TRANSPORT

LCC05(i)

Scheme Name:
North Hykeham Relief Road

Promoting Authority:
Lincolnshire County Council

Orders:
The Lincolnshire County Council (A1461 North Hykeham Relief Road) Compulsory Purchase Order 2024; and **The Lincolnshire County Council (A1461 North Hykeham Relief Road) (Classified Road) (Side Roads) Order 2024.**

Document Reference:
LCC 05(i)

Subject:
Air Quality

Author:
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Date:
June 2025

NORTH HYKEHAM RELIEF ROAD

AIR QUALITY - PROOF OF EVIDENCE

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1. INTRODUCTION

1.1 Qualifications

1.1.1 My name is Alice McLean. I gained a First-Class BSc Honours degree in Environmental Management from Manchester Metropolitan University in 1998 and an MSc in Pollution Monitoring at the University of Bradford in 2000.

1.1.2 I am a full member of the Institution of Environmental Sciences and Institute of Air Quality Management.

1.2 Relevant Experience

1.2.1 I have more than 22 years of experience in the field of air quality, working in consultancy for 18 years and currently as an Associate Air Quality Consultant at Ramboll UK. Prior to working in consultancy, I worked for four years within the public sector on Local Air Quality Management.

1.2.2 I have been the Air Quality Lead on many road schemes and linear infrastructure projects. My responsibilities included monitoring, modelling and assessment of atmospheric emissions to determine impacts on air pollution concentrations at relevant receptor locations. Examples of the most recent road schemes that I have led include the A2 Brenley Corner (Project Control Framework Stage 1 Environmental Assessment Report), the A27 Chichester Bypass (Environmental Assessment Report Addendum), the A40 Bus Lanes and Active Travel (Environmental Assessment), the A500 (Dust Management Plan), M27 (Dust Management Plan), and A35 (Dust Management Plan).

1.2.3 I am a competent air quality expert in accordance with the Institute of Air Quality Management criteria:

1.2.4 'A competent expert is an individual with a high level of skill and experience in assessing and/or advising on air quality impacts in the key area of relevance for the proposed development; the individual should also be at least a full Member of the Institute of Air Quality Management at the time of preparing the Environmental Statement.'

1.2.5 The evidence I am presenting relates to the North Hykeham Relief Road (NHRR), hereinafter referred to as the "Scheme".

1.3 Involvement with the Scheme

1.3.1 My evidence relates to my involvement in the Scheme since 2022. Initially I provided input to the air quality scoping report for the Scheme. Subsequently I managed the 12-month baseline nitrogen dioxide (NO_2) diffusion tube[1] survey between August 2022 and August 2023, assisted in undertaking the air quality assessment for the Environmental Statement (ES) **[CD7.1]**, and provided final review of the ES Chapter and Appendices (in 2023). I was also involved in consultation with the City of Lincoln Council regarding locations of diffusion tubes for the baseline survey and the proposed air quality assessment methodology. More recently (in 2024) I assisted in the preparation of a Dust Management Plan (DMP) **[CD8.81]** for the Scheme which outlines best practice dust mitigation measures during the construction stage.

1.3.2 In my evidence, I will make references to the findings of the Scheme Air Quality Assessment within Chapter 6 of the ES published in September 2023 Volume II including Appendices 6.2, 6.3, 6.4, 6.5, and 6.6 in ES Volume III **[CD7.1]**.

[1] An air quality diffusion tube is a device used to measure the concentration of specific gases in the air, such as nitrogen dioxide (NO_2). These tubes are passive samplers, meaning they don't require a power source to operate. They are typically small, transparent plastic tubes with caps at both ends. One cap is removed to allow air to enter, and the other contains a chemical reagent that absorbs the target gas.

1.3.3 I will provide evidence on the effect of the Scheme on air quality during construction and operation to demonstrate that the conclusions show that the Scheme effects are not significant with respect to air quality impacts.

1.3.4 I shall conclude that there are no detailed developments in design and changes to policy since permission was granted that change the conclusions of the ES for air quality.

2. DEVELOPMENT OF THE SCHEME

2.1 Background

2.1.1 The North Hykeham Relief Road (NHRR), previously known as the Lincoln Southern Bypass (LSB), will link the recently constructed Lincoln Eastern Bypass (LEB) with the Lincoln Western Relief Road (LWRR) and the A46 on the Strategic Road Network (SRN). The NHRR is the last major highway Scheme contained within the Lincoln Integrated Transport Strategy (LITS) **[CD4.2]** and provides a complete ring road around the greater Lincoln urban area, comprising both Lincoln and North Hykeham.

2.1.2 The completed ring road will comprise of four sections of carriageway: the Lincoln Western Relief Road (LWRR), the Lincoln Northern Relief Road (LNRR), the Lincoln Eastern Bypass (LEB), and the NHRR. The NHRR will also form part of the Lincolnshire Coastal Highway.

2.1.3 A route of the NHRR was identified and approved in 2006 following two public consultations (2005 and 2006). The route is included in the Central Lincolnshire Local Plan **[CD4.1]**, which was adopted in 2017 and carried forward in the 2023 Local Plan.

2.1.4 Balfour Beatty were appointed in 2022 to carry out a feasibility study to assess the budget, programme and risk profile of the 2018 route. In carrying out this study they identified further opportunities to optimise the Scheme.

2.1.5 Balfour Beatty have now been appointed to further develop their optimised 2018 route in conjunction with Ramboll. The development of the design is divided into the following stages:

2.2 Description of Project

2.2.1 LCC, as the Applicant, has obtained full planning permission for the construction of the NHRR, which comprises approximately 8 km of dual all-purpose two-lane carriageway that will link the Lincoln Eastern Bypass with the Lincoln Western Bypass to create a ring road around the City of Lincoln, Figure 2-1.

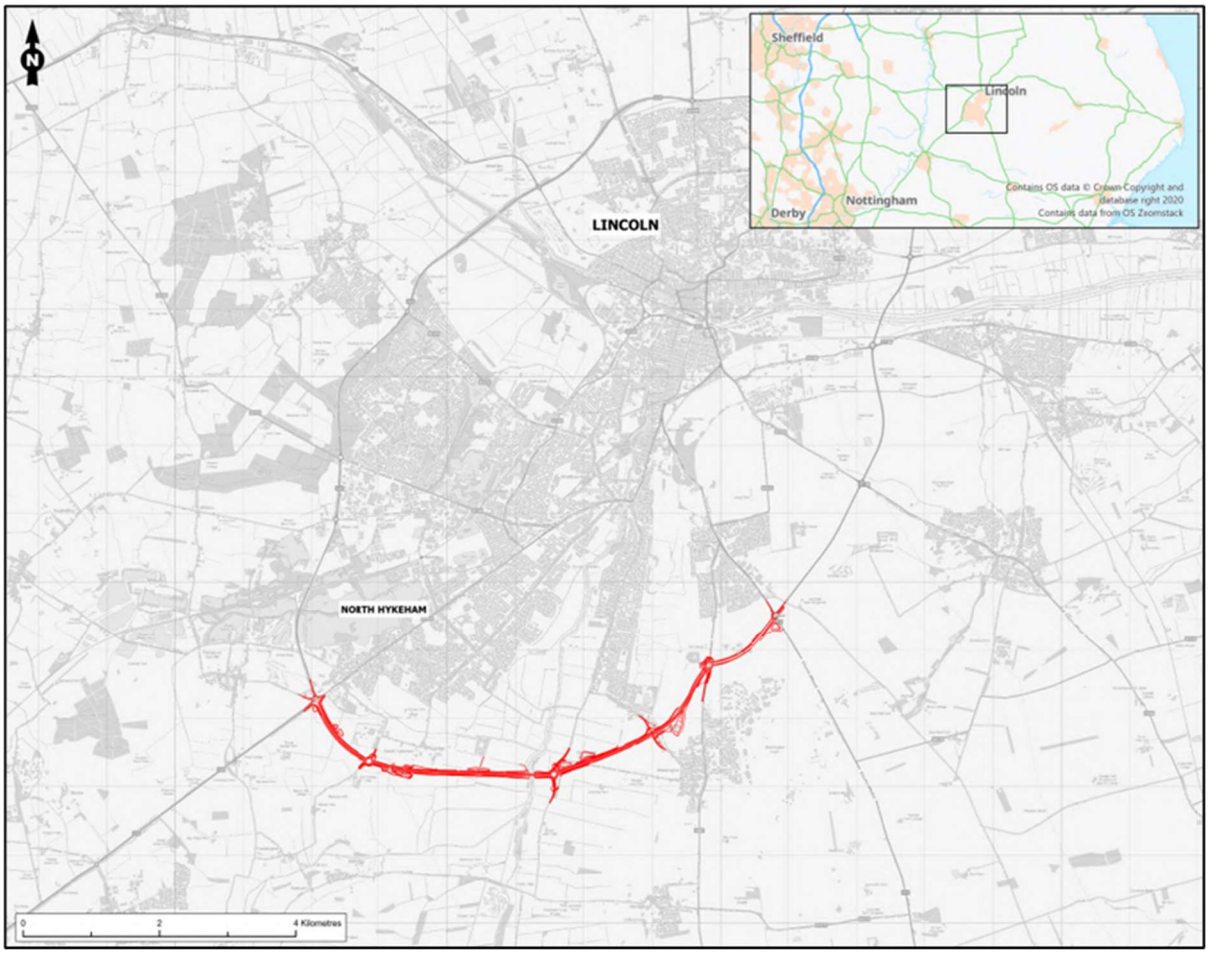

Figure 2-1: The Scheme

2.2.2 The Scheme is an approximately 8km 120kph dual all-purpose 2 lane carriageway running from the A46 throughout to join to the A15. The route is south of Lincoln, runs primarily over rural farmland crosses the River Witham and climbs the hill side to the west of Waddington Airfield.

