West Winch Housing Access Road

Environmental Statement: Chapter 6 – Air Quality

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Document Reference: NCC/3.06.00

Version Number: 001

Date: November 2023

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Glossary of Abbreviations and Defined Terms

Abbreviations

Abbreviation	Description
AADT	Annual Average Daily Traffic
AQMA	Air Quality Management Area.
AQS	Air Quality Strategy.
ASR	Annual status report.
AURN	Automatic Urban and Rural (air quality monitoring) Network, managed by contractors on behalf of Defra.
AW	Ancient Woodland.
BCKLWN	Borough Council of King's Lynn and West Norfolk.
CLd	Critical load.
CLvl	Critical level.
CWS	County Wildlife Site.
Defra	Department for Environment, Food and Rural Affairs.
DM	Do minimum is the future scenario without the Proposed Scheme.
DMRB	Design Manual for Roads and Bridges.
DS	Do something is the future scenario with the Proposed Scheme.
HDV	Heavy duty vehicle.
LAQM	Local Air Quality Management.
NO2	Nitrogen dioxide.
NOx	Nitrogen oxides (includes nitrogen dioxide and nitrogen monoxide).
OCEMP	Outline Construction Environmental Management Plan.
PCM	Pollution Climate Mapping.
PM10	Particulate matter with an aerodynamic diameter of less than 10 micrometres.

Abbreviation	Description
PM2.5	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
VT	Veteran tree.

Glossary

Word	Description
Adjustment	Application of a correction factor to modelled results to account for uncertainties in the model
Accuracy	A measure of how well a set of data fits the true value.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year.
Adjustment	Application of a correction factor to modelled results to account for uncertainties in the model.
Background (concentration/level)	The ambient concentrations of pollutants in a given location/area as modelled by Defra, usually for a 1 x 1km square.
Critical level	The concentration in the atmosphere above which direct adverse effects on receptors such as plants, ecosystems or materials may occur according to present knowledge.

Word	Description
Critical load	A quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge.
Dust	Dust comprises particles typically in the size range 1-75 micrometres (µm) in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials.
Emission rate	The quantity of a pollutant released from a source over a given period of time.
Exceedance	A period of time where the concentrations of a pollutant is greater than the appropriate air quality standard.
Dust	Dust comprises particles typically in the size range 1 to 75 micrometres (µm) in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials
Heavy duty vehicle	All road vehicles with a gross weight of at least 3.5 tonnes.
Model adjustment	Following model verification, the process by which modelled results are amended. This corrects for systematic error.
Verification (modelling)	Comparison of modelled results versus any local monitoring data at relevant locations.

1 Introduction

1.1.1 This chapter reports the outcome of the assessment of likely significant effects arising from the Proposed Scheme regarding air quality.

1.1.2 This chapter (and its associated figures and appendices) is intended to be read as part of the wider Environmental Statement (ES), with particular reference to **Chapter 8: Ecology**, **Chapter 15: Population and Human Health**, **Chapter 16: Traffic and Transport**, **and Chapter 17: Cumulative Effects**.

1.2 Legislative Framework, Policy and Guidance

Legislative Framework

Legislative Framework

1.2.1 The applicable legislative framework in respect of air quality standards is summarised as follows:

- The Environmental Protection Act 1990, Part III in relation to prevention of statutory nuisance being caused by emissions from construction site activities by using Best Practicable Means (**Ref. 6.1**).
- The Environment Act 1995, Part IV (**Ref. 6.2**) which sets out the requirements for a National Air Quality Strategy and places Local Air Quality Management (LAQM) obligations on local authorities to assess and tackle air pollution (**Ref. 6.3**). Where a local authority determines that one or more objective(s) is/are not likely to be met then it is required to declare one or more Air Quality Management Area (AQMA) and produce an Action Plan to improve air quality.
- The Environment Act 2021, Schedule 11 which amends Part IV of the Environment Act 1995 (**Ref. 6.4**) in relation to the LAQM framework. This provision is in place is to strengthen the LAQM framework and enable greater cooperation at local level, bringing more organisations into the process of improving air quality. Air quality targets for $PM_{2.5}$ set under the Act are:

- Annual mean concentration target for a maximum concentration of 10µg/m^3 to be met across England by 2040, with an interim target of 12µg/m^3 for 2028; and
- Population exposure reduction target for a 35% reduction in population exposure by 2040 (compared to a base year of 2018) (**Ref. 6.5**).

- The Air Quality (England) Regulations 2000 (as amended 2002) (**Ref. 6.6**, **Ref. 6.7**), which sets out ambient air quality objectives, as required by the National Air Quality Strategy which was published by the Secretary of State in accordance with section 80 of the Environment Act 1990.
- The Air Quality Standards Regulations 2010 (as amended 2016) (Ref. 6.8, Ref. 6.9), which set mandatory limit values, target values and critical levels for ambient air pollutants to be met at national level.

1.2.2 The relevant ambient air quality standards as included in the above legislation are set out in Table 1-1 below.

Table 1-1 – Relevant air quality standards

Pollutant	Concentration in micrograms per cubic metre (µg/m³)	Number of exceedances allowed in a calendar year	Set in regulations as
Annual mean nitrogen dioxide (NO2)	40	None	Objective and limit value
1-hour (hourly) NO2	200	No more than 18	Objective and limit value
Annual mean nitrogen oxides (NOx)	30	None	Critical level for the protection of vegetation
Annual mean PM10 (coarse particulate matter, less than 10 micrometres in diameter)	40	None	Objective and limit value
Annual mean PM10	50	No more than 35	Objective and limit value
Annual mean PM2.5	20	None	Limit value
Annual mean PM2.5	12	None	Interim target for 2028
Annual mean PM2.5	10	None	Target for 2040

Policy

1.2.3 Relevant policy is summarised in Table 1-2 below.

Table 1-2 – Relevant policy

Policy	Comment
National Planning Policy Framework (as revised December 2023) (**Ref. 6.10**)	The document encompasses the Government's overall planning policies for England and sets out how these are to be applied. The core underpinning principal of the Framework is the presumption in favour of sustainable development, defined as: *"…meeting the needs of the present without compromising the ability of future generations to meet their own needs."* In relation to air quality, the following paragraph in the document are relevant: Paragraph 105, which states "…*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…."*; Paragraph 186, which states *"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. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. 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."*;
National Air Quality Strategy (**Ref. 6.11**)	The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS). The AQS provides a framework for reducing air pollution in the UK with the aim of meeting mandatory limit values.

Guidance

1.2.4 The guidance documents listed in Table 1-3 below have been used in the preparation of this chapter.

Table 1-3 – Relevant guidance

Guidance	Comment
Design Manual for Roads and Bridges document LA 105 Air Quality (LA 105) (Ref. 6.12)	This guidance provides a framework for assessing, mitigating and reporting the effects of motorway and all-purpose trunk road projects on air quality. The LA 105 approach to considering construction phase air quality impacts was adopted as most appropriate for road schemes. This guidance was used to examine the expected changes in road traffic and road alignment to determine the affected road network and operational phase Study Area. The guidance was taken into consideration in determining the significance of effects in relation to human receptors.
A guide to the assessment of air quality impacts on designated nature conservation sites (Ref. 6.13)	This guidance was referred to in determining the operational phase air quality impacts at ecological receptors. Whilst it makes reference to LA 105, it goes further in recommending consideration of ammonia emissions: “5.5.4.2 The DMRB methodology[...] only requires the assessment of NOx emissions and nitrogen deposition. It does not consider NH3 or its contribution to nitrogen deposition. As road transport is a source of ammonia, albeit a small source compared to agriculture at a national level, consideration should be given to including it and its contribution to local nitrogen deposition.” In-combination impacts for the Proposed Scheme opening and design years at designated sites have been predicted following this guidance.
Local Air Quality Management Technical Guidance LAQM.TG(22) (Ref. 6.14)	This guidance includes the relevant good practice procedures for air quality modelling implemented within this assessment.

1.3 Consultation, Scope, Methodology and Significance Criteria

Consultation Undertaken to Date

1.3.1 Table 1-4 provides a summary of the consultation activities undertaken in support of the preparation of this assessment.

