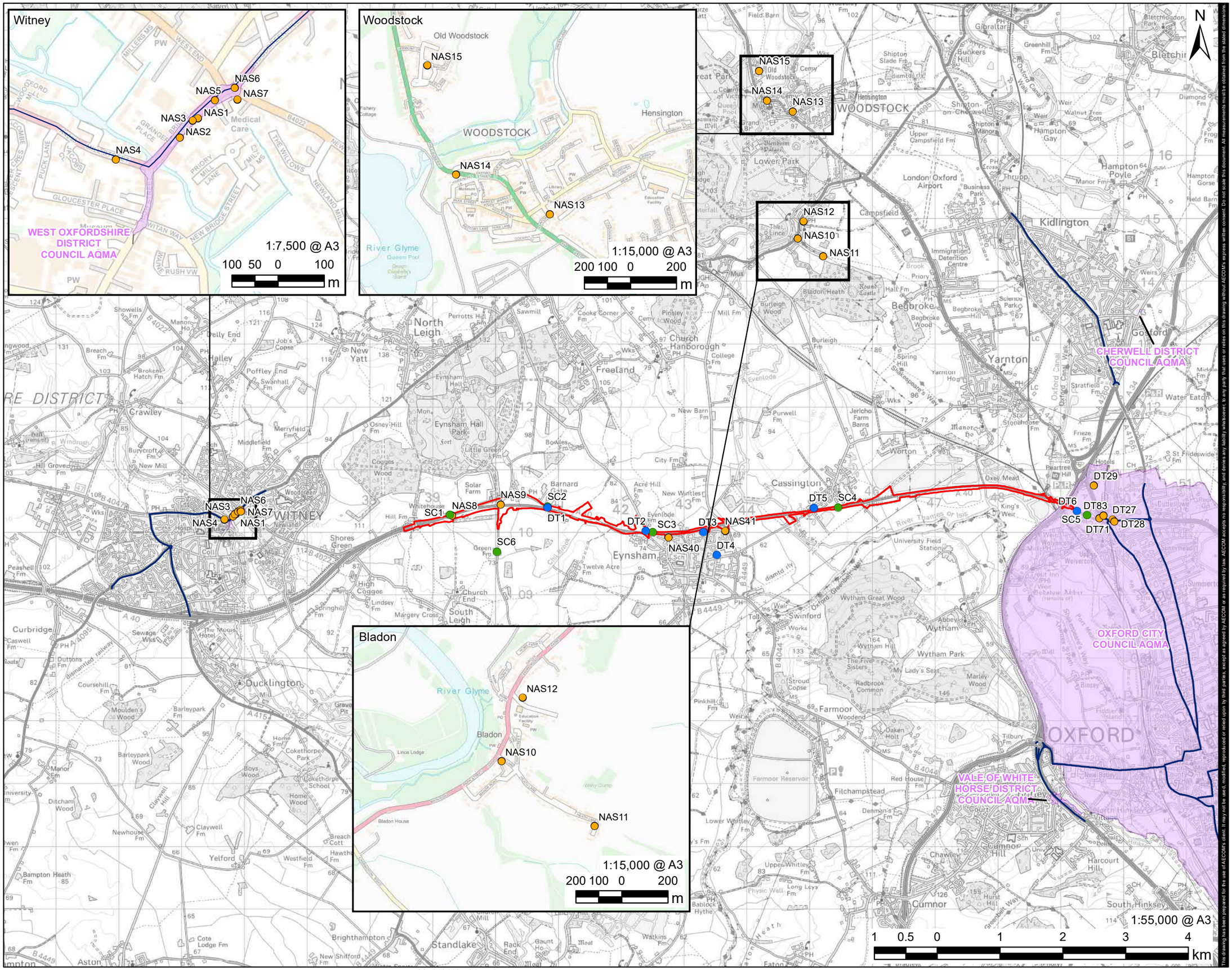
Ref 5-39 Oxford City Council (2020) 2019 Air Quality Annual Status Report (ASR)

Ref 5-40 Cherwell District Council, North Oxfordshire (2020) 2020 Air Quality Annual Status Report (ASR)

Ref 5-41 Woodland trust (2021) Ancient Tree Inventory. Available at: https://ati.woodlandtrust.org.uk/

Drawn: CN Checked: JW Approved: AR Date: 10/11/2021

Revision: 01



AECOM

PROJECT

A40 Smart Corridor

CLIENT

Oxfordshire County Council

CONSULTANT

AECOM Limited
Midpoint
Alencon Link
Basingstoke, RG21 7PP
T: +44-(0)20-7061-7000
www.aecom.com

LEGEND

- Site Boundary
- PCM Road Network
- Air Quality Management Area (AQMA)
- AECOM Diffusion Tube Locations 2017/2018
- AECOM Diffusion Tube Locations 2021
- Local Authority Diffusion Tube Locations