2.2.3 The following physical features are proposed along the Scheme from west to east:

- A46 North Hykeham Roundabout – an increase in size and number of circulatory lanes, an additional arm for the Scheme and signalisation of the roundabout, together with an associated combined footway/cycleway;
- South Hykeham Road Roundabout and associated Toucan crossing facility to the north of the roundabout;
- South Hykeham Road to Wath Lane combined footway/cycleway to the south of the Scheme;
- South Hykeham Bat Bridge;
- Wath Lane Crossing and Accommodation Bridge;
- River Witham Bridge;
- Brant Road Roundabout with associated crossing Toucan facility to the north of the roundabout and the realignment of Somerton Gate Lane;
- Somerton Gate Lane Bat Culvert;
- Station Road Bridge;
- Realigned Viking Way PRoW;
- Grantham Road Roundabout and associated crossing Toucan facility to the north of the roundabout;
- Modification of the existing signalised junction at A607 Grantham Road and High Dyke to incorporate a pedestrian crossing facility;
- A15 Sleaford Roundabout, associated Toucan crossing facility to the north of the roundabout and an additional arm; and
- Dualling of a 190m section of the Lincoln Eastern Bypass.

2.3 Traffic Data

2.3.1 Since the ES was completed in 2023 updated traffic data for the Core Scenario has been provided (on 14 March 2025). There have also been updates to the tools that were used to undertake the assessment (Defra background maps **[CD6.23]**, and Road Traffic Emission Factors Toolkit **[CD6.24]**).

2.3.2 A technical note has been prepared to compare the changes in the traffic flows between the traffic data used for the Air Quality Assessment in the North Hykeham Relief Road (NHRR) ES **[CD7.1]** (herein "ES Core") and an updated core scenario (Here in "Updated Core"). Updates to Defra background maps **[CD6.23]**, and Road Traffic Emission Factors Toolkit **[CD6.24]** have also been considered. The Technical Note is provided in Appendix LCC05(I)B.

2.3.3 It has been concluded that overall, the affected road networks (ARNs) between the two data sets are similar and sensitive receptors modelled would remain the same if the Updated Core data were used. In addition, updates to Defra background maps **[CD6.23]** result in decreases in background NO_2, PM_{10} and $PM_{2.5}$ concentrations at sensitive receptor locations, and updates to the Road Traffic Emission Factors Toolkit (EFT) (v13.1) **[CD6.24]** would be unlikely to change the predicted impact of road traffic emissions using EFT v11 which was used in the ES. If the Air Quality Assessment were to be updated, the results would be different, but as assessment conclusions would remain the same.

2.3.4 There are no concerns associated with the updated Core traffic data, and updates to Defra background maps **[CD6.23]** and the Road Traffic Emissions Factors Toolkit **[CD6.24]** as they would not change the assessment approach or outcome of the air quality assessment reported in the ES **[CD7.1]**. It is therefore correct to continue with the approach followed at the planning application stage.

3. ASSESSMENT OF THE SCHEME PROPOSALS

3.1 Introduction

3.1.1 The aim of the air quality assessment was to assess, mitigate and report the effects of the Scheme on air quality by:

- Determining whether construction activities associated with the delivery of the project would trigger a significant air quality effect on nearby sensitive receptors.
- Determining whether the impacts of the Scheme on human health or designated habitats could trigger a significant air quality effect.
- Determining whether the impacts of the Scheme could affect the UKs reported ability to comply with the EU Ambient Air Quality Directive 2008/50/EC **[CD2.12]** in the shortest timescales possible.
- Assessing and applying the appropriate mitigation measures and air quality monitoring where the Scheme:

  a. triggers a significant air quality effect.

  b. affects the UK's reported ability to comply with the 2008/50/EC **[CD2.12]** in the shortest timescales possible. or,

  c. results in adverse dust impacts.

3.1.2 This section summarises the air quality assessment undertaken for Scheme prepared in September 2023 and sets out:

- National legislation and Planning Policy relevant to air quality and current at the time of the assessment.
- Baseline air quality conditions around the Scheme area.
- The air quality assessment methodology.
- The potential effect of the Scheme on air quality.

- Proposed mitigation measures for air quality.
- The conclusions of the assessment.

3.2 National and European Legislation and National Planning Policy

3.2.1 Planning Permission for the Scheme has been with consent given in May 2024 **[CD7.1]** and a section 73 consent in January 2025 **[CD7.2]**. The planning policy that applied at the time consent was issued was followed as is the necessary approach. The position has, however been updated since and this proof will consider matters as they apply at the time of the inquiry

3.2.2 National legislation relevant to air quality current at the time of the assessment is summarised below:

- **Part IV of the Environment Act 1995 [CD2.13]**, requires the UK Government to publish an Air Quality Strategy (AQS) and local authorities to review, assess and manage air quality within their areas. This is known as Local Air Quality Management (LAQM).
- **The 2007 National Air Quality Strategy [CD3.10]** establishes the policy for ambient air quality in the UK. It includes the National Air Quality Objectives (NAQOs) for the protection of human health and vegetation for 11 pollutants.
- **The Air Quality (England) Regulations 2000 [CD2.14] and the Air Quality (Amendment) (England) Regulations 2002 [CD2.15]** outline those NAQOs included as part of the Local Air Quality Management regime. The NAQOs for the protection of human health, vegetation and ecosystems, which are applicable to this assessment are presented in Table 3-1 and The concentration of nitrogen oxides or NO_X (comprising nitric oxide (NO) and nitrogen dioxide NO_2) in the atmosphere above which direct adverse effects

on vegetation or ecosystems may occur (the critical level) relevant to this assessment is presented in Table 3-2.

- **The Clean Air Strategy 2019 [CD3.11]** sets out how the UK will significantly reduce harmful air pollutant emissions by 2020 and 2030. The Clean Air Strategy also includes an intention of working towards the World Health Organisation guideline value for $PM_{2.5}$ of 10 µg/m^3.
- **The Environmental Targets Fine Particle Matter Regulations [CD2.17]** sets targets for annual mean $PM_{2.5}$ concentrations, as well as a long-term population exposure reduction target.
- **The Air Quality Standard Regulation 2010 [CD2.16]** and amendments that were made in 2016 give statutory backing to the national ambient air quality standards and objectives
- **The Conservation of Habitats and Species Regulations Directive [CD2.18]** details where critical levels for vegetation apply.

3.2.3 European legislation relevant to air quality current at the time of the assessment is summarised below:

- **Directive 2008/50/EC [CD2.12]** of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe. Which requires member states to monitor air quality and report data to the European Environment Agency. Although the UK has left the EU, it continues to provide air quality data in line with requirements of this directive.

3.2.4 The national air quality objectives (NAQOs) relevant to this assessment are presented in Table 3-1. These objectives apply to external air where there is relevant exposure (i.e. where members of the public may be present for the averaging period of the objective).

Table 3-1: National Air Quality Objectives Relevant to this Assessment.

Pollutant	Averaging Period	NAQO
Nitrogen Dioxide (NO_2)	Annual mean	40 micrograms per metre cubed ($\mu g/m^3$)
	1-hour mean	200 $\mu g/m^3$ not to be exceeded more than 18 times per year
Particulate Matter (PM_{10})	Annual mean	40 $\mu g/m^3$
	24-hour mean	50 $\mu g/m^3$ not to be exceeded more than 35 times per year
Particulate Matter ($PM_{2.5}$)	Annual mean	20 $\mu g/m^3$
		15% reduction in concentrations measured at urban background sites.

3.2.5 The concentration of nitrogen oxides or NO_X (comprising nitric oxide (NO) and nitrogen dioxide NO_2) in the atmosphere above which direct adverse effects on vegetation or ecosystems may occur (the critical level) relevant to this assessment is presented in Table 3-2.

Table 3-2: Designated Habitats Critical Level

Pollutant	Averaging Period	Critical Level
Nitrogen Oxides (NO_X), expressed as NO_2	Annual Mean	30 $\mu g/m^3$

3.2.6 Critical loads for nitrogen deposition are defined as the amount of pollutant deposited to a given area over a period, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge. Exceedance of a critical load is used as an indication of the potential for harmful effects to occur. There are critical loads for nitrogen deposition (leading to eutrophication) and acid deposition (leading to acidification). Site specific critical loads were used for this assessment.