Table 1-4 – Summary of consultation undertaken

Body / organisation	Individual / statutory body / organisation	Meeting dates and other forms of consultation	Summary of outcome of discussions
Borough Council of King's Lynn and West Norfolk (BCKLWN)	Senior Environmental Quality Officer (Air)	Email correspondence on 28th September 2023 (consultation letter to BCKLWN), 4th October 2023 (response from BCKLWN confirming agreement and with requests) and 12th October 2023 (clarifications on BCKLWN diffusion tube locations).	The scope and methodology as presented in this chapter were agreed through this consultation. Three requests were made by BCKLWN, which are addressed in this chapter: 1) Sensitive receptors from the allocated housing sites within the West Winch Strategic Growth Area be reviewed and assessed. In response, receptors representing worst case locations closest to the junctions of the Proposed Scheme have been included in the assessment. 2) Modelling should account for the traffic generated from completed housing allocations (4000 homes) as well as any traffic generated as a result of the Proposed Development. In response, these matters are accounted for in the traffic data representing the 2042 design year of the Proposed Scheme. 3) Cumulative impacts and any required mitigation are considered with the King's Lynn AQMAs. In response, the assessment as presented in this chapter has considered this. There would be a reduction in of approximately 150 annual average daily traffic (AADT) movements on the A148 through the Railway Road AQMA and an increase of approximately 50 AADT on Gaywood Road through the Gaywood Clock AQMA. The increase in vehicles through the Gaywood Clock AQMA is insufficient to warrant specific mitigation.

Scope of the Assessment

1.3.2 The scope of this assessment has been established through an ongoing scoping process. Further information can be found in **Chapter 5: Approach to EIA**.

1.3.3 This section provides an update to the scope of the assessment and re-iterates the evidence base for scoping out elements following further iterative assessment.

Effects scoped out of the assessment

1.3.4 The effects listed in Table 1-5 are not likely be significant as a result of the Proposed Scheme, with the incorporation of embedded mitigation measures, and have therefore not been considered within this assessment.

Table 1-5 – Effects scoped out of the assessment

Effect scoped out	Justification
Effects from plant and machinery emissions	Emissions from construction plant and machinery are unlikely to give rise to significant effects. Plant and machinery will be moved around the site. Emissions will be transitory in nature and are consequently unlikely to have a significant impact. Emissions controls are set out in the Outline Construction Environmental Management Plan (OCEMP) – refer to Appendix 18-1.
Effects from vehicle emissions during construction	Scoped out of the assessment on the basis that there are no existing road links where the construction traffic is predicted to exceed LA 105 criteria for road traffic. Roads were scoped out where the predicted change in annual average daily traffic (AADT) flow did not meet either of the following criteria: 1000 vehicles or more in total; or 200 heavy duty vehicles or more. Details of construction traffic can be found in Chapter 16: Traffic and Transport.

Effects scoped into the assessment

Construction Phase

1.3.5 Dust generated during construction impacting human and ecological receptors is considered to have the potential to give rise to likely significant effects and has therefore been considered within this assessment.

Operational Phase

1.3.6 The following elements are considered to have the potential to give rise to likely significant effects during operation of the Proposed Scheme and have therefore been considered within this assessment:

- Emissions from road traffic in relation to human health at human receptors; and
- Emissions from road traffic in relation to sensitive habitats at ecological receptors.

Extent of the Study Area

Construction Phase

1.3.7 For the construction phase, LA 105 requires consideration of an area within 200m from construction activities. **Figure 6-1** shows the construction phase Study Area which was measured from the Proposed Scheme Boundary.

Operational Phase

1.3.8 In line with the requirements of, LA 105 the Study Area was set to 200m corridors either side of the affected road network for the operational phase, which was determined using the adopted criteria set out in LA 105. The criteria are:

- The total AADT flow changes by 1000 or more; or
- The AADT flow of heavy duty vehicle flows changes by 200 or more; or
- Road alignment change of 5m or more.

1.3.9 In terms of the above criteria for the Proposed Scheme, the dominant factor was change in total AADT flow. **Figure 6-2** shows the operational phase Study Area.

Method of Baseline Data Collation

1.3.10 Air quality data for NO_2, PM_{10} and $PM_{2.5}$ were obtained for the Study Area from BCKLWN Air Quality Annual Status Report (**Ref. 6.15**). This was supplemented with data from Defra's Pollution Climate Mapping (PCM) model

(**Ref. 6.16**, **Ref. 6.17**) that are indicative of current and future baseline roadside and background concentrations.

1.4 Assessment Methodology

Construction Phase

1.4.1 The methodology follows the guidance set out in LA 105. The assessment considers the construction dust risk potential (Table 1-6 below) and the sensitivity of the receiving environment in terms of human and ecological receptors (Table 1-7 below). Receptors are shown in **Figure 6-1**. Human receptors include residential premises, schools and hospitals where present within 200m of the Proposed Scheme Boundary. Ecological receptors include non-statutory and statutory designed ecological habitats within 200m of the Proposed Scheme Boundary.

Table 1-6 – Construction dust risk potential

Risk	Examples of the types of project as given in LA 105
Large	Large smart motorway projects, bypass and major junction improvements.
Small	Junction congestion relief projects i.e. small junction improvements, signalling changes. Short smart motorway projects.

Table 1-7 – Receiving environment's sensitivity to construction dust in relation to distance from construction activities

Risk Potential	0 to 50 m	50 to 100 m	100 to 200 m
Large	High	High	Low
Small	High	Low	Low

Operational Phase

1.4.2 The Proposed Scheme is assumed to be open by 2027. The design year for the Proposed Scheme is 2042. The following scenarios were modelled:

- Base year 2019, for model verification and base year concentrations
- Do minimum (DM) 2027 without the Proposed Scheme, but including 300 dwellings within the West Winch Growth Area
- Do something (DS) 2027 with the Proposed Scheme, including 4000 dwellings within the West Winch Growth Area
- DM 2042 without the Proposed Scheme, but including 300 dwellings within the West Winch Growth Area
- DS 2042 with the Proposed Scheme, including 4000 dwellings within the West Winch Growth Area.

1.4.3 The road traffic data used in the assessment can be found in **Appendix 6-1**. The traffic modelling completed for the project has been used to inform the air quality assessment. . For further details refer to **Chapter 16: Traffic and Transport**.

1.4.4 To determine the air quality impacts of the Proposed Scheme and enable the assessment of effects, detailed air quality modelling was undertaken to predict road traffic emissions contributions to concentrations of:

- NO_2, PM_{10} and $PM_{2.5}$ at human receptors; and
- Concentrations of NO_x, NH_3 and nitrogen deposition at ecological receptors.

1.4.5 The projected base year scenarios represent 2019 traffic conditions but assume improvements in vehicle emissions and background air quality as expected for 2027 and 2042. Doing this enables the in-combination air quality impacts to be reported for ecological receptors in support of the assessment presented in **Chapter 8: Ecology**. The projected base year scenarios assume zero growth in traffic from 2019 thereby allowing the air quality impacts of the Proposed Scheme in-combination with other plans and projects to be assessed for 2027 and 2042.

1.4.6 The modelling was undertaken using ADMS (Atmospheric Dispersion Modelling System) -Roads (**Ref. 6.18**) detailed dispersion modelling software.

1.4.7 **Appendix 6-2** provides detailed information on the how road traffic emissions were derived, the dispersion modelling was undertaken, and model outputs were then processed to determine annual mean concentrations of NO_2, PM_{10}, $PM_{2.5}$, NO_x, NH_3 and nitrogen deposition for each scenario. **Appendix 6-2** also includes details of the model verification.

1.4.8 NO_2, PM_{10} and $PM_{2.5}$ concentrations were modelled at a selection of human receptors where the changes in pollutant concentrations with the Proposed Scheme are likely to be greatest, such as at road junctions and within 200m of the Proposed Scheme.

1.4.9 For ecological receptors, NO_x and NH_3 concentrations and nitrogen deposition rates were modelled at 10m intervals along transects within the Study Area of up to 200m from the affected road network.

Significance Criteria

Construction Phase

1.4.10 LA 105 guidance suggests that with suitable best practice construction mitigation in place, which is determined on the basis of professional judgement of the risks, the impacts of construction dust are unlikely to cause a significant air quality effect at either human or ecological receptors.