NOTES

ISSUE PURPOSE

ENVIRONMENTAL STATEMENT

PROJECT NUMBER

60615257

SHEET TITLE

Air Quality Study Area

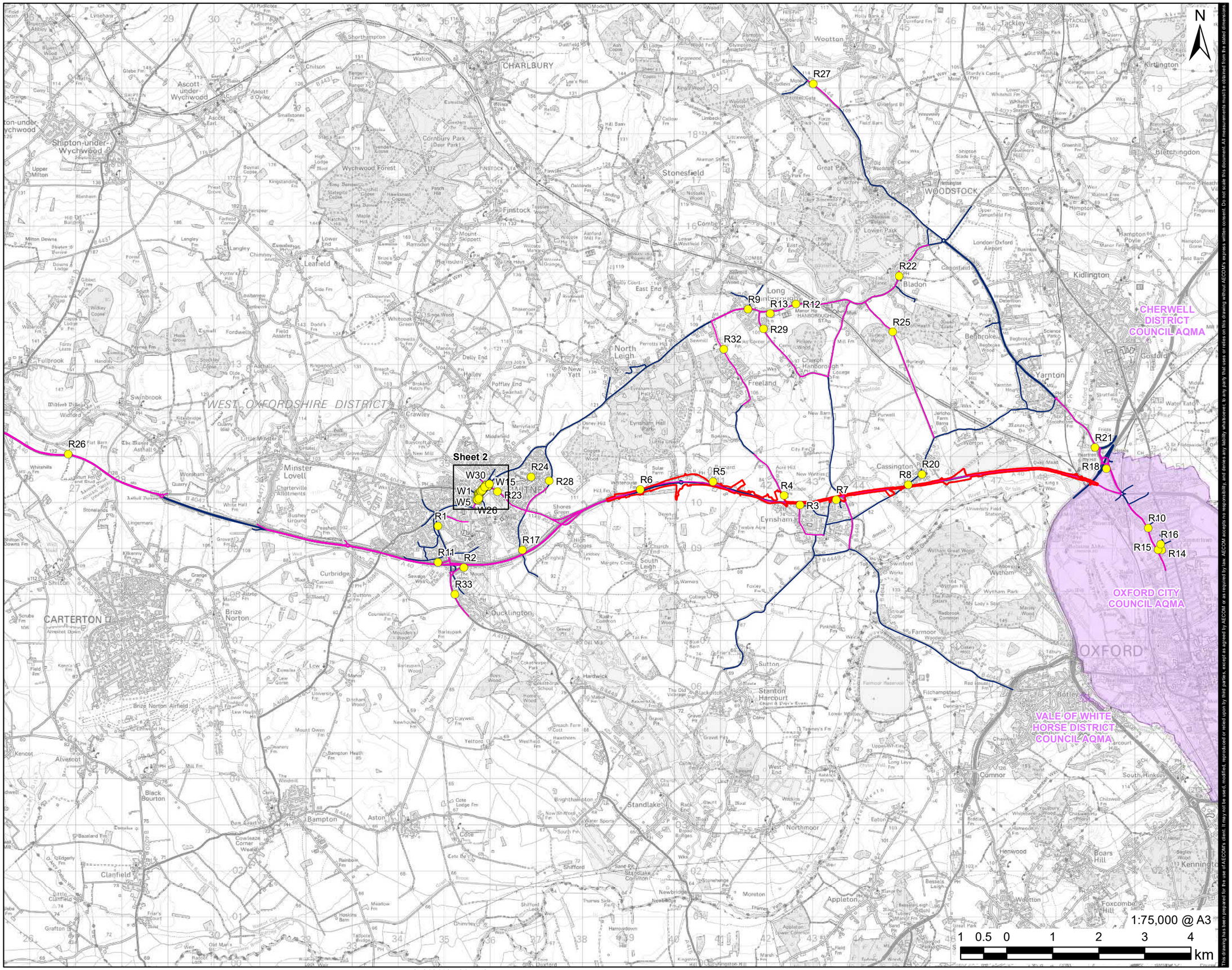
SHEET NUMBER

Figure 5-1

Filename: C:\Users\simon.baldwin\Documents\A40\AirQuality\ES_AQ_FIG1_1_AQMonitoring_Locations_All_A3_210413_r01.mxd

Drawn: CN Checked: JW Approved: AR Date: 10/11/2021

Revision: 01



Filename: C:\Users\simon.baldwin\Documents\A40\AirQuality\ES_AQ_FIG1_2_SH1_PublicExpReceptors_A3_210413_r01.mxd

AECOM

PROJECT

A40 Smart Corridor

CLIENT

Oxfordshire County Council

CONSULTANT

AECOM Limited
Midpoint
Alencon Link
Basingstoke, RG21 7PP
T: +44-(0)20-7061-7000
www.aecom.com

LEGEND

- Site Boundary
- Public Exposure Receptors
- Modelled Road Network
- Affected Road Network
- Air Quality Management Area (AQMA)

NOTES

ISSUE PURPOSE

ENVIRONMENTAL STATEMENT

PROJECT NUMBER

60615257

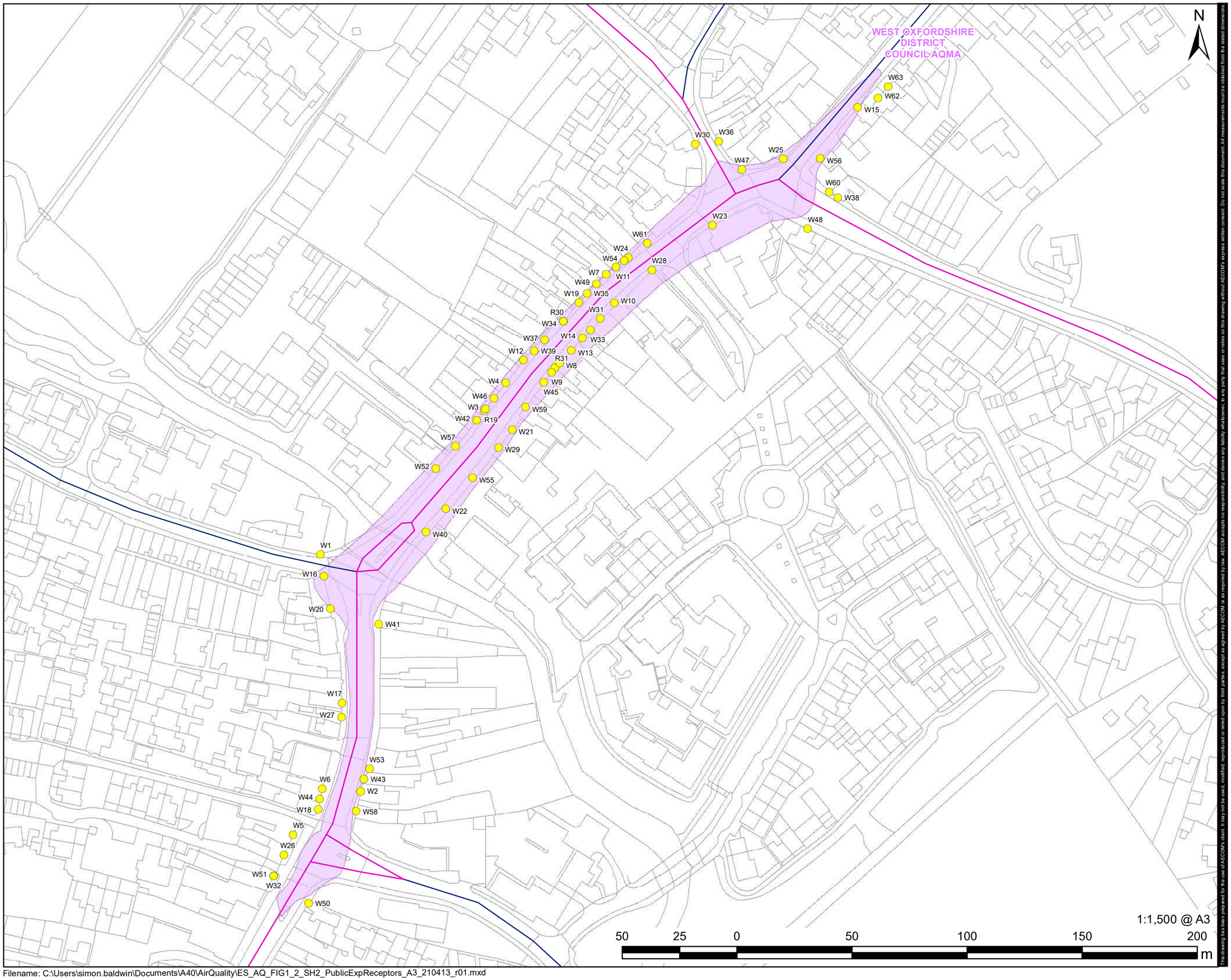
SHEET TITLE

Air Quality Public Exposure Receptors
Sheet 1 of 3

SHEET NUMBER

Figure 5-2

Revision: 01 Drawn: CN Checked: JW Approved: AR Date: 04/11/2021



Filename: C:\Users\simon.baldwin\Documents\A40\AirQuality\ES_AQ_FIG1_2_SH2_PublicExpReceptors_A3_210413_r01.mxd

AECOM

PROJECT

A40 Smart Corridor

CLIENT

Oxfordshire County Council

CONSULTANT

AECOM Limited
Midpoint
Alencon Link
Basingstoke, RG21 7PP
T: +44-(0)20-7061-7000
www.aecom.com

LEGEND

- Modelled Road Network
- Affected Road Network
- Air Quality Management Area (AQMA)
- Public Exposure Receptors