3.2.7 Both critical levels and critical loads were used for the assessment of the impacts of road traffic emissions on vegetation and ecosystems. Critical levels refer to the concentration of pollutants in the air, while critical loads refer to the amount of pollutants deposited on the ground.

3.2.8 There have been no changes to national air quality legislation since the assessment was undertaken.

3.2.9 Planning policy relevant to air quality current at the time of the assessment is summarised below:

- **The National Planning Policy Framework (NPPF) [CD3.5],** published in 2012 and revised in September 2023 **[CD3.6]**, sets out the Government's planning policies for England and how these are expected to be applied.
- **The Planning Practice Guidance [CD3.12]** was launched as an online resource in March 2014 to support the NPPF and has separate guidance on air quality.
- **The Central Lincolnshire Local Plan [CD4.1]** includes policies to minimise pollution including air quality.

3.2.10 The recent revision of the NPPF (dated December 2024) **[CD3.5]** provides an update to paragraph numbers, however it does not introduce any new policy for air quality in any material way so does not alter any conclusions made in the ES **[CD7.1]**. The conclusion contained within the ES **[CD7.1]** therefore remains and should be applied.

3.3 Baseline Air Quality

3.3.1 An assessment of the existing air quality in the study area (existing baseline) was undertaken in accordance with the Department of Transport (DfT) in the DMRB LA 105 Air Quality **[CD6.1]** to provide a reference level against which changes in air quality could be assessed.

3.3.2 The baseline assessment found that the Proposed Scheme is not located within an Air Quality Management Area[2] ((AQMA) where air quality objectives are likely to be exceeded). The nearest AQMA is Lincoln AQMA located approximately 4.5km to the north of the site boundary. The City of Lincoln Council planned to revoke this AQMA if the NO_2 annual mean concentrations for 2022 remained below the annual mean National Air Quality Objective (NAQO). The AQMA has now been revoked.

3.3.3 Local Authority monitoring data for NO_2 and particulate matter (PM_{10}) from the City of Lincoln (CLC) and North Kesteven (NKDC) monitoring sites indicated that long and short term NAQOs were being met. NO_2 and PM_{10} concentrations showed an overall downward trend between 2017 and 2021. There were no $PM_{2.5}$ monitoring sites within the study area.

3.3.4 Monitoring data recorded in 2019 by NKDC and CLC was the latest pre-pandemic data with a full year of monitoring results available which was not impacted by COVID-19 travel restrictions and lockdowns. COVID-19 had an impact on traffic levels and society behavioural patterns, such as hybrid working, which are likely to continue in the longer term.

[2] An Air Quality Management Area is a designated area where air pollution levels exceed or are likely to exceed national air quality objectives. These objectives are set to protect human health and the environment.

3.3.5 A Scheme specific NO_2 diffusion tube monitoring survey was undertaken to complement local authority monitoring between 4/08/2022 and 4/08/2023. The monitoring data was annualised[3], and bias adjusted[4] in accordance with Defra's LAQM.TG22 guidance. Annual mean concentrations were all well below the NAQO.

3.3.6 Sixteen sensitive designated ecological sites[5] (mostly woodlands) were identified within the study area. Defra background annual mean concentrations of NO_X were within the critical level of 30 µg/ m^3 at these sites indicating that within the study area existing NO_X concentrations in the atmosphere are unlikely to have a direct adverse effect on vegetation or ecosystems. However, existing levels of nitrogen deposited on the ground exceeded the critical load at all the designated habitats indicating the potential for harmful effects to occur.

3.3.7 The ADMS-Roads atmospheric dispersion model was used to predict baseline 2022 annual mean NO_2, PM_{10} and particulate matter $PM_{2.5}$ concentrations at representative existing human health receptor locations (mainly schools, residential properties, hotels and the proposed Bracebridge Heath residential development). Predicted annual mean concentrations were all well below the NAQOs at these receptors and exceedances of short-term objectives were considered unlikely based on predicted long term concentrations.

[3] Annualisation of air quality monitoring data is a method used to estimate the annual mean concentration of pollutants when data capture is below the required threshold, typically 75%. This process ensures that even with incomplete data, a reliable annual average can be calculated.

[4] Bias adjustment of air quality monitoring data is a process used to correct systematic errors in measurements, ensuring that the data accurately reflects the true concentrations of pollutants.

[5] A sensitive designated ecological site for air quality is an area recognized for its ecological importance and vulnerability to air pollution. These sites are often protected by law and include habitats that support rare or endangered species, unique ecosystems, or areas of significant biodiversity.

3.3.8 The assessment found that five road links in Defra's Pollution Climate Mapping (PCM) model[6] along the A1434, A15, A607, A1192 and the A57 resided within the extents of the ARN for the Proposed Scheme. The 2022 minimum and maximum annual mean NO_2 concentrations along these PCM links were taken from the PCM model and found to be compliant with the European Union (EU) annual mean NO_2 limit value of 40 µg/ m^3.

3.4 Baseline Conclusion

3.4.1 The baseline assessment concluded that despite a predicted increase in vehicle numbers on the road network between 2015 - 2030, local air quality would improve and remain well below the NAQOs and EU limit values by the Proposed Scheme opening year (2028). Concentrations within Lincoln AQMA would also be expected to reduce. It should be noted that since the ES **[CD7.1]** was undertaken the AQMA has been revoked. This improvement in air quality is mainly associated with the renewal of the vehicle fleet with vehicles with lower emissions. As well as an improved testing regime and enforcement of national policies such as the DfT's Decarbonising Transport Plan **[CD3.14]** and National Highways' Net Zero Highways 2030/2040/2050 Plan **[CD3.15]** proposing a net zero network by 2050.

[6] The Defra Pollution Climate Mapping (PCM) model is a comprehensive set of models used by the UK's Department for Environment, Food & Rural Affairs (Defra) to assess and report on air pollutant concentrations across the country. This model helps the UK meet its obligations under EU Directive 2008/50/EC, which requires monitoring and reporting of air quality

3.5 Air Quality Methodology

3.5.1 The assessment considered impacts on air quality during the construction and operational phases of the Scheme. It followed the methodology set out by the Department of Transport (DfT) in the DMRB LA 105 Air Quality **[CD6.1]** guidance along with Defra's LAQM Guidance TG22 **[CD3.13]**, as appropriate. For Local Air Quality Management, the significance of impacts was also assessed based on guidance published by the EPUK and IAQM **[CD6.48]**.

3.5.2 The main air pollutants of concern related to construction were dust and fine particulate matter (PM_{10} and $PM_{2.5}$), and during the operation of the development were from road traffic, which are predominantly NO_2, PM_{10} and $PM_{2.5}$. DMRB LA 105 indicates that $PM_{2.5}$ does not need to be considered as the UK currently meets its legal requirements for the achievement of the $PM_{2.5}$ air quality thresholds. However, for the purpose of Local Air Quality Management (LAQM), the assessment also considered impacts on $PM_{2.5}$.

3.5.3 The demolition and construction dust assessment study area included human health and ecological receptor locations up to 200m from all construction activity, which was assumed to be 200m from the red line boundary as discussed in paragraph 3.2.30 as this presented the worst-case scenario.

3.5.4 The study area for the air quality assessment included human health receptors and nitrogen sensitive designated habitats within 200 m of the affected road network (ARN) defined by DMRB LA 105 **[CD6.1]** as "*all roads that trigger the traffic screening criteria and adjoining roads within 200m*". The following traffic screening criteria was used and is "*based on the changes between the do something traffic (with the project) compared to the do minimum traffic (without the project) in the opening year*":

- annual average daily traffic (AADT) change by 1,000; or
- heavy duty vehicle (HDV) AADT change by 200; or
- change in speed band; or
- change in carriageway alignment by 5m.

3.5.5 The traffic screening criteria above was applied to the area covered by the traffic model (the Traffic Reliability Area (TRA)) and the adjoining roads within 200m of the TRA, defined as the ARN.

3.5.6 The assessment of air quality effects due to changes in traffic during operation of the Proposed Scheme was undertaken for the following scenarios:

- Baseline (2022), for model validation[7];
- Opening year (2028) Do minimum 'without the Scheme' traffic emissions during the opening year of operation; and
- Opening year (2028) Do Something 'with the Scheme' traffic emissions during the opening year of operation.

3.5.7 Dispersion modelling was undertaken of road traffic emission impacts associated with the Proposed Scheme at representative sensitive existing human health receptors within 200m of the ARN likely to experience the highest pollutant concentrations, i.e., receptors located closer to the ARN links with the largest change in traffic and close to junctions, where change in traffic emissions associated with the Proposed Scheme are predicted. Two receptors (BBH_01 and BBH_02) representing Bracebridge Heath, a proposed new housing estate east of the NHRR were also modelled. The location of modelled air quality receptors is provided in Figure 3-2 (Figure 6.5 of the Environmental Statement **[CD7.1]**)

[7] Air quality model validation is the process of evaluating the accuracy and reliability of air quality models by comparing their predictions with observed data. This ensures that the models can accurately simulate real-world conditions and are suitable for regulatory and decision-making purposes. 2022 monitoring data was used for model validation.