Operational Phase

Human receptors

1.4.11 For impacts at human receptors, the significance of effect was determined with reference to LA 105 guidance. The guidance applies to impacts on annual mean NO_2 and PM_{10} concentrations in the opening year only, although consideration was also given in this assessment to $PM_{2.5}$ and to impacts in the design year.

1.4.12 According to LA 105, any impacts that occur below the annual mean standard for NO_2 or PM_{10} (see Table 1-1) are deemed ‘not significant’. Impacts that

create, make worse or remove an exceedance of a standard where the change in annual mean NO_2 or PM_{10} concentration is greater than 0.4µg/m^3 may be considered to constitute a significant effect; however, this also depends on the magnitudes of the impact(s) and the numbers of human receptors that are likely to be affected. Furthermore, determination of significant effect also needs consideration of the compliance risk in relation to the standard (as a limit value) for annual mean NO_2 (see Table 1-1), which takes into account future baseline predictions of roadside concentrations from Defra's PCM model. Ultimately, the determination of a significant effect relies on professional judgement of the available evidence.

Ecological receptors

1.4.13 For ecological receptors, consideration of significance expands on LA 105 guidance, which focuses on nitrogen deposition impacts in the opening year only. This assessment considers the impacts on annual mean NO_x and NH_3 concentrations and nitrogen deposition in the opening and design years. The 1% change criterion for ruling out a significant effect from nitrogen deposition as given in LA 105 was also applied for NO_x and NH_3. For NO_x and NH_3, if the change is less than 1% of the relevant critical level then the effect is deemed not significant. For nitrogen deposition, if the change is less than 1% of the relevant lower critical load then effect is deemed not significant. However, where a change is greater than 1% of the relevant critical level/load the effect cannot be discounted as not significant and must be considered by a qualified Ecologist. The significance of effects for ecological receptors is therefore reported in **Chapter 8: Ecology**.

1.5 Baseline Conditions

1.5.1 An overview of baseline air quality conditions is given in Table 2-8 below. Local authority monitoring sites are shown in **Figure 6-5**. Overall, it can be concluded that baseline air quality is good within the Study Area.

Table 1-8 – Baseline conditions

Local Authority	Available Data	Summary
BCKLWN	At the time of writing, the latest air quality monitoring data published by BCKLWN is the 2023 Annual Status Report (Ref. 6.15). There are two AQMAs just outside of the study area. These are Railway Road AQMA and Gaywood Clock AQMA, which were both declared for NO2 by BCKLWN. There are six monitoring sites within the Study Area. All of these locations have been below the 40µg/m3 standard since 2018. The highest recorded concentration in the study area in 2022 was 16.9µg/m3 at location 94. Within the Study Area for the Proposed Scheme, the main sources of NOx are road traffic emissions from the A149, A47 and A10. Defra's predicted roadside NO2 concentrations within the Study Area are well below the 40µg/m3 standard. The highest concentration for 2019 is 21.0µg/m3 on the A149 (census ID 802048405). Defra's predicted background NO2 concentrations are well below the 40µg/m3 standard. There are five monitoring sites for PM10 and four monitoring sites for PM2.5 within the borough. There are no AQMAs for PM10 and PM2.5. PM10 and PM2.5 at all monitoring sites in the borough are well below the respective 40µg/m3 and 20µg/m3 standards. Within the Study Area, the main sources of PM10 and PM2.5 are road traffic generated emissions from the A149, A47 and A10. Defra's predicted background PM10 and PM2.5 concentrations are well below the respective 40µg/m3 and 20µg/m3 standards.	Overall, baseline air quality is likely to be good within the Study Area.

Defra Pollution Climate Mapping

Roadside Concentrations

1.5.2 The PCM model shows no exceedances of limit values for pollutant concentrations within the Study Area in the 2019 base year.

Background Concentrations

1.5.3 Table 1-9 gives background concentrations of NO_2, PM_{10}, and $PM_{2.5}$ for 2019 across the Study Area. The concentrations are well below the respective air quality standards (see Table 1-1) and reflect the predominately rural nature of the Study Area.

Table 1-9 – Background annual mean NO_2, PM_{10} and $PM_{2.5}$ Concentrations (µg/m^3)

Year	Average NO_2 (Minimum, Maximum)	Average PM_{10} (Minimum, Maximum)	Average $PM_{2.5}$ (Minimum, Maximum)
2019	9.4 (14.5, 7.2)	16.1 (17.7, 14.0)	9.6 (10.6, 8.9)
2027	7.3 (10.8, 5.8)	14.9 (16.5, 12.8)	8.7 (9.6, 7.9)
2030	7.0 (10.2, 5.6)	14.9 (16.5, 12.8)	8.7 (9.6, 7.9)

Future Baseline

1.5.4 Pollutant concentrations in the future are anticipated to decrease. This is due to the replacement of older, more polluting vehicles with newer, cleaner vehicles as emissions technologies improve and with the introduction of electric vehicles into the fleet. This is reflected in Defra's PCM model predictions for roadside and background concentrations.

1.5.5 Table 1-9 gives predicted background concentrations of NO_2, PM_{10} and $PM_{2.5}$ for the 2027 opening year, and 2030 across the Study Area. As Defra's projections do not extend beyond 2030 the background concentrations for 2030 were assumed as representative of conditions in the 2042 design year.

1.6 Design and Embedded Best Practice Mitigation Measures

1.6.1 Embedded mitigation measures and best practice included within the Proposed Scheme during construction (OCEMP in **Appendix 18-1**) include:

- Storage of potentially dusty materials as far as practicable from sensitive receptors and with appropriate screening/containment to minimise dust emissions;
- Promptly clear any spillages of potentially dusty materials;
- Minimise material drop heights and avoid double handling;
- Enforcement of vehicle speed limits on site;
- Regular inspection and maintenance of haul road surfaces;
- Damping down of unpaved surfaces during dry conditions to minimise dust emissions;
- Wheel washing;
- Regular inspections of unpaved surfaces;
- Ensure all loads of potentially dusty materials leaving the site are covered to prevent dust emissions/loss of materials during transit;
- Regular inspection and cleansing of all paved surfaces including the public highway in the vicinity of site access points; and
- Use vacuum sweepers for cleaning of hard paving/public highway as deemed required.

1.6.2 There are no design measures to specifically mitigate operational effects in relation to air quality.

1.7 Sensitive receptors

1.7.1 For the construction dust, the sensitivity of the receiving environment is considered (see Table 1-7). There are 335 human receptors, comprising residential properties only, within the construction phase Study Area as shown in **Figure 6-1**; ecological receptors are also shown.

1.7.2 For operational impacts, all receptors are considered to be highly sensitive to changes in pollutant levels.

1.7.3 A total of 58 representative human receptors were included in the assessment for the operational phase. The locations were chosen where changes in pollutant concentrations are likely to be greatest, such as at road junctions and within 200m of the Proposed Scheme. **Figure 6-3** shows the locations of human receptors. Details are given in **Appendix 6-3**.

1.7.4 **Figure 6-4** shows the location and name of ecological sites (six in total) and veteran trees (four in total) within the operational phase Study Area. For each of these, **Figure 6-2** also shows the representative receptor transect locations (eight in total) and associated identification (ID). Each receptor transect comprises a number of points along a straight line extending perpendicular from the centreline of the nearest affected road into the adjacent ecological site. The air quality impacts are determined for each point in each receptor transect. The designated ecological habitats within the operational phase Study Area include:

- One Ancient Woodland (AW);
    - Reffley Wood (receptor ID: ECO8);
- Five County Wildlife Sites (CWS);
    - Rush Meadow (receptor ID: ECO1);
    - West Winch Common (receptor ID: ECO2, ECO3);
    - Sheep's Course Wood (receptor ID: ECO4, ECO5);

- Saddlebow Reedbeds (receptor ID: ECO6);
- Brook Watering Meadow (receptor ID: ECO7);

- Four Veteran Trees (VT);
  - Ancient Tree Inventory ID 11903 (Adjacent to A149 and Reffley Wood AW; receptor ID: ECO9);
  - Ancient Tree Inventory ID 11884 (Adjacent to A149 and Reffley Wood AW; receptor ID: ECO10);
  - Ancient Tree Inventory ID 11882 (Adjacent to A149 and Reffley Wood AW; receptor ID: ECO11); and
  - Ancient Tree Inventory ID 11879 (Adjacent to A149 and Reffley Wood AW; receptor ID: ECO12).