NOTES

ISSUE PURPOSE

ENVIRONMENTAL STATEMENT

PROJECT NUMBER

60615257

SHEET TITLE

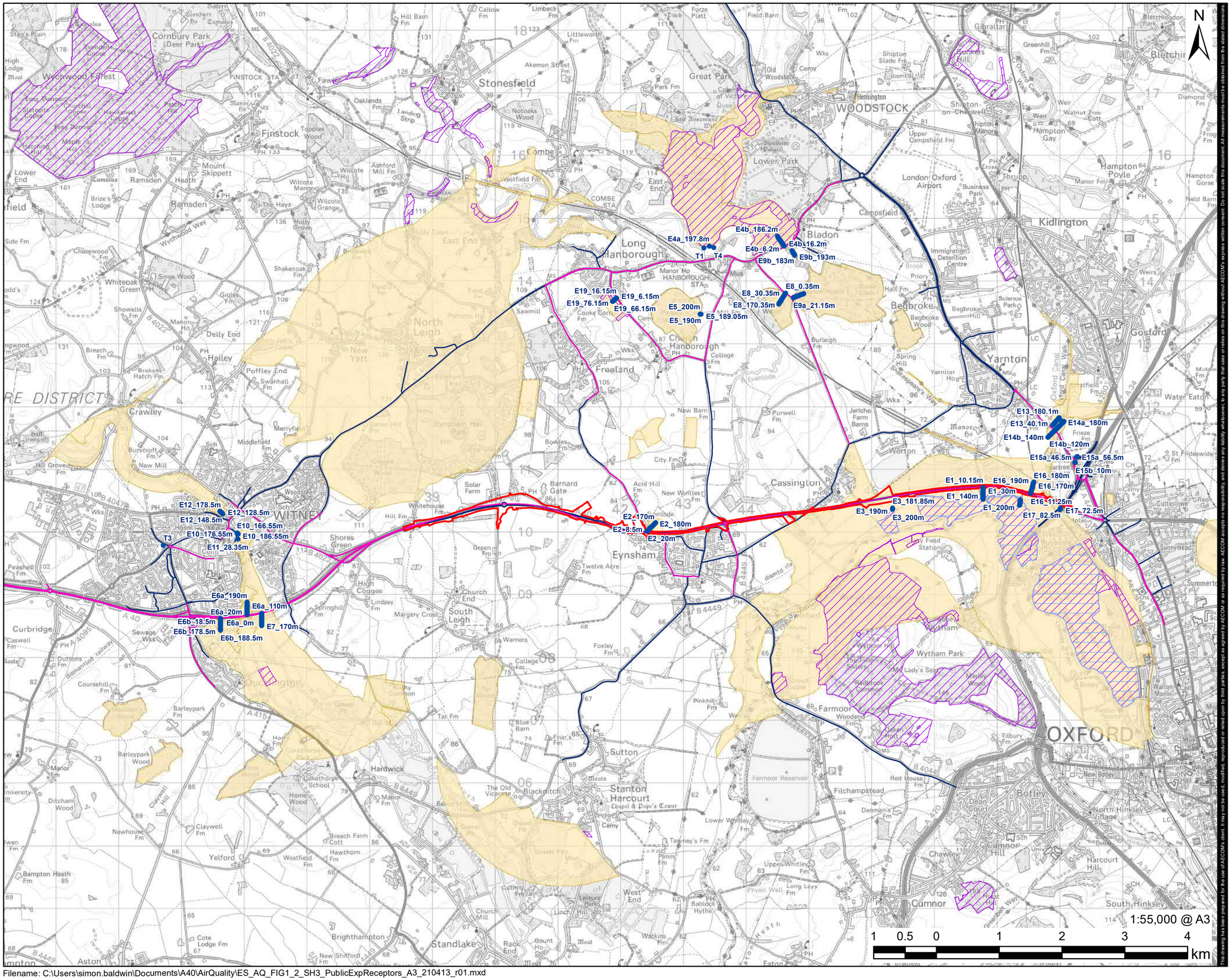
Air Quality Public Exposure Receptors
Sheet 2 of 3

SHEET NUMBER

Figure 5-2

Drawn: CN Checked: JW Approved: AR Date: 10/11/2021

Revision: 01



AECOM

PROJECT

A40 Smart Corridor

CLIENT

Oxfordshire County Council

CONSULTANT

AECOM Limited
Midpoint
Alencon Link
Basingstoke, RG21 7PP
T: +44-(0)20-7061-7000
www.aecom.com

LEGEND

- Site Boundary
- Modelled Road Network
- Affected Road Network
- Ecological Receptor Transect Locations
- Special Area of Conservation (SAC)
- Site of Special Scientific Interest (SSSI)
- Local Ecological Sites (within 5km of Site)

NOTES

ISSUE PURPOSE

ENVIRONMENTAL STATEMENT

PROJECT NUMBER

60615257

SHEET TITLE

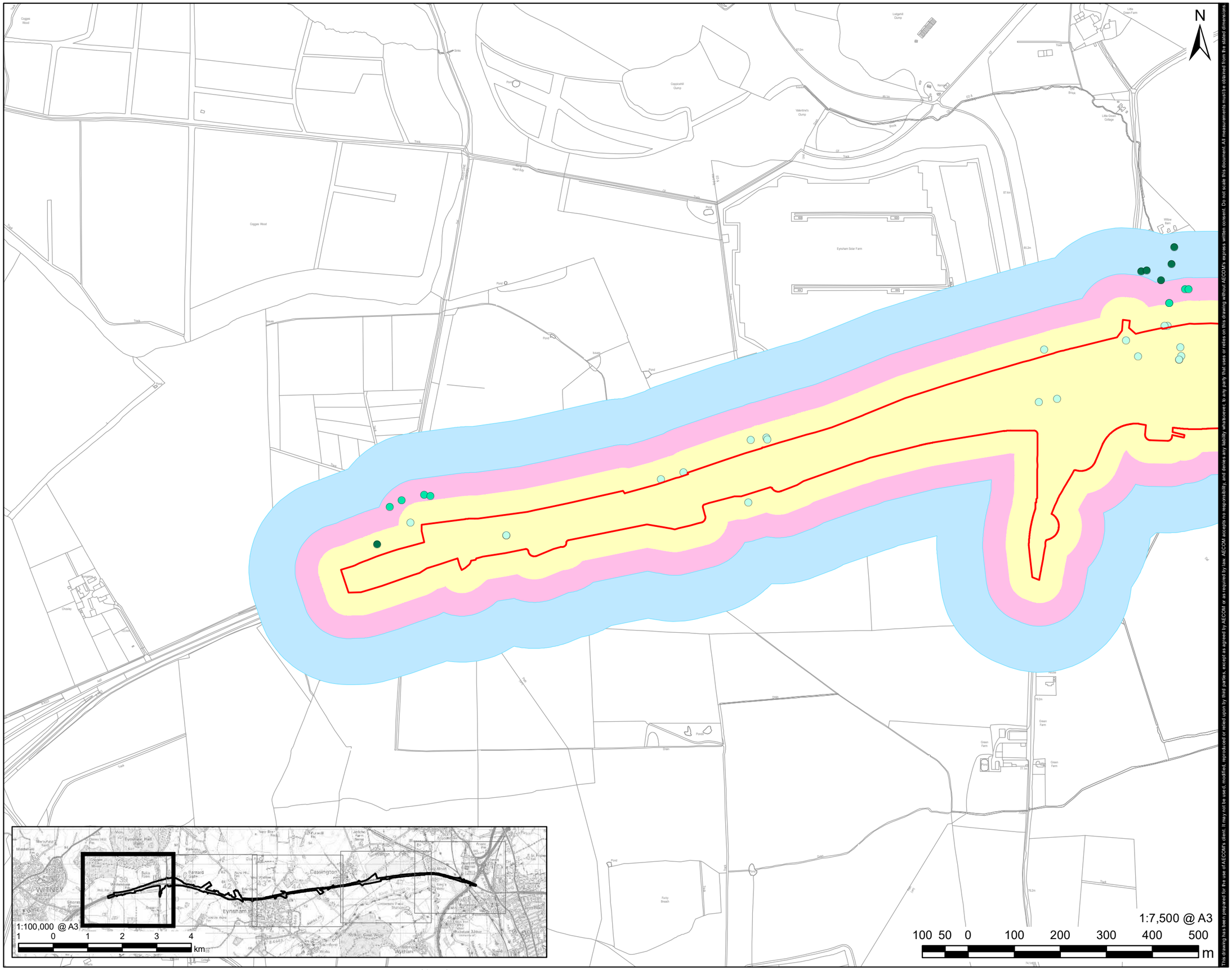
Air Quality Designated Ecological Receptors Sheet 3 of 3