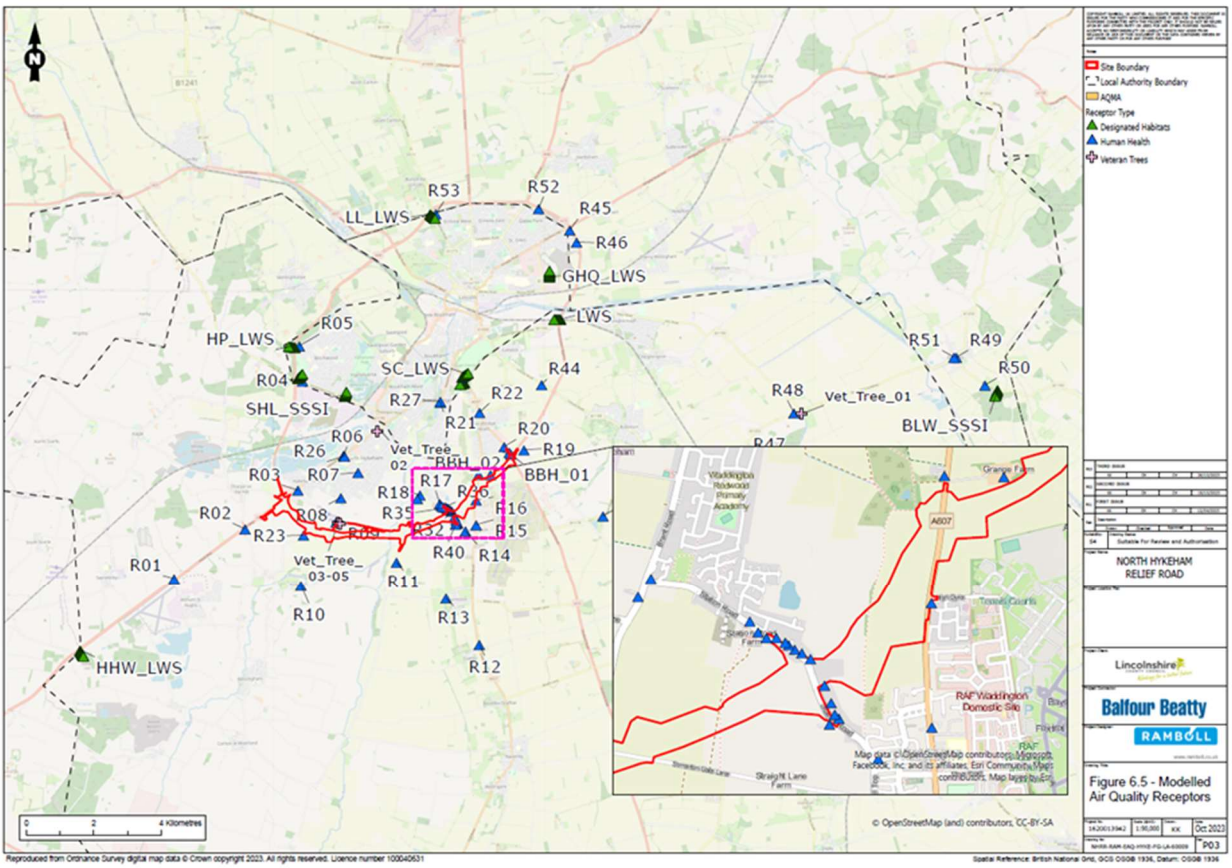

Figure 3-2: Modelled Air Quality Receptors

3.5.8 A compliance risk assessment was undertaken to determine whether the Scheme would affect the UK's ability to comply with the EU Ambient Air Quality Directive (2008/50/EC) **[CD2.12]** in the shortest timescales possible and whether it triggers a significant air quality effect.

3.5.9 The DMRB LA 105 designated habitat screening criteria was used to determine the need for further consideration of the impacts of nitrogen deposition. This is where total nitrogen deposition is greater than the relevant lower critical load, and the change in nitrogen deposition is greater than 1% of the relevant lower critical load. Where these criteria are exceeded, further consideration should be given to the magnitude of the change in nitrogen deposition.

3.5.10 Where this is greater than 0.4 kg N/ha/yr then the significance of effect should be assessed by a competent expert for biodiversity.

3.6 Scheme Impact – Construction Phase

3.6.1 The construction phase assessment reported that demolition and construction stage activities for the Scheme are planned for 36 months. Air quality impacts due to construction would be temporary, and likely to occur within 200m of the construction site/haulage routes. They would typically include an increase in emissions of dust and particulate matter from earthworks and general construction activity and the presence of heavy construction related traffic. The materials processing area would be located within the red line boundary, and therefore effects of dust from this location were considered within the assessment. There was the potential for dust nuisance, which is separate from adverse effects on health, through for example, the soiling of windows, cars, washing and other property.

3.6.2 The construction dust risk assessment determined that there was the potential to affect approximately 600 high and medium risk human health receptors which are located within 200m of the construction site boundary in Bracebridge Heath, Waddington, Hykeham Moor and South Hykeham. The location of these receptors is provided in Figure 3-3 (Figure 6.3) of the Environmental Statement **[CD7.1]**.

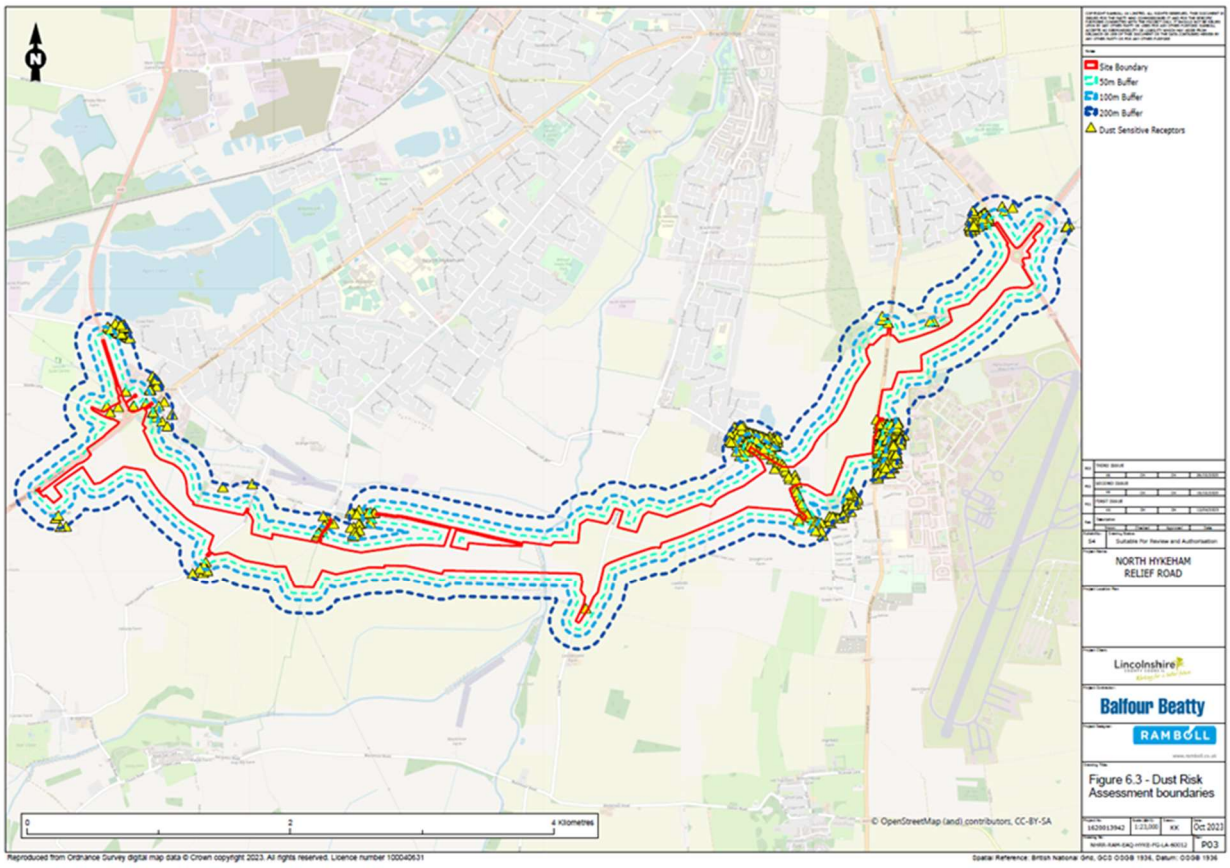

Figure 3-3: Dust Sensitive Receptors

3.6.3 In accordance with DMRB the overall construction dust risk potential for the Proposed Scheme was identified as "high". It was considered likely that all elements of the bypass would be constructed alongside one another. Best practice construction dust mitigation measures from IAQM guidance **[CD6.48]** were recommended based on the identified level of dust risk in accordance with DMRB LA105 **[CD6.1]** guidance. It was recommended that as there are some sections of the Scheme where there are no receptors within 50m of the construction activities, "low" risk mitigation measures from IAQM guidance **[CD6.48]** may be applied where appropriate.