1.7.5 Further locational details of ecological receptors are given in **Appendix 6-5**.

1.8 Assessment of Potential Effects, Mitigation and Residual Effects

Construction Phase

1.8.1 The assessment of dust impacts and effects as a result of the Proposed Scheme is set out in Table 1-10.

Table 1-10 – Assessment of potential effects, additional mitigation, residual effects and monitoring of dust generated during construction

Item	Description
Sensitive receptor	There are 335 residential properties (human receptors) and one ecological receptor (Sheep's Course Wood CWS) within 200m of the Proposed Scheme Boundary. Human and ecological receptors are shown in **Figure 1-1**.
Potential effects	The dust risk potential for the Proposed Scheme is 'large' (Table 1-7). As sensitive receptors are identified within 50m from the construction activities the sensitivity of the receiving environment is 'high'. Without the embedded mitigation measures proposed it is considered that construction dust impacts resulting in soiling or discolouration of exposed surfaces could have a **significant adverse effect** in terms of amenity, particularly at human receptors.
Requirement for additional mitigation	The construction contractor will be required use Best Practicable Means to mitigate potential dust impacts. The requirements are set out in the OCEMP in **Appendix 18.1**. With embedded mitigation in place, no additional mitigation is required.
Residual effects and monitoring	With the embedded mitigation measure proposed the effect associated with construction dust is **not significant**. The contractor will be required to routinely monitor the effectiveness of dust mitigation. Regular inspections will be undertaken to monitor dust. The frequency of monitoring will be increased when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions. This requirement is set out in the OCEMP (**Appendix 18.1**).

Operational Phase

Opening Year 2027

1.8.2 The assessment of impacts in relation to human and ecological receptors in the opening year is set out in Table 1-11 and Table 1-12 respectively. Further information on the requirement for additional mitigation measures and residual effects and monitoring is provided in Chapter 8: Ecology with regards to ecological receptors.

Table 1-11 – Assessment of potential effects, additional mitigation, residual effects and monitoring during operation for human receptors in the opening year

Item	Description
Sensitive receptor	A total of 58 representative human receptors have been included in this assessment. These receptors are shown in **Figure 6-3** with details given in **Appendix 6-3**.
Potential effects	The potential effects of the Proposed Scheme were assessed by comparing the results of the DS scenario against the DM scenario for 2027. All impacts at human receptors are negligible. The most notable impacts are discussed below. Detailed results for all receptors are included in **Appendix 6-5**. The local air quality impacts of the Proposed Scheme in the opening year were assessed looking at the predicted changes in annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations at sensitive human receptors. The predicted annual mean NO_2 concentrations range between 6.7µg/m^3 and 11.9µg/m^3 in the DM scenario, and between 6.8µg/m^3 and 12.2µg/m^3 in the DS scenario. The concentrations are well below the standard of 40µg/m^3 at all receptors in both scenarios. The biggest increase with the Proposed Scheme is +1.8µg/m^3 at potential receptors P2 and P3. The biggest reduction is -2.9µg/m^3 at receptor R24. The predicted annual mean PM_{10} concentrations range between 14.7µg/m^3 and 16.8µg/m^3 in the DM scenario, and between 14.8µg/m^3 and 16.9µg/m^3 in the DS scenario. The annual mean PM_{10} concentrations are well below the standard of 40µg/m^3 at all receptors in both scenarios. The biggest increase with the Proposed Scheme is +0.6µg/m^3 at potential receptor P3. The biggest reduction is -1.0µg/m^3 at receptor R35. The predicted annual mean $PM_{2.5}$ concentrations range between 8.6µg/m^3 and 9.8µg/m^3 in the DM scenario, and between 8.7µg/m^3 and 9.9µg/m^3 in the DS scenario. The predicted annual mean $PM_{2.5}$ concentrations are well below the standard of 20µg/m^3 at all receptors in both scenarios. The predicted 2027 concentrations are below the UK interim target of 12µg/m^3 (to be achieved by 2028). The biggest increase with the Proposed Scheme is +0.3µg/m^3 at potential receptors P1, P2, P3, P4, P5 and P7. The biggest reduction is -0.6µg/m^3 at receptor R35.
Requirement for additional mitigation	The change in pollutant concentrations attributable to traffic emissions associated with the operational phase of the Proposed Scheme (i.e., impacts on local air quality) are negligible (themselves not warranting the need for mitigation). Therefore, no additional mitigation for impacts at human receptors is required.
Residual effects and monitoring	As none of the predicted concentrations exceed any of the standards in either the DM or DS scenarios, the effect in relation to human receptors is **not significant**. No monitoring is required.

Table 1-12 – Assessment of potential effects, additional mitigation, residual effects and monitoring during operation for ecological receptors in the opening year

Item	Description
Sensitive receptor	There are six ecological sites and four veteran trees within 200m of roads that are expected to experience increased or reduced traffic levels as a result of the Proposed Scheme. Of the six ecological sites, several are affected by the changes on the affected road network in different locations, for example Sheep's Course Wood CWS which is bordered by both the Proposed Scheme and the A47 on opposite sides of the site. The impacts on annual mean NO_x, NH_3 and nitrogen deposition have been predicted at all affected locations totalling eight transects of receptor points extending up to 200m within affected designated sites and four receptor points each representative of an affected veteran tree. These receptors are shown in **Figure 6-4** with details given in **Appendix 6-4**.
Potential effects	The potential impacts of the Proposed Scheme were assessed by comparing the DS scenario against the DM scenario. The impacts are summarised for each pollutant below. Detailed results for all transect receptors are included in **Appendix 6-6**. **Impacts on NO_x (Critical Level, CLvl = 30µg/m^3)** • CLvl not exceeded. Negligible impacts. All designated sites: ECO1, ECO2, ECO3, ECO4, ECO5, ECO6, ECO7, ECO8,. All veteran trees: ECO9, ECO10, ECO11, ECO12. **Impacts on NH_3 (CLvl = 1µg/m^3 for sites with lichen and bryophytes, or 3µg/m^3 for sites with higher plants only)** • CLvl not exceeded. Negligible impacts. One transect: ECO6. No veteran trees. • CLvl exceeded but no increases above 1% of lower CLd. Negligible adverse impacts. Some beneficial impacts. Four transects: ECO1, ECO2, ECO3, ECO8. Four veteran trees: ECO9, ECO10, ECO11, ECO12. • CLvl exceeded and increases above 1% of lower CLd. Adverse impacts are not negligible. No beneficial impacts. Two transects: ECO4, ECO5. No veteran trees. **Impacts on nitrogen deposition** • Lower Critical Load (CLd) exceeded but no increases above 1% of lower CLd. Negligible adverse impacts. Some beneficial impacts. Five transects: ECO1, ECO2, ECO3, ECO6, ECO8. Four veteran trees: ECO9, ECO10, ECO11, ECO12. • Lower CLd exceeded and increases above 1% of lower CLd. Adverse impacts are not negligible. No beneficial impacts. Two transects: ECO4, ECO5. No veteran trees.
Additional mitigation	Refer to **Chapter 8: Ecology**.
Residual effects and monitoring	Refer to **Chapter 8: Ecology**.

Design Year 2042

1.8.3 The assessment of impacts in relation to human and ecological receptors in the opening year is set out in Table 1-13 and Table 1-14 respectively. Further information on the requirement for additional mitigation measures and residual effects and monitoring is provided in Chapter 8: Ecology with regards to ecological receptors.