SHEET NUMBER

Figure 5-2

Filename: C:\Users\simon.baldwin\Documents\A40\AirQuality\ES_AQ_FIG1_2_SH3_PublicExpReceptors_A3_210413_r01.mxd

Revision: 01 Drawn: CN Checked: JW Approved: GW Date: 10/11/2021



AECOM

PROJECT

A40 Smart Corridor

CLIENT

Oxfordshire County Council

CONSULTANT

AECOM Limited
Midpoint
Alencon Link
Basingstoke, RG21 7PP
T: +44-(0)20-7061-7000
www.aecom.com

LEGEND

- Site Boundary

Dust Buffer

- 0 - 50m
- 50 - 100m
- 100 - 200m

Human Receptor

- within 50m
- 50 - 100m
- 100 - 200m

Ecological Receptor

- within 50m
- 50 - 100m
- 100 - 200m

NOTES

ISSUE PURPOSE

ENVIRONMENTAL STATEMENT

PROJECT NUMBER

60615257

SHEET TITLE

Air Quality Results – Construction Dust Assessment
Sheet 1 of 5

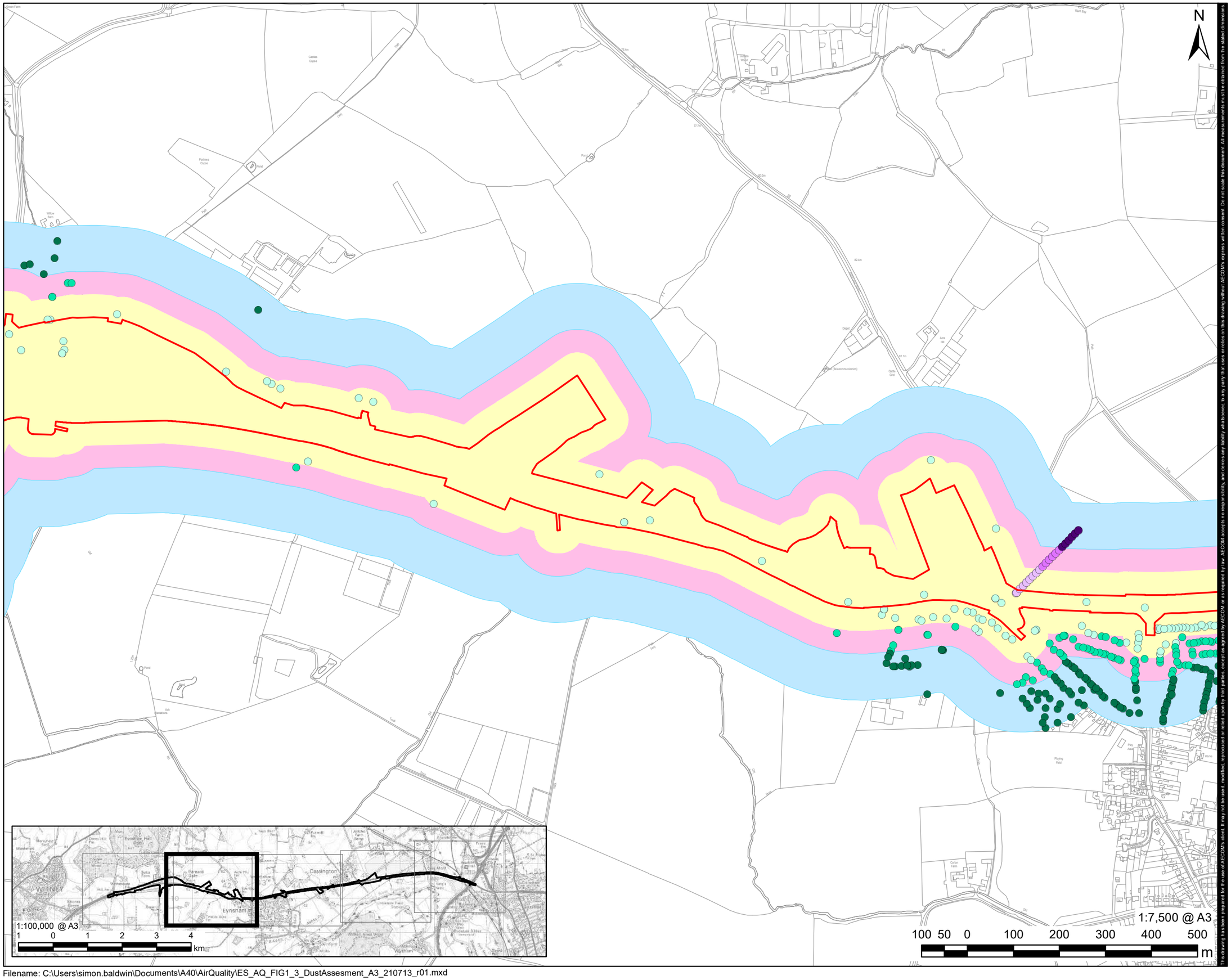
SHEET NUMBER

Figure 5-3

Filename: C:\Users\simon.baldwin\Documents\A40\AirQuality\ES_AQ_FIG1_3_DustAssesment_A3_210713_r01.mxd

Drawn: CN Checked: JW Approved: GW Date: 10/11/2021

Revision: 01



AECOM

PROJECT

A40 Smart Corridor

CLIENT

Oxfordshire County Council

CONSULTANT

AECOM Limited
Midpoint
Alencon Link
Basingstoke, RG21 7PP
T: +44-(0)20-7061-7000
www.aecom.com

LEGEND

- Site Boundary

Dust Buffer

- 0 - 50m
- 50 - 100m
- 100 - 200m

Human Receptor

- within 50m
- 50 - 100m
- 100 - 200m

Ecological Receptor

- within 50m
- 50 - 100m
- 100 - 200m

NOTES

ISSUE PURPOSE

ENVIRONMENTAL STATEMENT

PROJECT NUMBER

60615257

SHEET TITLE

Air Quality Results – Construction Dust Assessment
Sheet 2 of 5

SHEET NUMBER

Figure 5-3

Filename: C:\Users\simon.baldwin\Documents\A40\AirQuality\ES_AQ_FIG1_3_DustAssesment_A3_210713_r01.mxd

Revision: 01 Drawn: CN Checked: JW Approved: GW Date: 10/11/2021

AECOM

PROJECT

A40 Smart Corridor

CLIENT

Oxfordshire County Council

CONSULTANT

AECOM Limited
Midpoint
Alencon Link
Basingstoke, RG21 7PP
T: +44-(0)20-7061-7000
www.aecom.com