3.6.4 Some of these areas included the western section of the bypass between the A46 and South Hykeham Road, land 800m to the west and east of the River Witham. Specific mitigation measures were not listed however they would be agreed with LCC prior to the start of construction.

3.6.5 The construction phase dust risk assessment concluded that existing onsite and off-site human health receptors may experience impacts from dust soiling and increased particulate matter concentrations due to demolition and construction works. However, with effective mitigation in place it was considered likely that potential impacts would be reduced to a negligible level and therefore no significant effects would be expected.

3.6.6 Information was provided on demolition and construction traffic movements which indicated that the total offsite heavy-duty vehicle (HDV) daily movements to and from the site were anticipated to be 172 (two-way flow), below the 200 AADT screening criteria, and the total light duty vehicles (LDV) associated with staff and operatives were predicted to be 323 total, well below the 1,000 AADT screening criteria. As the predicted offsite construction traffic vehicle movements were below the assessment thresholds then the offsite impacts from construction traffic would not be significant.

3.6.7 An average of 342 HDV daily trips were predicted within the site boundary associated with earthworks and the movement of materials between sections, with approximately three to eight HDV for each work area and four to five areas active at any one time. Although the overall movements exceed the screening criteria, no significant impacts were expected as the HDVs would be working within the site boundary only (not offsite) and not all vehicles would be present simultaneously at any one location.

3.6.8 The effects of demolition and construction traffic related emissions were negligible and not significant and were scoped out of further consideration within the assessment.

3.6.9 The construction phase assessment found that construction activities associated with delivery of the Scheme do not trigger a significant air quality effect on nearby sensitive receptors.

3.7 Scheme Impact – Operational Phase

3.7.1 It was identified that the Proposed Scheme has the potential to cause a change in concentrations of NO_2, PM_{10} and $PM_{2.5}$, through changes to vehicle emission rates because of traffic re-routing and changes to fleet mix and speeds along the affected road network which is shown in Figure 3-4 (Figure A6.1 in the Environmental Statement **[CD7.1]**).

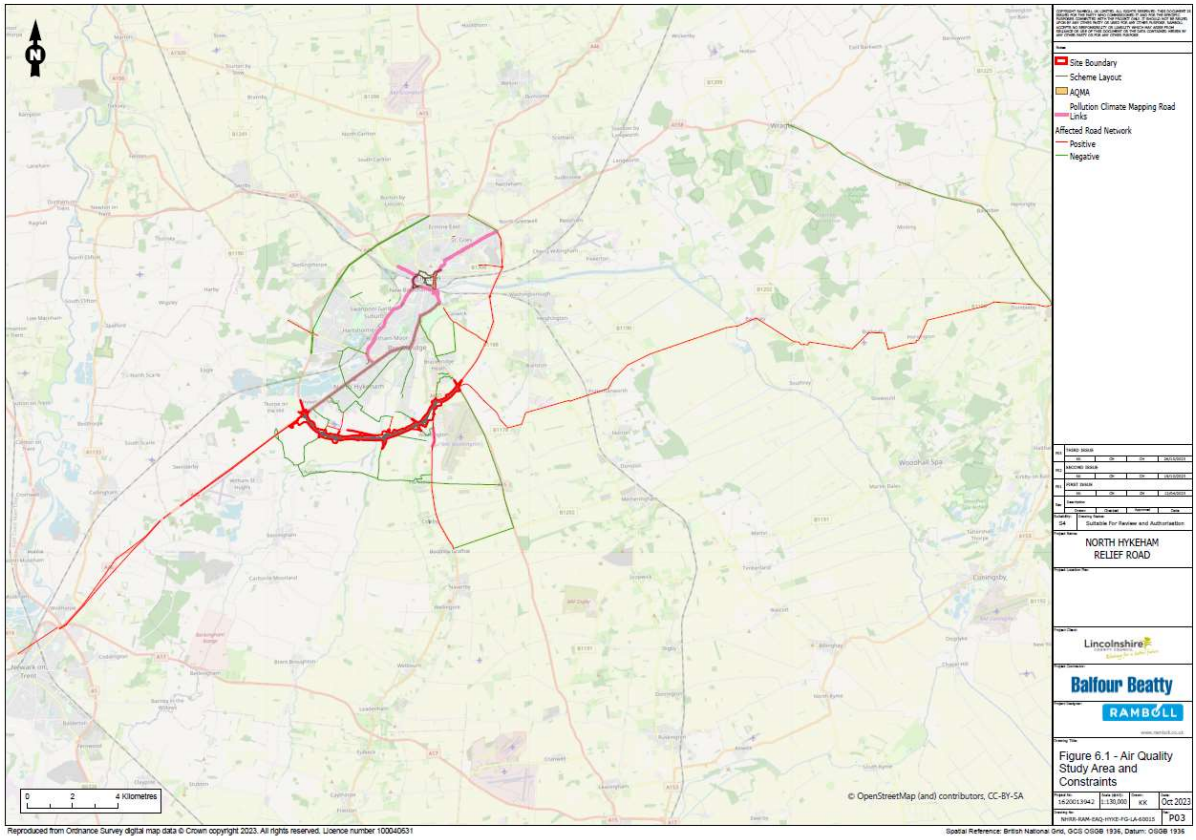

Figure 3-4: Affected Road Network

3.8 Impact Assessment - Human Health

3.8.1 The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations in 2028 (Scheme opening year) without and with the Proposed Scheme in place were below all the relevant long- and short-term objectives (Table 3-1) at all assessed existing receptor locations.

3.8.2 The Scheme was predicted to improve air quality in some locations. The largest improvement in annual mean NO_2 and PM_{10} concentrations (-1.29 µg/m^3 and -0.55 µg/m^3 respectively) were predicted at receptor R10 (alongside Chapel/Station Road). This is likely to be associated with a predicted decrease of approximately 5,700 vehicles per day along the nearest road (Harmston Road), which is likely to have previously been used by vehicles travelling between the A46 and A15. The second largest improvement in NO_2 and PM_{10} concentrations was predicted at R14 (alongside Manor Lane). Traffic flows along Manor Lane were also predicted to decrease by approximately 3,700 vehicles per day, the improvement in air quality at R14 is likely due to this decrease in vehicle flows. All modelled receptors had an imperceptible change in $PM_{2.5}$ concentrations.

3.8.3 The Scheme was predicted to increase air pollution by a small amount at some locations. R28 (located along Grantham Road) was predicted to experience a small increase in NO_2 pollutant concentrations of 0.66 µg/ m^3¬, which was the largest predicted increase at all modelled receptors. However, predicted annual mean concentrations at this receptor (7.5 µg/m^3) were well below the annual mean objective for NO_2. The change is likely to due to the close alignment of the Proposed Scheme in relation to the receptor, and its proximity to the A607.

3.8.4 When the Scheme is operational (the Do Something scenario) the receptor locations with the highest modelled annual mean concentrations varied by pollutant as follows: for NO_2 13.8 µg/m^3 at R04 (alongside Lissette Close, near Doddington Roundabout), for PM_{10} 18.2 µg/ m^3 at R46 (near the A15), and for $PM_{2.5}$ 9.5 µg/ m^3 at R27. The predicted concentrations are mainly due to existing background pollutant concentrations which are also highest at these receptor locations.

3.8.5 Overall, based on the EPUK/IAQM assessment criteria **[CD6.48]** the Proposed Scheme was predicted to have a negligible impact on air quality in the opening year (2028) at all modelled human health receptor locations. Overall, the impact of the Proposed Scheme was not significant for human health receptors.

3.8.6 The operational phase assessment found that operation of the Proposed Scheme does not trigger a significant air quality effect at human health receptors.

3.9 Compliance Risk Assessment

3.9.1 DMRB LA105 requires assessment of roads identified within Defra's PCM model which are within the ARN with qualifying features (public access areas, sensitive human receptors) within 15 m of the running lane/kerbside but not within 25 m of a junction.

3.9.2 The compliance risk assessment found five road links in Defra's PCM model along the A1434, A15, A607, A1192 and the A57 (shown in Figure 3-4) within the extents of the ARN for the Proposed Scheme. All these links showed a decrease in traffic greater than 1,000 AADT, except for the A607 where an increase in HDV AADT flows of between 200 at 239 was predicted. No exceedances of the EU NO_2 limit value were predicted, and concentrations were well below the objectives at all identified receptor locations adjacent to PCM links.