Table 1-13 – Assessment of potential effects, additional mitigation, residual effects and monitoring during operation for human receptors in the design year

Item	Description
Sensitive receptor	A total of 58 representative human receptors have been included in this assessment. These receptors are shown in **Figure 6-3** with details given in **Appendix 6-3**.
Potential effects	The potential effects of the Proposed Scheme were assessed by comparing the results of the DS scenario against the DM scenario for 2042. All impacts at human receptors are negligible. The most notable impacts are discussed below. Detailed results for all receptors are included in **Appendix 6-5**. The local air quality impacts of the Proposed Scheme in the opening year were assessed looking at the predicted changes in annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations at sensitive human receptors. The predicted annual mean NO_2 concentrations range between 6.6µg/m^3 and 11.2µg/m^3 in the DM scenario, and between 6.9µg/m^3 and 12.3µg/m^3 in the DS scenario. The concentrations are well below the standard of 40µg/m^3 at all receptors in both scenarios. The biggest increase with the Proposed Scheme is +2.0µg/m^3 at potential receptor P3. The biggest reduction is -1.7µg/m^3 at receptor R35. The predicted annual mean PM_{10} concentrations range between 14.7µg/m^3 and 16.9µg/m^3 in the DM scenario, and between 14.8µg/m^3 and 16.9µg/m^3 in the DS scenario. The annual mean PM_{10} concentrations are well below the standard of 40µg/m^3 at all receptors in both scenarios. The biggest increase with the Proposed Scheme is +0.8µg/m^3 at potential receptor P3. The biggest reduction is -0.8µg/m^3 at receptor R35. The predicted annual mean $PM_{2.5}$ concentrations range between 8.6µg/m^3 and 9.8µg/m^3 in the DM scenario, and between 8.7µg/m^3 and 9.9µg/m^3 in the DS scenario. The predicted annual mean $PM_{2.5}$ concentrations are well below the standard of 20µg/m^3 at all receptors in both scenarios. The predicted 2027 concentrations are below the UK interim target of 12µg/m^3 (to be achieved by 2028). The biggest increase with the Proposed Scheme is +0.4µg/m^3 at potential receptors P1, P2, P3, P4, P5 and P7. The biggest reduction is -0.5µg/m^3 at receptor R35.
Additional mitigation	The change in pollutant concentrations attributable to traffic emissions associated with the operational phase of the Proposed Scheme (i.e. impacts on local air quality) are negligible (themselves not warranting the need for mitigation). Therefore, no additional mitigation for impacts at human receptors.
Residual effects and monitoring	As none of the predicted concentrations exceed any of the standards in either the DM or DS scenarios, the effect in relation to human receptors is **not significant**. No monitoring is required.

Table 1-14 – Assessment of potential effects, additional mitigation, residual effects and monitoring during operation of ecological receptors in the design year

Item	Description
Sensitive receptor	There are six designated sites and four veteran trees within 200m of roads that are expected to experience increased or reduced traffic levels as a result of the Proposed Scheme. Of the six designated sites, several are affected by the changes on the affected road network in different locations, for example Sheep's Course Wood CWS which is bordered by both the Scheme and the A47 on opposite sides of the site. The impacts on annual mean NO_x, NH_3 and nitrogen deposition have been predicted at all affected locations totalling eight transects of receptor points extending up to 200m within affected designated sites and 4 receptor points each representative of an affected veteran tree. These receptors are shown in **Figure 6-4**, with details given in **Appendix 6-4**.
Potential effects	The potential impacts of the Proposed Scheme were assessed by comparing the DS scenario against the DM scenario. The impacts are summarised for each pollutant below. Detailed results for all transect receptors are included in **Appendix 6-6**. **Impacts on NO_x (CLvl = 30µg/m^3)** • CLvl not exceeded. Negligible impacts. All designated sites: ECO1, ECO2, ECO3, ECO4, ECO5, ECO6, ECO7, ECO8. All veteran trees: ECO9, ECO10, ECO11, ECO12. **Impacts on NH_3 (CLvl = 1µg/m^3 for sites with lichen and bryophytes, or 3µg/m^3 for sites with higher plants only)** • CLvl exceeded but no increases above 1% of lower CLd. Negligible adverse impacts. Four transects: ECO1, ECO2, ECO3, ECO4, ECO5, ECO6, ECO7, ECO8. Four veteran trees: ECO9, ECO10, ECO11, ECO12. **Impacts on nitrogen deposition** • Lower CLd exceeded but no increases above 1% of lower CLd. Negligible adverse impacts. Some beneficial impacts. Seven transects: ECO1, ECO2, ECO3, ECO5, ECO6, ECO7, ECO8. Four veteran trees: ECO9, ECO10, ECO11, ECO12. • Lower CLd exceeded and increases above 1% of lower CLd. Adverse impacts are not negligible. No beneficial impacts. One transect: ECO4. No veteran trees.
Additional mitigation	Refer to **Chapter 8: Ecology**.
Residual effects and monitoring	Refer to **Chapter 8: Ecology**.

In-combination Impacts at Designated Sites

1.8.4 To support **Chapter 8: Ecology**, for ecological receptors, in-combination air quality impacts as a consequence of the Proposed Scheme were determined. The in-combination air quality impacts were determined by comparing the DS scenario with the projected base year scenario for both the opening year and design year.

Opening Year 2027

1.8.5 The assessment of in-combination impacts in relation to ecological receptors in the opening year are given in Table 1-15. Further information on the requirement for additional mitigation measures and residual effects and monitoring is provided in Chapter 8: Ecology.

Table 1-15 – Assessment of potential in-combination impacts, additional mitigation, residual effects and monitoring during operation for ecological receptors in the opening year

Item	Description
Sensitive receptor	There are six designated sites and four veteran trees within 200m of roads that are expected to experience increased or reduced traffic levels as a result of the Proposed Scheme. Of the six designated sites, several are affected by the changes on the affected road network in different locations, for example Sheep's Course Wood CWS which is bordered by both the Scheme and the A47 on opposite sides of the site. The impacts on annual mean NO_x, NH_3 and nitrogen deposition have been predicted at all affected locations totalling 8 transects of receptor points extending up to 200m within affected designated sites and 4 receptor points each representative of an affected veteran tree. These receptors are shown in **Figure 6-4**, with details given in **Appendix 6-4**.
Potential effects	The potential impacts of the Proposed Scheme were assessed by comparing the DS scenario against the DM scenario. The impacts are summarised for each pollutant below. Detailed results for all transect receptors are included in **Appendix 6-6**. **Impacts on NO_x (CLvl = 30µg/m^3)** • CLvl not exceeded. Negligible impacts. All designated sites: ECO1, ECO2, ECO3, ECO4, ECO5, ECO6, ECO7, ECO8. All veteran trees: ECO9, ECO10, ECO11, ECO12. **Impacts on NH_3 (CLvl = 1µg/m^3 for sites with lichen and bryophytes, or 3µg/m^3 for sites with higher plants only)** • CLvl not exceeded. Negligible impacts. One transect: ECO6. No veteran trees. • CLvl exceeded but no increases above 1% of lower CLd. Negligible adverse impacts. Some beneficial impacts. Four transects: ECO1, ECO2, ECO3, ECO8. Four veteran trees: ECO9, ECO10, ECO11, ECO12. • CLvl exceeded and increases above 1% of lower CLd. Adverse impacts are not negligible. No beneficial impacts. Two transects: ECO4, ECO5. No veteran trees. **Impacts on nitrogen deposition** • Lower CLd exceeded but no increases above 1% of lower CLd. Negligible adverse impacts. Some beneficial impacts. Five transects: ECO1, ECO2, ECO3, ECO6, ECO8. Four veteran trees: ECO9, ECO10, ECO11, ECO12. • Lower CLd exceeded and increases above 1% of lower CLd. Adverse impacts are not negligible. No beneficial impacts. Two transects: ECO4, ECO5. No veteran trees.
Additional mitigation	Refer to **Chapter 8: Ecology**.
Residual effects and monitoring	Refer to **Chapter 8: Ecology**.

Design Year 2042

1.8.6 The assessment of in-combination impacts in relation to ecological receptors in the design year are given in Table 1-16. Further information on the requirement for additional mitigation measures and residual effects and monitoring is provided in Chapter 8: Ecology with regards to ecological receptors.