LEGEND

- Site Boundary

Dust Buffer

- 0 - 50m
- 50 - 100m
- 100 - 200m

Human Receptor

- within 50m
- 50 - 100m
- 100 - 200m

Ecological Receptor

- within 50m
- 50 - 100m
- 100 - 200m

NOTES

ISSUE PURPOSE

ENVIRONMENTAL STATEMENT

PROJECT NUMBER

60615257

SHEET TITLE

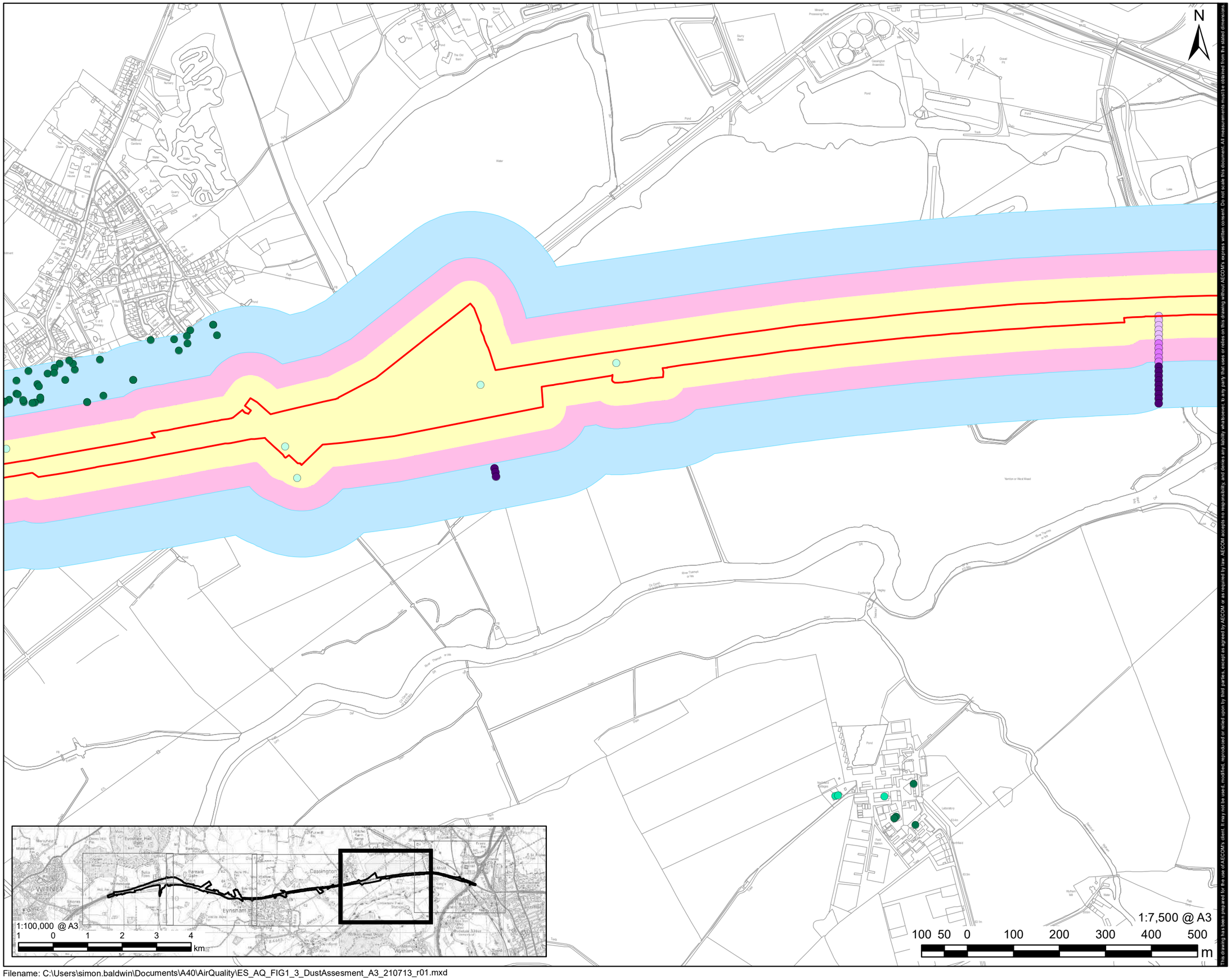
Air Quality Results – Construction Dust Assessment
Sheet 3 of 5

SHEET NUMBER

Figure 5-3

Filename: C:\Users\simon.baldwin\Documents\A40\AirQuality\ES_AQ_FIG1_3_DustAssesment_A3_210713_r01.mxd

Revision: 01 Drawn: CN Checked: JW Approved: GW Date: 10/11/2021



AECOM

PROJECT

A40 Smart Corridor

CLIENT

Oxfordshire County Council

CONSULTANT

AECOM Limited
Midpoint
Alencon Link
Basingstoke, RG21 7PP
T: +44-(0)20-7061-7000
www.aecom.com