3.9.3 The assessment concluded that the Proposed Scheme would not cause or worsen exceedances of the EU limit values and, therefore, there would be a low risk of impacting Defra's projected compliance with the Air Quality Directive in the shortest timescales possible.

3.10 Impact Assessment – Designated Habitats

Critical Level

3.10.1 The designated habitats impact assessment found a maximum change of 1.3 µg. m^3 in NO_X concentrations (4.3% of the Critical Level) between the Do Minimum and Do Something (with Scheme) scenarios. This was predicted at the Hill Holt Wood LWS. Total NO_X concentrations (background plus Scheme contributions) were below the NO_X Critical Level at all habitats assessed, indicating that within the study area NO_X concentrations in the atmosphere are unlikely to have a direct adverse effect on vegetation or ecosystems.

Critical Load

3.10.2 The designated habitats impact assessment found four modelled points across two Local Wildlife Sites (Hill Holt Woods and LWS West of the Lincoln Eastern Bypass) where a change in nitrogen deposition greater than 1% was predicted indicating potentially significant effects.

3.10.3 However, the change in nitrogen deposition rates with the Proposed Scheme was between -0.2 and +0.2 N/ha/yr at all relevant designated habitats which is less than the DMRB LA 105 **[CD6.1]** designated habitat screening criteria of 0.4 kg N/ha/yr. As the current background deposition rate significantly exceeded the critical load at these sites, it was unlikely that they would be sensitive to a change in deposition of the magnitudes predicted. It was also likely that baseline deposition rates would reduce by more than the predicted contribution from the Proposed Scheme by the time that it is operational. Overall, it was therefore considered unlikely that there would be a significant effect on the integrity of the assessed designated habitats from traffic related emissions associated with the Proposed Scheme.

3.11 Scheme Mitigation Measures

3.11.1 As there are sensitive receptors within 200 metres of the proposed construction works it was recommended that best practice mitigation measures for high-risk sites be included in a project specific Construction Environmental Management Plan (CEMP) **[CD8.82]** that will be agreed with LCC prior to the start of construction to help to ensure that construction dust does not result in a significant effect.

3.11.2 The operation of the Scheme does not require any specific mitigation measures.

4. SUMMARY AND CONCLUSION

4.1 Introduction

4.1.1 Planning Permission for the Scheme was granted in May 2024 **[CD7.1]** and a section 73 consent in January 2025 **[CD7.2]**. The Planning Application self-contained all relevant detail including an extensive and comprehensive ES **[CD7.1]**.

4.1.2 This proof of evidence references the findings of the Scheme Air Quality Assessment within Chapter 6 of the ES published in September 2023 **[CD7.1]** Volume II including Appendices 6.2, 6.3, 6.4, 6.5, and 6.6 in ES Volume III. It provides evidence on baseline air quality within the study area and the effects of the Scheme on air quality during its construction and operation.

4.1.3 The aim of the air quality assessment was to assess, mitigate and report the effects of the Scheme on air quality by:

- Determining whether construction activities associated with the delivery of the project would trigger a significant air quality effect on nearby sensitive receptors.
- Determining whether the impacts of the Scheme on human health or designated habitats could trigger a significant air quality effect.
- Determining whether the impacts of the Scheme could affect the UKs reported ability to comply with the EU Ambient Air Quality Directive 2008/50/EC **[CD2.12]** in the shortest timescales possible.
- Assessing and applying the appropriate mitigation measures and air quality monitoring where the Scheme:

  a) triggers a significant air quality effect.

b) affects the UK's reported ability to comply with the 2008/50/EC **[CD2.12]** in the shortest timescales possible. or,

c) results in adverse dust impacts.

4.2 Traffic Data

4.2.1 Since the ES **[CD7.1]** was completed in 2023 updated traffic data for the Core Scenario has been provided (on 14 March 2025). There have also been updates to the tools that were used to undertake the assessment (Defra background maps **[CD6.23]**, and Road Traffic Emission Factors Toolkit **[CD6.24]**). A technical note has been prepared to compare the changes in the traffic flows between the traffic data used for the Air Quality Assessment in the North Hykeham Relief Road (NHRR) ES **[CD7.1]** (herein "ES Core") and an updated core scenario (Here in "Updated Core"). Updates to Defra background maps **[CD6.23]**, and Road Traffic Emission Factors Toolkit **[CD6.24]** have also been considered.

4.3 Methodology

4.3.1 The Air Quality assessment followed the methodology set out by the Department of Transport (DfT) in the DMRB LA 105 Air Quality **[CD6.1]** guidance along with Defra's LAQM Guidance TG22 **[CD3.13]**, as appropriate. For Local Air Quality Management, the significance of impacts was also assessed based on guidance published by the EPUK and IAQM **[CD6.48]**.

4.3.2 The main air pollutants of concern related to construction were dust and fine particulate matter (PM_{10} and $PM_{2.5}$), and during the operation of the development were from road traffic, which are predominantly NO_2, PM_{10} and $PM_{2.5}$. DMRB LA 105 indicates that $PM_{2.5}$ does not need to be considered as the UK currently meets its legal requirements for the achievement of the $PM_{2.5}$ air quality thresholds. However, for the purpose of Local Air Quality Management (LAQM), the assessment also considered impacts on $PM_{2.5}$.

4.3.3 In accordance with DMRB LA105 **[CD6.1]** the demolition and construction dust assessment study area included human health and ecological receptor locations up to 200m from all construction activity, which was assumed to be 200m from the red line boundary as this presented the worst-case scenario.

4.3.4 The study area for the air quality assessment included human health receptors and nitrogen sensitive designated habitats within 200 m of the ARN. The DMRB LA105 **[CD6.1]** traffic screening criteria was applied to the area covered by the traffic model (the Traffic Reliability Area (TRA)) and the adjoining roads within 200m of the TRA, defined as the ARN.

4.3.5 Dispersion modelling was undertaken of road traffic emission impacts associated with the Proposed Scheme at representative sensitive existing human health receptors within 200m of the ARN likely to experience the highest pollutant concentrations.

4.3.6 A compliance risk assessment was undertaken to determine whether the Scheme would affect the UK's ability to comply with the EU Ambient Air Quality Directive (2008/50/EC) **[CD2.12]** in the shortest timescales possible and whether it triggers a significant air quality effect.

4.3.7 The DMRB LA 105 **[CD6.1]** designated habitat screening criteria was used to determine the need for further consideration of the impacts of nitrogen deposition.

4.4 National and European Legislation and National Planning Policy

4.4.1 A summary of National legislation and Planning Policy relevant to air quality current at the time of the assessment was provided. There have been no changes to national air quality legislation since the assessment was undertaken. The recent revision of the NPPF (dated December 2024) **[CD3.5]** provides an update to paragraph numbers, however it does not introduce any new policy for air quality in any material way so does not alter any conclusions made in the ES **[CD7.1]**. The conclusion contained within the ES **[CD7.1]** therefore remains and should be applied.

4.4.2 The assessment of effects followed the guidance set out by the DfT in the DMRB LA 105 Air Quality **[CD6.1]** guidance. For LAQM, the significance of impacts was assessed based on guidance published by the EPUK and IAQM **[CD6.48]**.

4.5 Baseline Assessment

4.5.1 Consistent with good practice the air quality assessment for the Scheme was supported by a 12-month baseline air quality survey.

4.5.2 The baseline assessment reported that air quality within the study area was good with pollutant concentrations below NAQOs (based on air quality monitoring results and modelled concentrations at sensitive receptor locations). NOx concentrations in the atmosphere are unlikely to have a direct adverse effect on vegetation or ecosystems at sensitive designated ecological sites within the study area as they are within the critical level of 30 µg/m^3. However existing levels of nitrogen deposited on the ground exceeded the critical load at all the designated habitats indicating the potential for harmful effects to occur.

4.5.3 The assessment concluded that despite a predicted increase in vehicle numbers on the road network between 2015 - 2030, local air quality would improve and remain well below the NAQOs and EU limit values by the Proposed Scheme opening year (2028). Concentrations within Lincoln AQMA would also be expected to reduce.

4.6 Construction Phase

4.6.1 There are approximately 600 sensitive human receptors within 200 m of the Scheme redline boundary. The construction phase assessment reported that construction works pose a temporary high risk of creating dust and PM_{10} emissions. However, these would be effectively controlled using suitable mitigation measures implemented through the provision of a CEMP **[CD8.82]** that will be agreed with CLC prior to the start of construction.

4.6.2 With implementation of best practice mitigation measures it was concluded that construction activities associated with delivery of the Scheme do not trigger a significant air quality effect on nearby sensitive receptors.

4.7 Operational Phase

4.7.1 The operational phase assessment predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ at several worst-case locations representing existing receptors close to the ARN. Predicted concentrations were below the relevant objectives at all the modelled existing receptor locations in 2028 with the Proposed Scheme in place.

4.7.2 The operational phase assessment found that operation of the Proposed Scheme does not trigger a significant air quality effect at human health or ecological receptors. No additional mitigation is therefore required to reduce the effects of the Scheme on local air quality.