Table 1-16 – Assessment of potential in-combination impacts, additional mitigation, residual effects and monitoring during operation for ecological receptors in the opening year

Item	Description
Sensitive receptor	There are six designated sites and four veteran trees within 200m of roads that are expected to experience increased or reduced traffic levels as a result of the Proposed Scheme. Of the six designated sites, several are affected by the changes on the affected road network in different locations, for example Sheep's Course Wood CWS which is bordered by both the Scheme and the A47 on opposite sides of the site. The impacts on annual mean NO_x, NH_3 and nitrogen deposition have been predicted at all affected locations totalling eight transects of receptor points extending up to 200m within affected designated sites and 4 receptor points each representative of an affected veteran tree. These receptors are shown in **Figure 6-4**, with details given in **Appendix 6-4**.
Potential effects	The potential impacts of the Proposed Scheme were assessed by comparing the DS scenario against the DM scenario. The impacts are summarised for each pollutant below. Detailed results for all transect receptors are included in **Appendix 6-6**. **Impacts on NO_x (CLvl = 30µg/m^3)** • CLvl not exceeded. Negligible impacts. All designated sites: ECO1, ECO2, ECO3, ECO4, ECO5, ECO6, ECO7, ECO8,. All veteran trees: ECO9, ECO10, ECO11, ECO12. **Impacts on NH_3 (CLvl = 1µg/m^3 for sites with lichen and bryophytes, or 3µg/m^3 for sites with higher plants only)** • CLvl exceeded but no increases above 1% of lower CLd. Negligible adverse impacts. Some beneficial impacts. Four transects: ECO1, ECO2, ECO3, ECO8. Four veteran trees: ECO9, ECO10, ECO11, ECO12. • CLvl exceeded and increases above 1% of lower CLd. Adverse impacts are not negligible. No beneficial impacts. Two transects: ECO4, ECO5. No veteran trees. **Impacts on nitrogen deposition** • Lower CLd exceeded but no increases above 1% of lower CLd. Negligible adverse impacts. Some beneficial impacts. Six transects: ECO1, ECO2, ECO3, ECO6, ECO7, ECO8. Four veteran trees: ECO9, ECO10, ECO11, ECO12. • Lower CLd exceeded and increases above 1% of lower CLd. Adverse impacts are not negligible. No beneficial impacts. Two transects: ECO4, ECO5. No veteran trees.
Additional mitigation	Refer to **Chapter 8: Ecology**.
Residual effects and monitoring	Refer to **Chapter 8: Ecology**.

1.8.7 Climate change will affect weather patterns which will in-turn affect the distribution and levels of air pollutants. Although it is not practicable to quantify how climate change may affect the findings presented in this chapter, it is considered that the influence of climate change is unlikely to substantially affect the findings of this assessment within the timeframe considered.

1.8.8 The Royal Society's report on 'Effects of net-zero policies and climate change on air quality' (**Ref. 6.19**) examines how climate change itself is expected to affect air quality in the UK by influencing emissions, atmospheric processing and transport of many pollutants. Some of these effects are likely to slow or temporarily reverse improvements in air quality. They are also likely to lead to changes in the seasonal and geographical variations in air quality. For example, pollution events associated with secondary pollutants such as ozone and particulate matter are likely to become more common in summer months with more frequent intense heatwaves. Conversely, pollution events in warmer winter months may reduce as stable atmospheric conditions under which pollution levels build up become less frequent.

1.8.9 The report also sets out how the changing climate, and the net zero measures adopted to limit further warming, can affect air quality. Net zero measures will generally compliment measures being implemented through legislation and policy to improve local air quality, with progressive reductions in vehicle exhaust emissions of NO_x and particulate matter (PM_{10} and $PM_{2.5}$) expected to continue for the foreseeable future.

1.8.10 The Royal Society's report also discusses possible mitigation measures that could be considered alongside net zero measures to limit negative effects on air quality.

1.8.11 Assuming the worst case, in the absence of large reductions in NH_3 from agriculture, UK emissions of NH_3 are expected to grow in response to a warmer climate and will dominate nitrogen deposition and effects on ecosystems and contribute substantially to human health effects (due to secondary particulate formation) through to 2050. This has been reflected in

the air quality assessment as far as is possible by assuming the 'business as usual' scenario for background NH_3 concentrations as set out in the Joint Nature Conservation Committee's Nitrogen Futures report (**Ref. 6.20**). This scenario assumes that emissions steadily increase. The air quality modelling undertaken for the assessment has also assumed vehicle emissions factors which predict higher NH_3 emissions in the future compared to the present day (see **Appendix 6-2**).

1.9 Cumulative Effects

1.9.1 In the construction phase, there is one committed development within the construction phase study area. This is a warehouse extension adjacent to the south of the Site boundary (23/00195/F). As this is an extension to an existing warehouse, construction activities will likely be small and unlikely to present a significant cumulative effect if these activities occur at the same time as the construction phase of the Proposed Scheme.

1.9.2 In the operational phase, all committed developments that are likely to cause substantial increases in traffic have been included in the traffic data, and so have been included in the air quality assessment and effects are **not significant**.

1.10 Opportunities for Environmental Enhancement

1.10.1 No opportunities for enhancement have been identified.

1.11 Difficulties and Uncertainties

1.11.1 As the final construction traffic routing has not yet been confirmed, consideration of this aspect has been considered using the best information available at the time.

1.11.2 The dispersion model software used in this assessment simulates complex real-world processes in necessarily simplified terms and as such there will always be some uncertainty in the predictions. This is minimised as far as possible by the software developer regularly upgrading and testing (validating)

model algorithms to improve predictive ability. Additionally, dispersion modelling relies on input data that are generated by actual measurement (such as meteorological data) or modelling (such as traffic data) with some degree of inherent uncertainty.

1.11.3 For the modelling with ADMS-Roads, to minimise the degree of uncertainty as far as possible, base year model predictions have been verified against roadside monitoring data, with adjustment to compensate for systematic under-estimation of pollutant concentrations. This process can never eliminate uncertainty entirely from subsequent adjusted model predictions but does ensure that the assessment undertaken is as robust as possible.

1.11.4 Due to limited Defra projections, the vehicle emissions factors and background pollution data used in this assessment are not forecast beyond 2030. The impacts that are reported in this chapter for 2027 (human and ecological receptors) and 2042 (ecological receptors only) therefore don't account for any improvements in air quality that would occur after 2030. In this respect, the air quality assessment is conservative.

1.12 Summary

1.12.1 Table 1-17 provides a summary of the findings of the assessment.

Table 1-17 – Summary of air quality effects

Receptor	Potential Effects	Additional Mitigation	Residual Effects	Monitoring
Construction Phase There are 335 residential properties (human receptors) and one ecological receptor (Sheep's Course Wood CWS) with 200m of the Proposed Scheme Boundary.	The dust risk potential for the Proposed Scheme with embedded mitigation is 'not significant'.	No additional mitigation is required.	Negligible (not significant) T / D / ST	The construction contractor will be required to routinely monitor the effectiveness of dust mitigation by undertaking and recording regular visual inspections during dry conditions. This requirement is set out in the OCEMP.
Operational Phase Human receptors (residential properties)	Changes in ambient concentrations of NO2, PM10 and PM2.5. All impacts (adverse and beneficial) are predicted to be negligible.	None.	Negligible (not significant) P / D / LT	None
Operational Phase Ecological receptors	Changes in ambient concentrations of NOx and NH3, and nitrogen deposition. Beneficial and adverse impacts have been predicted.	Refer to Chapter 8: Ecology	Refer to Chapter 8: Ecology	Refer to Chapter 8: Ecology

Key to table:

P / T = Permanent or Temporary, D / I = Direct or Indirect, ST / MT / LT = Short Term, Medium Term or Long Term, N/A = Not Applicable

1.13 References

- Reference 6.1: Environmental Protection Act 1990 [accessed October 2023]
- Reference 6.2: Environment Act 1995 [accessed October 2023]
- Reference 6.3: Department for Environment, Food and Rural Affairs (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volume 1). [accessed October 2023]
- Reference 6.4: Environment Act 2021 [accessed October 2023]
- Reference 6.5: Air Quality Targets in the Environment Act [accessed October 2023]
- Reference 6.6: The Air Quality (England) Regulations 2000 [accessed October 2023]
- Reference 6.7: The Air Quality (England) (Amendment) Regulations 2002 [accessed October 2023]
- Reference 6.8: The Air Quality Standards Regulations 2010 [accessed October 2023]
- Reference 6.9: The Air Quality Standards (Amendment) Regulations 2016 [accessed October 2023]
- Reference 6.10: Ministry of Housing, Communities and Local Government, (2023). National Planning Policy Framework. [accessed December 2023]
- Reference 6.11: Defra (2007). The Air Quality Strategy for England, Scotland, Wales and Northern Ireland [accessed October 2023]
- Reference 6.12: National Highways (2019) Design Manual for Roads and Bridges Sustainability & Environment Appraisal LA 105 Air Quality [accessed October 2023]