LEGEND

- Site Boundary

Dust Buffer

- 0 - 50m
- 50 - 100m
- 100 - 200m

Human Receptor

- within 50m
- 50 - 100m
- 100 - 200m

Ecological Receptor

- within 50m
- 50 - 100m
- 100 - 200m

NOTES

ISSUE PURPOSE

ENVIRONMENTAL STATEMENT

PROJECT NUMBER

60615257

SHEET TITLE

Air Quality Results – Construction Dust Assessment
Sheet 4 of 5

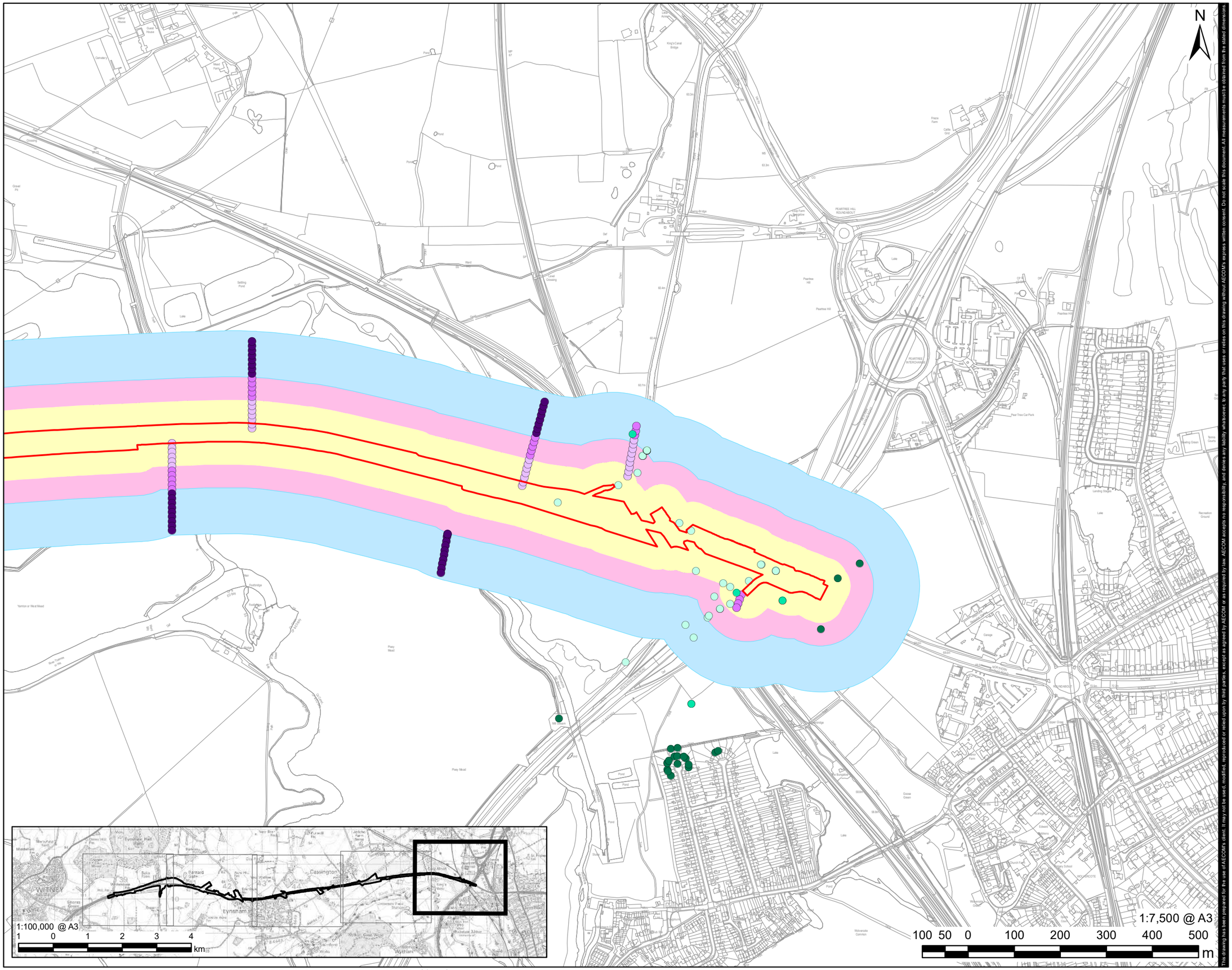
SHEET NUMBER

Figure 5-3

Filename: C:\Users\simon.baldwin\Documents\A40\AirQuality\ES_AQ_FIG1_3_DustAssesment_A3_210713_r01.mxd

Drawn: CN Checked: JW Approved: GW Date: 10/11/2021

Revision: 01



AECOM

PROJECT

A40 Smart Corridor

CLIENT

Oxfordshire County Council

CONSULTANT

AECOM Limited
Midpoint
Alencon Link
Basingstoke, RG21 7PP
T: +44-(0)20-7061-7000
www.aecom.com

LEGEND

- Site Boundary

Dust Buffer

- 0 - 50m
- 50 - 100m
- 100 - 200m

Human Receptor

- within 50m
- 50 - 100m
- 100 - 200m

Ecological Receptor

- within 50m
- 50 - 100m
- 100 - 200m

NOTES

ISSUE PURPOSE

ENVIRONMENTAL STATEMENT

PROJECT NUMBER

60615257

SHEET TITLE

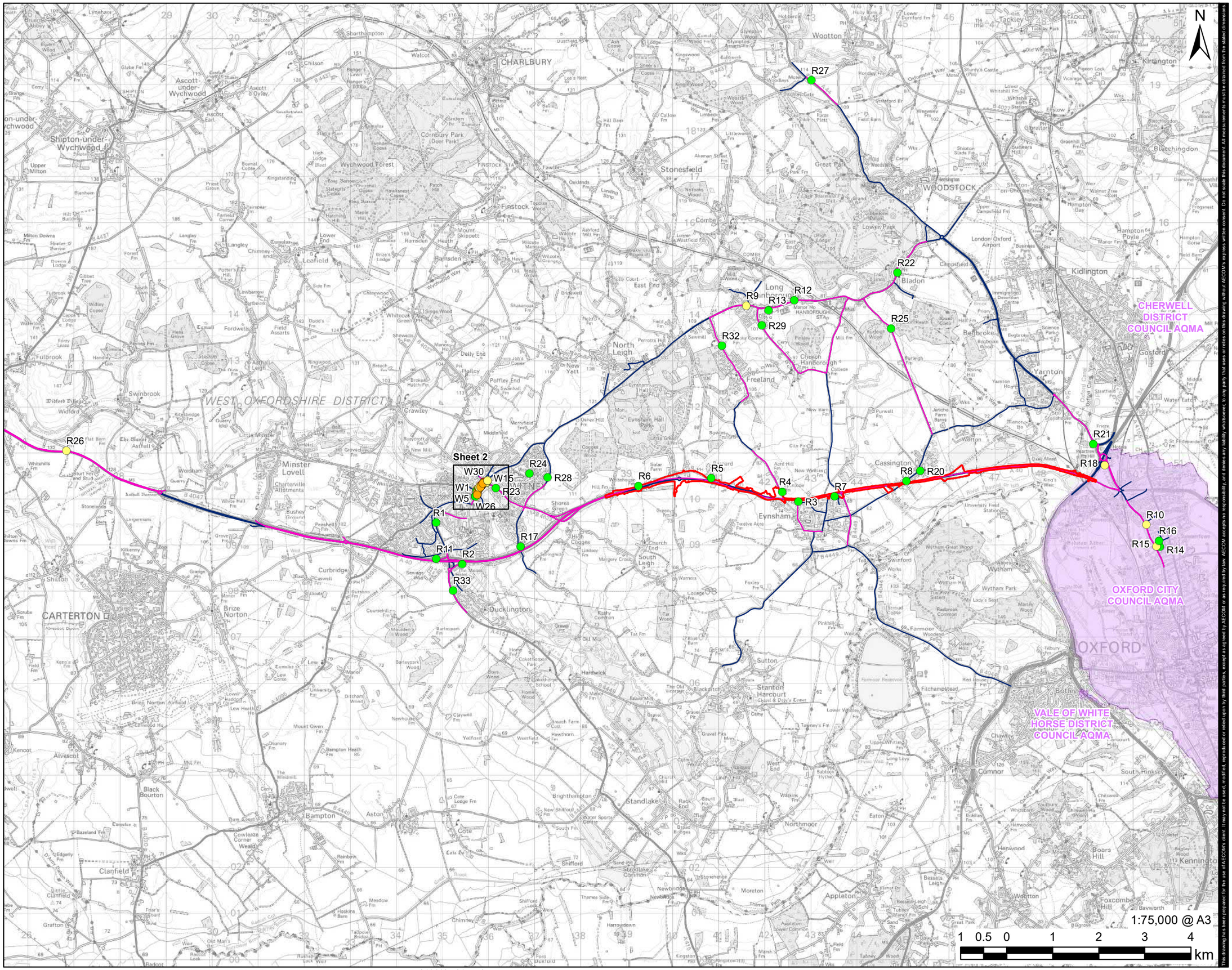
Air Quality Results – Construction Dust Assessment
Sheet 5 of 5

SHEET NUMBER

Figure 5-3

Filename: C:\Users\simon.baldwin\Documents\A40\AirQuality\ES_AQ_FIG1_3_DustAssesment_A3_210713_r01.mxd

Revision: 01 Drawn: CN Checked: JW Approved: AR Date: 10/11/2021



AECOM

PROJECT

A40 Smart Corridor

CLIENT

Oxfordshire County Council

CONSULTANT

AECOM Limited
Midpoint
Alencon Link
Basingstoke, RG21 7PP
T: +44-(0)20-7061-7000
www.aecom.com

LEGEND

- Site Boundary
- Modelled Road Network
- Affected Road Network
- Air Quality Management Area (AQMA)