4.7.3 The Proposed Scheme would not cause or worsen exceedances of the EU limit values and, therefore, there would be a low risk of impacting Defra's projected compliance with the Air Quality Directive in the shortest timescales possible.

4.7.4 There are no detailed developments in design and changes to policy since permission was granted that change the conclusions of the ES for air quality.

5. STATEMENT OF TRUTH

5.1.1 I can confirm that I am able to give evidence considering my relevant experience as summarised above. I can confirm that the evidence I prepared is in accordance with the guidance of my professional institution and that the opinions given are my true professional opinions.

APPENDIX LCC05(I)A - GLOSSARY

Table A1.1 Glossary

Abbreviations	Meaning
AADT	Annual Average Daily Traffic
ADMS	Air Dispersion Modelling System
APIS	Air Pollution Information System
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
ARN	Affected road network
CHP	Combined Heat and Power
CEMP	Construction Environmental Management Plan
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
Diffusion Tube	A passive sampler used for collecting NO_2 in the air
DMRB	Design Manual for Road and Bridges
EFT	Emission Factor Toolkit
EPUK	Environmental Protection UK
HDV	Heavy Duty Vehicle; a vehicle with a gross vehicle weight greater than 3.5 tonnes. Includes Heavy Goods Vehicles and buses
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LWS	Local Wildlife Site
CLC	City of Lincoln Council
LDV	Light Duty Vehicle; a vehicle with a gross vehicle weight less than or equal to 3.5 tonnes
NAQO	National Air Quality Objective as set out in the Air Quality Strategy and the Air Quality Regulations
NKDC	North Kesteven district council
NO_2	Nitrogen Dioxide
NO_x	Nitrogen oxides, generally considered to be nitric oxide and NO_2
NPPF	National Planning Policy Framework
$PM_{10}/PM_{2.5}$	Small airborne particles less than 10/2.5 microns in aerodynamic diameter
PPG	Planning Practice Guidance
Receptor	A location where the effects of pollution may occur
RLB	Red Line Boundary
WLC	West Lindsay Council
($\mu g/m^3$)	Micrograms per metre cubed

APPENDIX LCC05(I)B - TECHNICAL NOTE

North Hykeham Relief Road – Core traffic Comparison

Project name	**North Hykeham Relief Road**
Project no.	**1620013942-003**
Version	**P01.11.0**
Prepared by	**---Callum Hayles**
Checked by	**---Alice McLean**
Approved by	**---Graham Harker**

A1 Introduction

Since the ES **[CD 7.1]** was completed in 2023 updated traffic data for the Core Scenario has been provided (on 14 March 2025). There have also been updates to the tools that were used to undertake the assessment (Defra background maps **[CD6.23]**, and Road Traffic Emission Factors Toolkit **[CD6.24]**).

This technical note has been prepared to compare the changes in the traffic flows between the traffic data used for the Air Quality Assessment in the North Hykeham Relief Road (NHRR) ES (herein "ES Core") and an updated core scenario (Here in "Updated Core"). Updates to Defra background maps, and Road Traffic Emission Factors Toolkit have also been considered.

The qualitative review was undertaken to determine whether the updated traffic data, background maps and emission factors would potentially affect the conclusions of the ES Air Quality Assessment. Remodelling of traffic data has not been undertaken.

A2 Review

A2.1 Affected Road Network (traffic data) and Receptors

The study area for the air quality assessment included human health receptors and nitrogen sensitive designated habitats within 200m of the affected road network (ARN) defined by DMRB LA 105 **[CD6.1]** as *"all roads that trigger the traffic screening criteria and adjoining roads within 200m"*. The following traffic screening criteria were used to define the ARN and are based on the changes between the do something (with the project) traffic and road network compared to the do minimum (without the project) traffic and road network in the opening year:

- annual average daily traffic (AADT) change by 1,000; or
- heavy duty vehicle (HDV) AADT change by 200; or
- change in speed band; or

- change in carriageway alignment by 5m.

A comparison of the ARNs between the ES Core and the Update Core has been undertaken and the findings are provided below.

Roads within the Updated Core have been split into more links than those in the ES Core, therefore traffic data cannot easily be directly compared on a link-by-link basis. However, an overall comparison is possible.

The extent of the ARN in the Updated Core and ES Core are very similar as shown in Figure A2.1 and Figure A2.2.

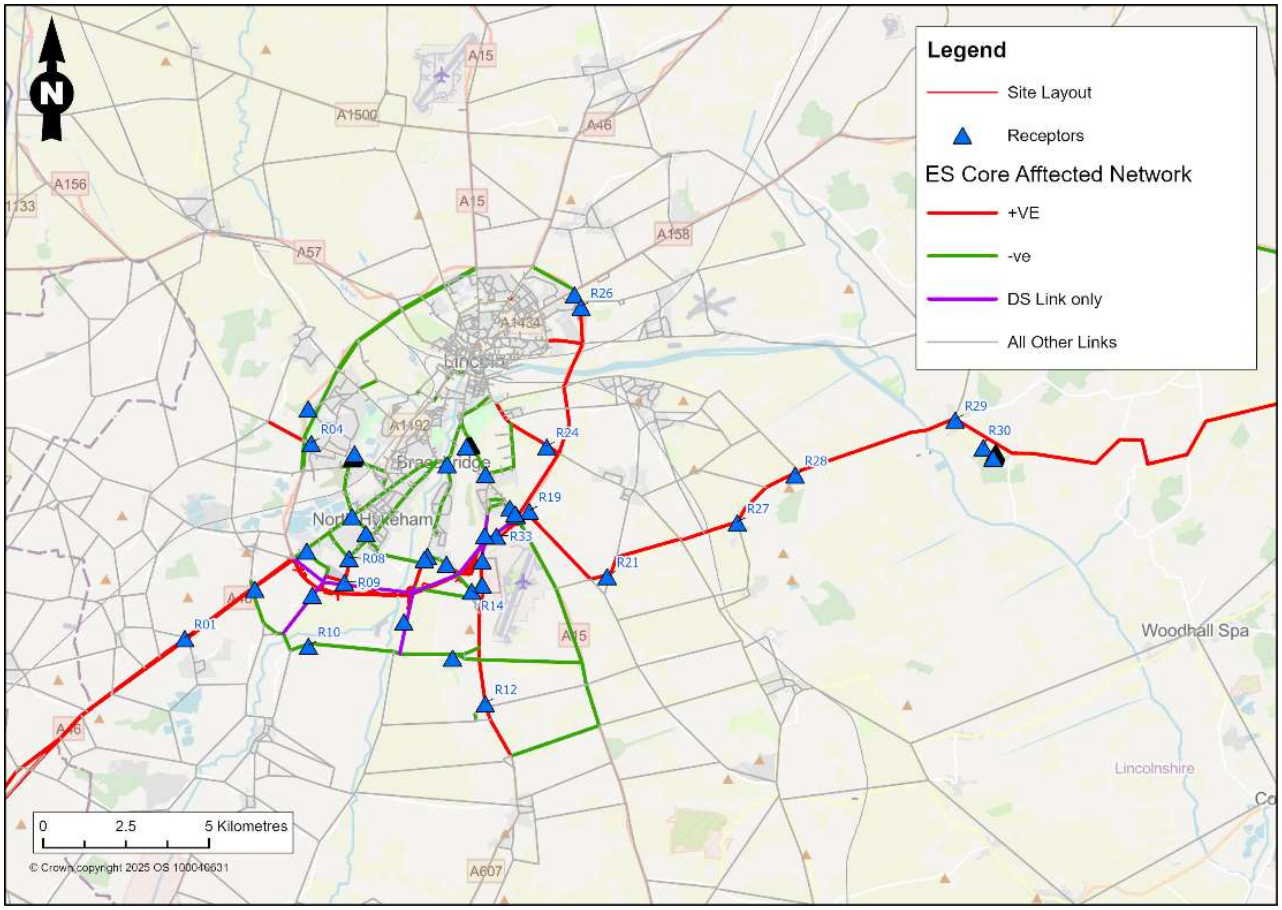

Figure A2.1 ES core affected road network (numbered receptors are those in Table A2.1)