- Reference 6.13: Holman et al (2020). A guide to the assessment of air quality impacts on designated nature conservation sites – version 1.1, Institute of Air Quality Management, London [accessed October 2023]
- Reference 6.14: Defra (2022) Local Air Quality Management Technical Guidance (TG22) [accessed October 2023]
- Reference 6.15: BCKLWN (2023) Annual Status Report 2023 [accessed October 2023]
- Reference 6.16: Defra Background Mapping data for local authorities – 2018 [accessed October 2023]
- Reference 6.17: Defra 2020 NO2 and PM projections data (2018 reference year) [accessed October 2023]
- Reference 6.18: Cambridge Environmental Research Consultants Ltd, ADMS-Roads [accessed October 2023]
- Reference 6.19: The Royal Society (2021) Effects of net-zero policies and climate change on air quality [accessed October 2023]
- Reference 6.20: Joint Nature Conservation Committee (2020) Nitrogen Futures, JNCC Report No. 665 [accessed October 2023]

Figure 1-1 - Construction Phase Study Area

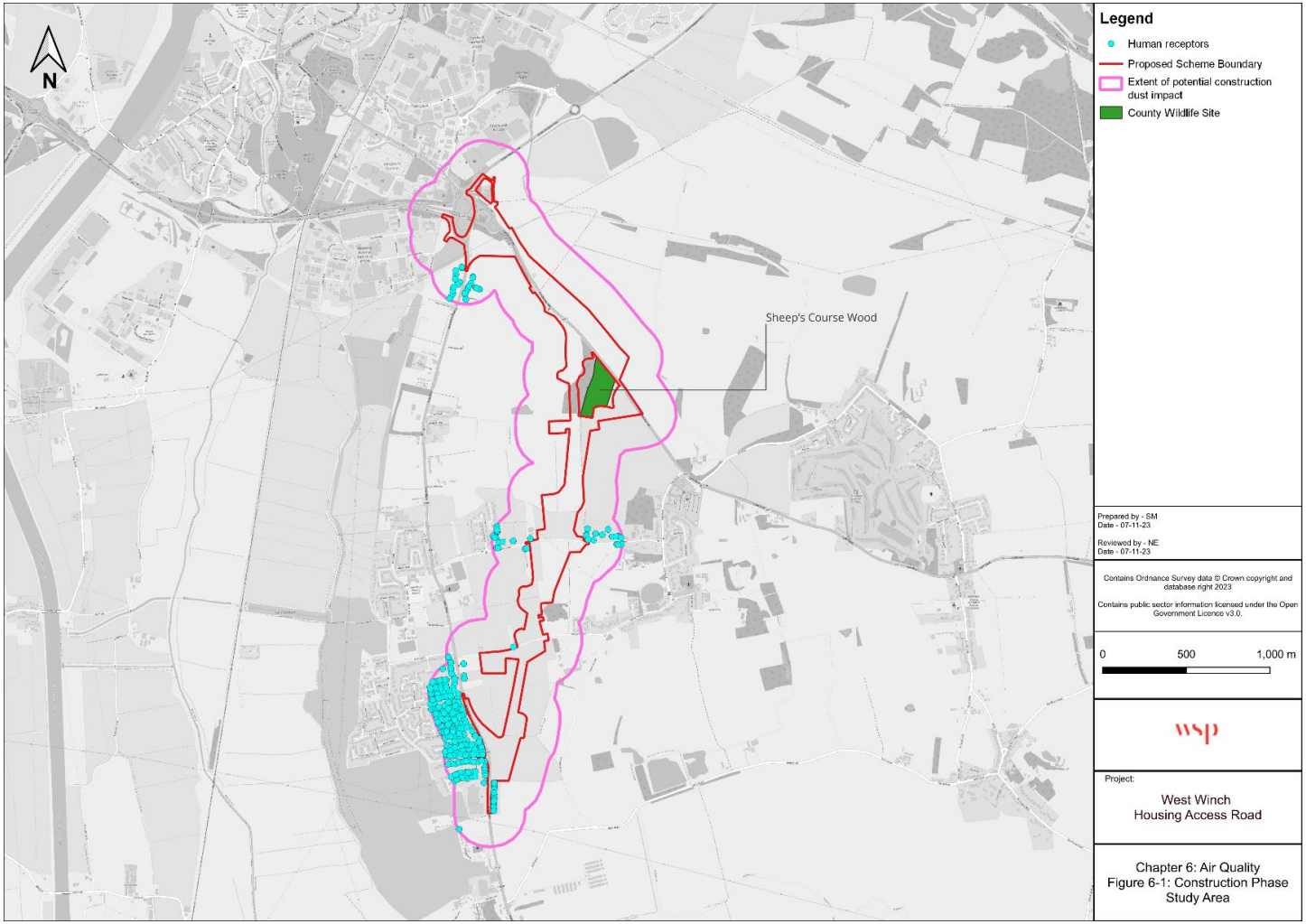

Figure 1-2 - Operational Phase Study Area

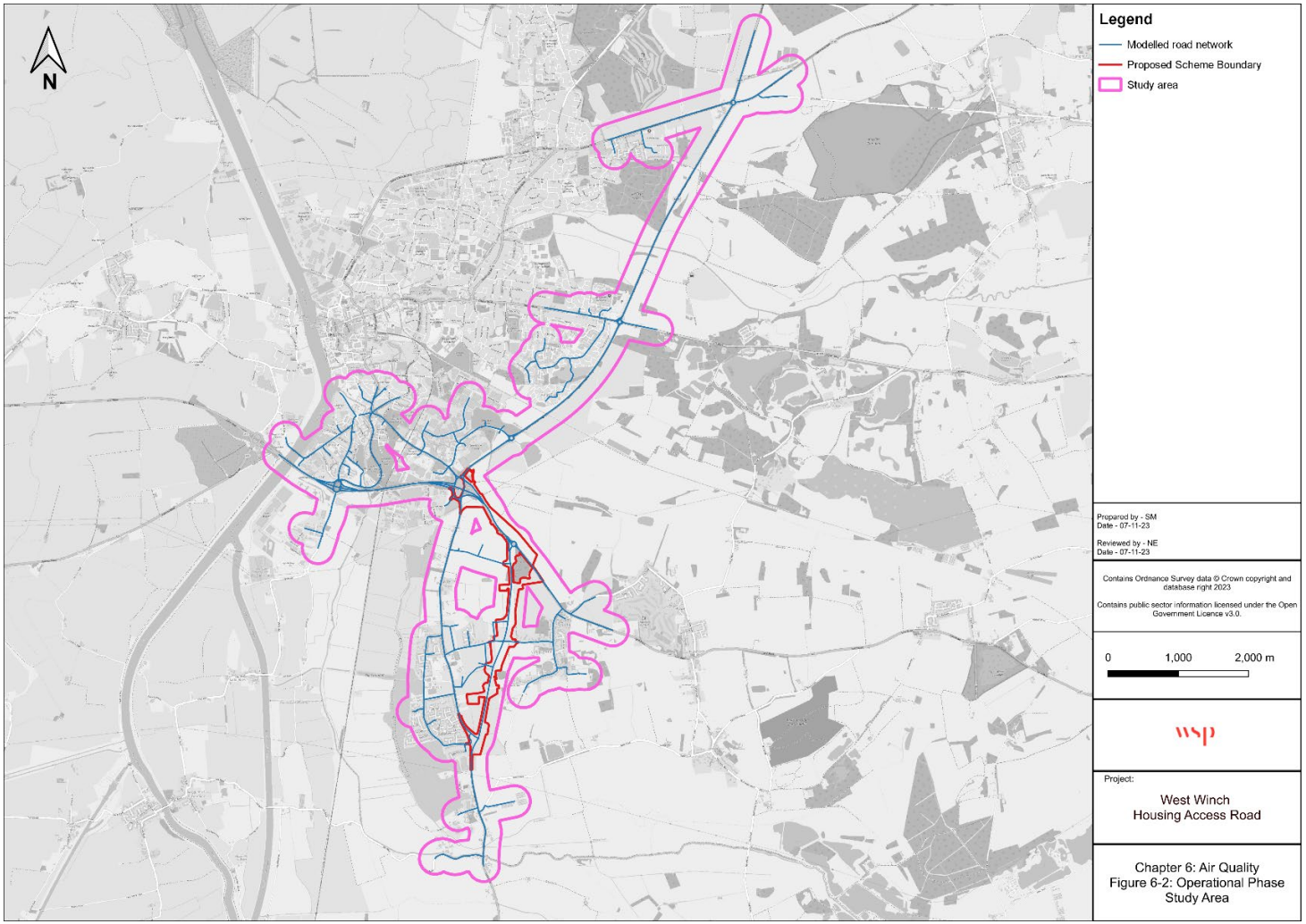

Figure 1-3 - Operational Phase Human Receptors

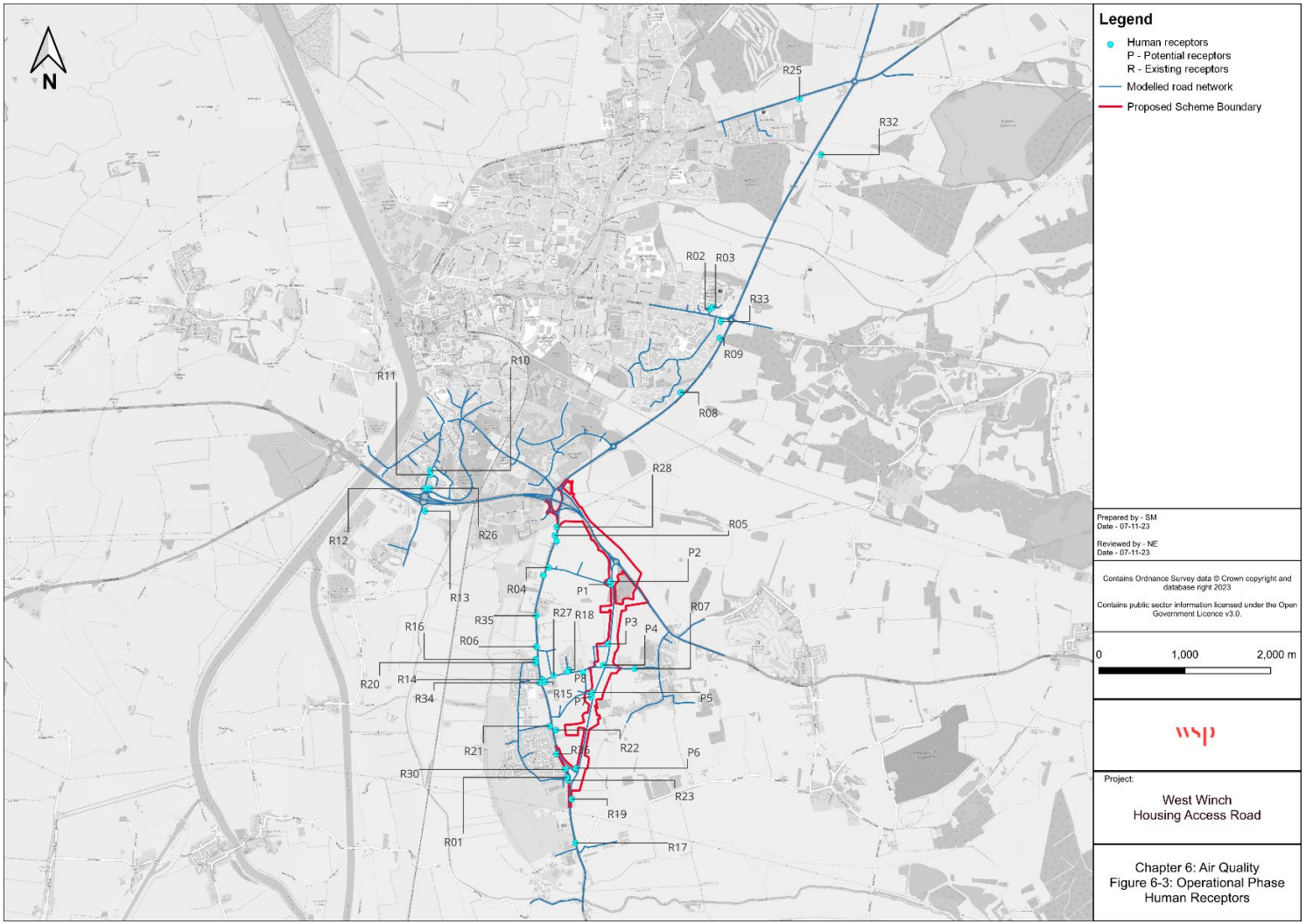

Figure 1-4 - Operational Phase Ecological Receptors

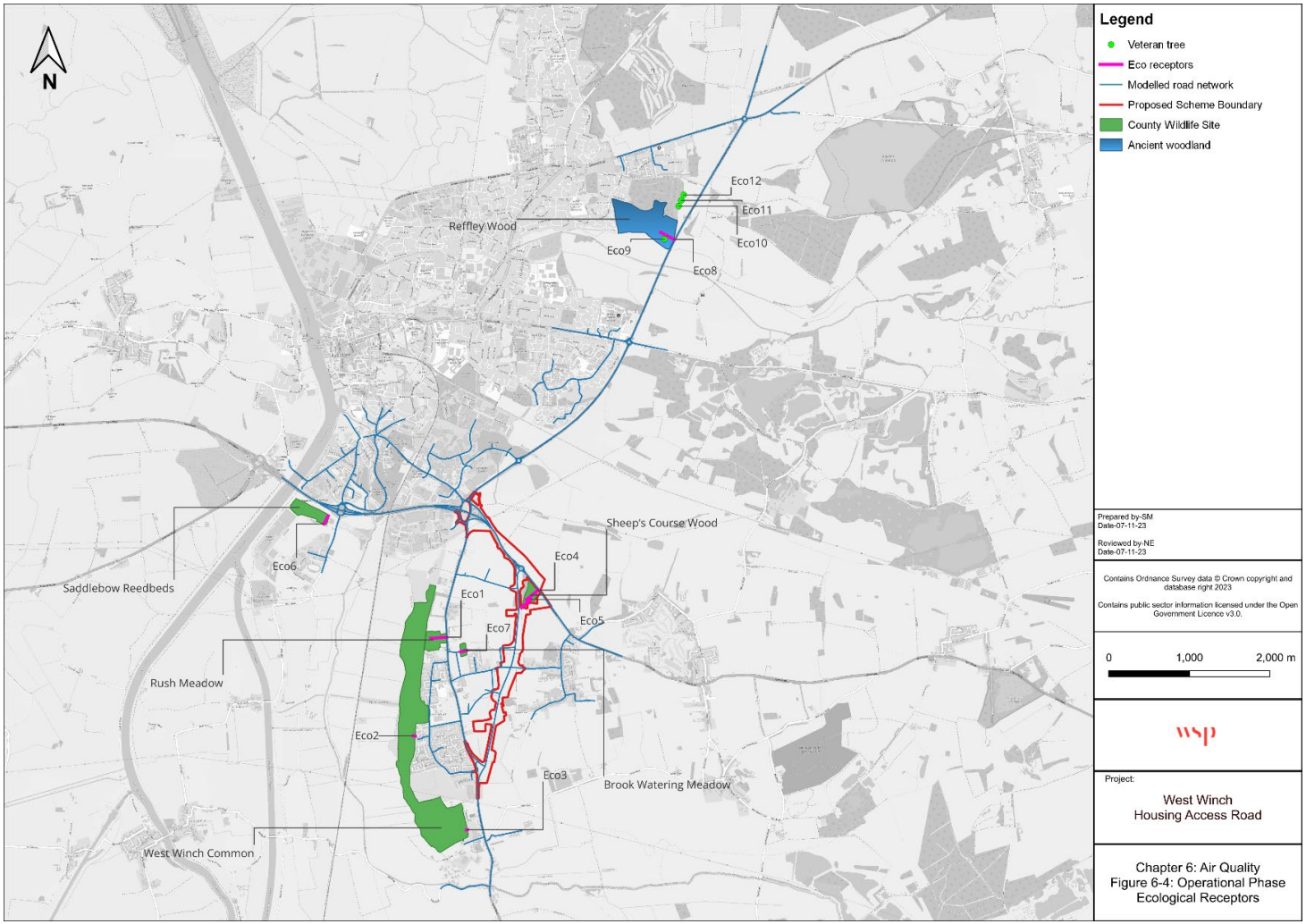

Figure 1-5 - Local Authority Monitoring Locations