Public Exposure Receptors - DS Concentration µg/m^3

- <20
- 20 - 30
- 30 - 40
- >40

NOTES

ISSUE PURPOSE

ENVIRONMENTAL STATEMENT

PROJECT NUMBER

60615257

SHEET TITLE

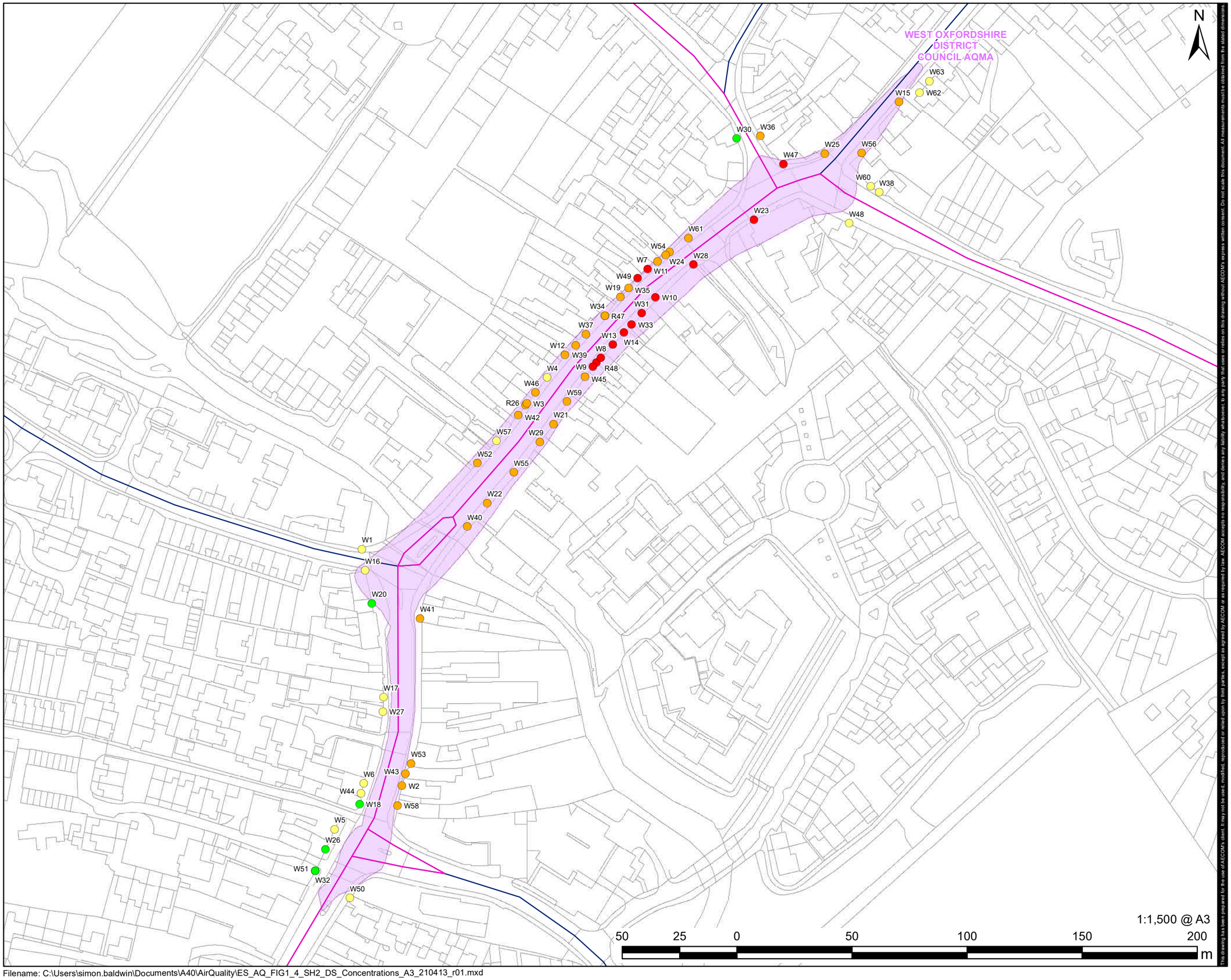
Air Quality Results - Do Something (DS) NO_2 Concentrations
Sheet 1 of 4

SHEET NUMBER

Figure 5-4

Filename: C:\Users\simon.baldwin\Documents\A40\AirQuality\ES_AQ_FIG1_4_SH1_DS_Concentrations_A3_210413_r01.mxd

Revision: 01 Drawn: CN Checked: JW Approved: AR Date: 03/11/2021



AECOM

PROJECT

A40 Smart Corridor

CLIENT

Oxfordshire County Council

CONSULTANT

AECOM Limited
Midpoint
Alencon Link
Basingstoke, RG21 7PP
T: +44-(0)20-7061-7000
www.aecom.com

LEGEND

- Site Boundary
- Modelled Road Network
- Affected Road Network
- Air Quality Management Area (AQMA)

Public Exposure Receptors - DS Concentration µg/m^3

- <20
- 20 - 30
- 30 - 40
- >40

NOTES

ISSUE PURPOSE

ENVIRONMENTAL STATEMENT

PROJECT NUMBER

60615257

SHEET TITLE

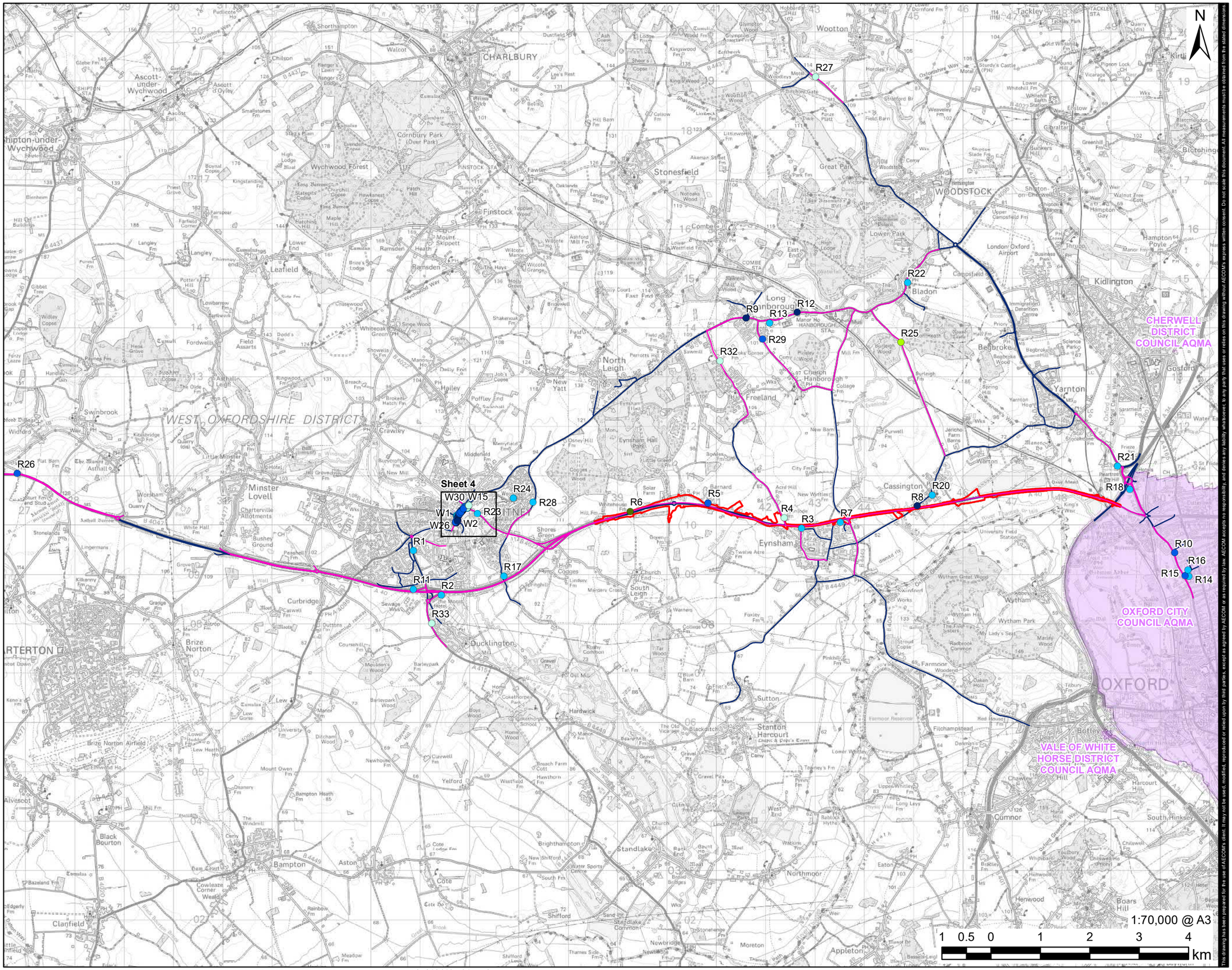
Air Quality Results - Do Something (DS) NO_2 Concentrations
Sheet 2 of 4

SHEET NUMBER

Figure 5-4

Filename: C:\Users\simon.baldwin\Documents\A40\AirQuality\ES_AQ_FIG1_4_SH2_DS_Concentrations_A3_210413_r01.mxd

Revision: 01 Drawn: CN Checked: JW Approved: AR Date: 10/11/2021



AECOM

PROJECT

A40 Smart Corridor

CLIENT

Oxfordshire County Council

CONSULTANT

AECOM Limited
Midpoint
Alencon Link
Basingstoke, RG21 7PP
T: +44-(0)20-7061-7000
www.aecom.com

LEGEND

- Site Boundary
- Modelled Road Network
- Affected Road Network
- Air Quality Management Area (AQMA)

Public Exporsure Receptors DS - DM NO_2 Concentration Changes µg/m³

- >-4
- -4 - -2
- -2 - -0.5
- -0.5 - 0
- 0 - 0.5
- 0.5 - 1
- 1 - 2

NOTES

ISSUE PURPOSE

ENVIRONMENTAL STATEMENT

PROJECT NUMBER

60615257

SHEET TITLE

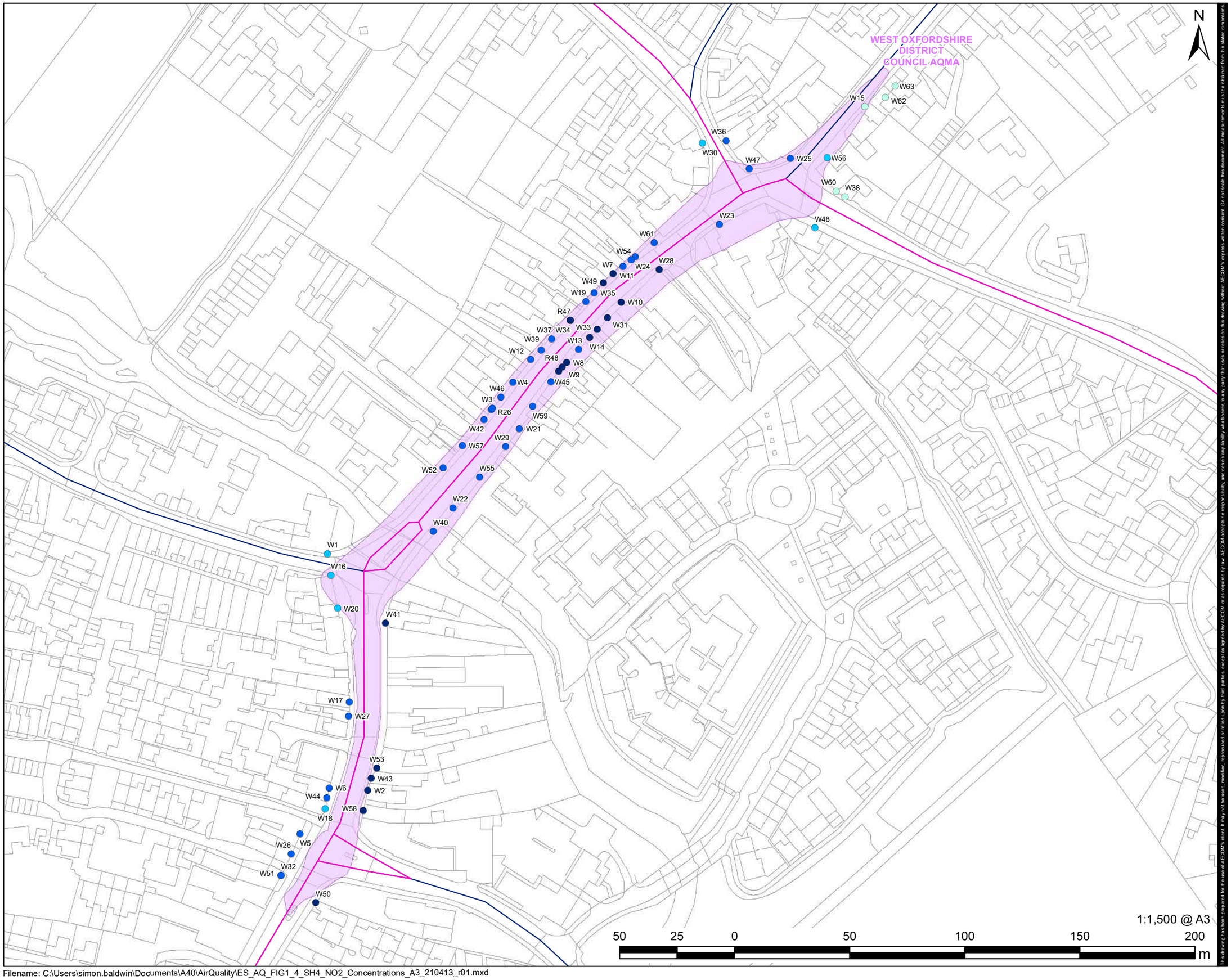
Air Quality Results - Change In NO_2 Concentrations Sheet 3 of 4

SHEET NUMBER

Figure 5-4

Filename: C:\Users\simon.baldwin\Documents\A40\AirQuality\ES_AQ_FIG1_4_SH3_NO2_Concentrations_A3_210413_r01.mxd

Revision: 01 Drawn: CN Checked: JW Approved: AR Date: 03/11/2021



This drawing has been prepared for the use of AECOM's client. It may not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent. Do not scale this document. All measurements must be obtained from the stated dimensions.

AECOM

PROJECT

A40 Smart Corridor

CLIENT

Oxfordshire County Council

CONSULTANT

AECOM Limited
Midpoint
Alencon Link
Basingstoke, RG21 7PP
T: +44-(0)20-7061-7000
www.aecom.com

LEGEND

- Modelled Road Network
- Affected Road Network
- Air Quality Management Area (AQMA)

Public Exposure Receptors DS - DM NO_2 Concentration Changes µg/m^3

- >-4
- -4 - -2
- -2 - -0.5
- -0.5 - 0
- 0 - 0.5
- 0.5 - 1
- 1 - 2

NOTES

ISSUE PURPOSE

ENVIRONMENTAL STATEMENT

PROJECT NUMBER

60615257

SHEET TITLE

Air Quality Results - Change In NO_2 Concentrations
Sheet 4 of 4

SHEET NUMBER

Figure 5-4

Filename: C:\Users\simon.baldwin\Documents\A40\AirQuality\ES_AQ_FIG1_4_SH4_NO2_Concentrations_A3_210413_r01.mxd