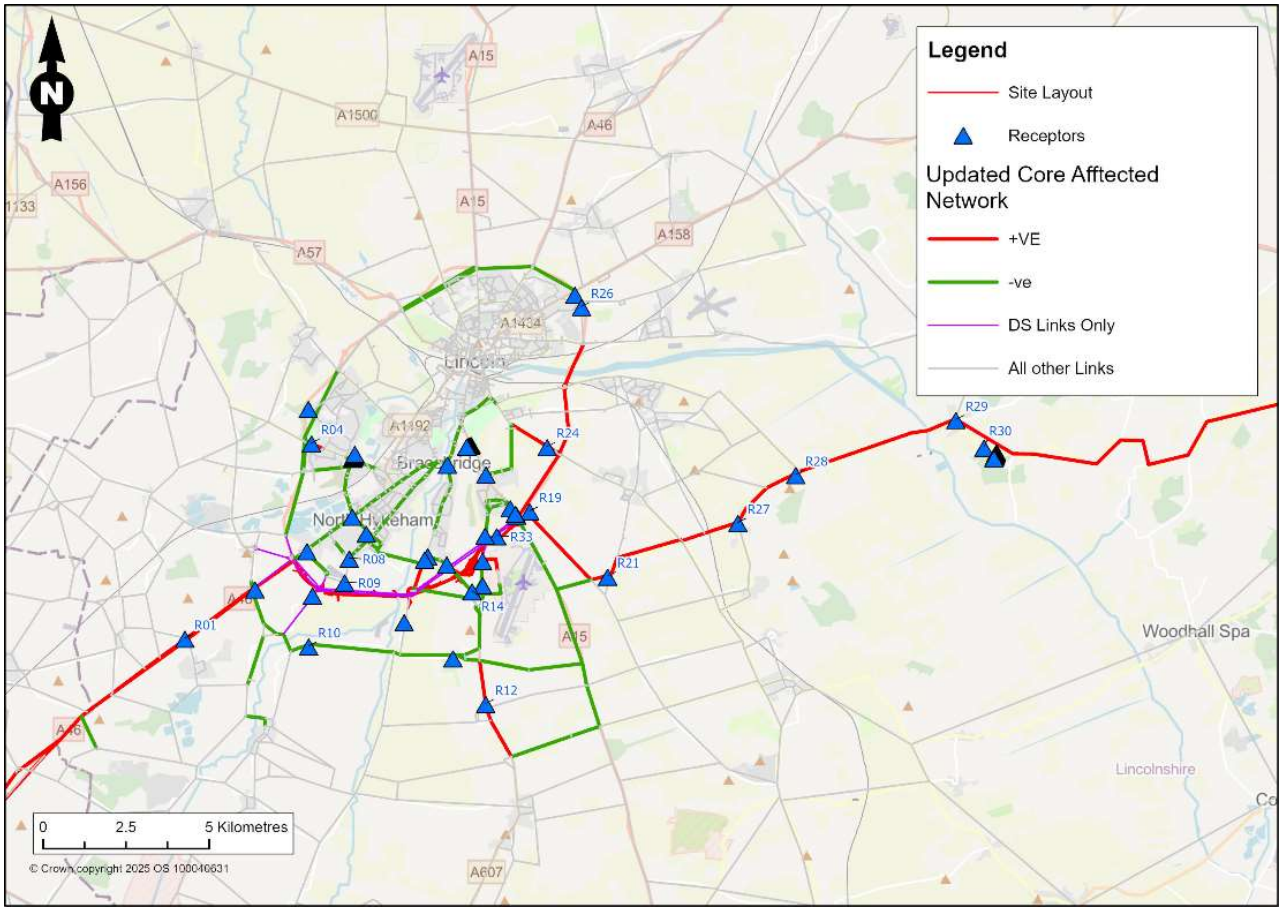

Figure A2.2 Updated Core Affected Road Network (numbered receptors are those in Table A2.1)

Figure A2.1 and Figure A2.2 show that there are no additional road links or sensitive receptors which would require assessment using the Updated Core traffic data.

Sensitive receptors nearest to the ARN where traffic flows are predicted to increase were identified (adjacent to red links in Figure A2.1 and Figure **A2.2** A2.2). A comparison between the ES Core and Updated Core traffic data sets was undertaken for road links nearest to each receptor as presented in Table A2.1. The data in the table shows that at all but two receptor locations the change in AADT and HDV flows (i.e. between the do something and do minimum scenarios) is lower in the Updated Core Scenario compared to the ES Core scenario.

It should be noted that DMRB LA105 advises that 1,000 vehicles and 200 HDVs represent the lowest threshold above which the traffic model can represent change in traffic conditions to a reasonable level of confidence. Where the change has increased between the ES Core and Updated Core scenarios the increase is less than 1,000 AADT.

Table A2.1: Traffic data comparison

Receptor	ES Core (ESC)		Updated Core (UC)		Difference (UC-ESC)	
	AADT Change	HDV Change	AADT Change	HDV Change	AADT Change	HDV Change
R01	3363	60	3103	14	-260	-46
R04	1012	2	1913	7	901	5
R08	1801	1	509	-10	-1292	-11
R09	1801	1	509	-10	-1292	-11
R12	2728	284	1474	238	-1254	-46
R19	10093	349	10716	647	623	298
R21	2251	100	1847	20	-404	-80
R24	3343	14	2732	51	-611	37
R26	1053	131	925	116	-128	-15
R27	2228	115	1863	49	-365	-66
R28	2205	114	1905	37	-300	-77
R29	1945	90	1439	95	-506	5
R30	1945	90	1439	95	-506	5
R33	25410	756	24677	1240	-733	484

A2.2 Defra Background Concentrations

Since the ES **[CD7.1]** was completed in 2023 Defra background pollutant concentrations based on 2018 monitored concentrations have been updated with new values based on 2021 monitored concentrations. A review of updated background concentrations at the sensitive receptor locations in Table A2-1 was undertaken. At these locations the Defra background concentrations based on 2021 data are lower than those based on 2018 data as presented in Table A2.2. Updated background concentrations at each receptor location are provided in Appendix A. Total pollutant concentrations presented in the ES would therefore be lower if the latest Defra background maps were to be used for the assessment.

Table A2.2: Decrease in Defra background concentrations 2021 based projections vs 2018 based projections.

Location	2028 Range of Decrease in NO_2	2028 Range of Decrease in PM_{10}	2028 Range of Decrease in $PM_{2.5}$

Modelled Human Health Receptors in Table	0.8 – 2.3	1.1 – 2.0	1.5 – 2.5

A2.3 Defra Emission Factors

The Defra Road Traffic Emission Factors Toolkit (EFT) **[CD6.24]** is used to calculate road vehicle pollutant emission rates for use in air quality dispersion modelling. Since the ES was completed in 2023 the EFT version 11 used in the assessment has been updated (reflecting changes to vehicle fleet composition and underlying data) and the latest version is EFT v13.1.

Emissions from ES Core traffic data using EFT v13.1 would be higher than those in the ES which used EFT V11 which has the potential to increase the predicted pollutant concentrations arising from road traffic emissions. However, an increase in the emission factors would reduce the calculated model verification factor as the road component of the total predicted concentration would be higher. Overall therefore, there is likely to be little change in the predicted impact of road traffic emissions as a result of the updated EFT version. In addition, the predicted change in pollutant concentrations at sensitive receptors using EFT v11 were such that the predicted magnitude of impacts (negligible) would be unlikely to change using EFT v13.1 (as outlined in the following section).

A2.4 Predicted impacts

All modelled pollutant concentrations presented in the ES **[CD7.1]** are well below the air quality objectives (AQOs) for NO_2 and particulate matter (PM_{10} and $PM_{2.5}$). The Proposed Scheme was predicted to have a negligible impact on air quality at all modelled sensitive human receptor locations in the opening year (2028).

Changes in PM_{10} and $PM_{2.5}$ concentrations predicted in the ES were imperceptible at most receptor locations therefore the review of the predicted impacts has focused on NO_2.

Highest Annual Mean Concentration

In the ES the highest Do Something annual mean NO_2 concentration of 13.8 $\mu g/m^3$ was predicted at R04 (situated alongside Lissette Close, near Doddington Roundabout), with an increase of 0.07 $\mu g/m^3$ compared to the Do Minimum. This is a negligible change in concentration relative to the National Air Quality Objective of 40 $\mu g/m^3$.

Changes in AADT and HDV flows between the Updated Care and ES Core traffic data on the road adjacent to R04 are presented in Table A2.1 In the Updated Core traffic data AADT and HDV flows at R04 have increased by 901 AADT and 5 HDV. However, roads within 200m of this road show a decrease in AADT and HDV flows in the Updated Core data (not shown in Table A2.1). The predicted magnitude of impact at R04 (negligible) would therefore not change if Updated

Core traffic data were used as the difference in traffic flows between the two data sets is less than 1000 AADT and 200 HDV.

Largest increase in Pollutant Concentration

In the ES receptor R28 (located along Grantham Road) was predicted to experience a small increase in NO_2 pollutant concentrations of 0.66 µg/m^3, which was the largest predicted increase at all modelled receptor locations. The Do Something modelled concentration at R28 (7.5 µg/m^3) was predicted to be well below the annual mean objective for NO_2 (40 µg/m^3).

Changes in AADT and HDV flows between the Updated Care and ES Core traffic data on the road adjacent to R28 are presented in Table A2.1. In the Updated Core data AADT and HDV flows have decreased by 300 AADT and 77 HDV. Notwithstanding changes in vehicle emission factors, the increase in NO_2 concentrations at receptor R28 would likely be lower with the Updated Core traffic data compared to the ES Core data. The magnitude of impact predicted at R28 using ES Core traffic data was negligible and there would be no change to this using the Updated Core data.

Largest decrease in Pollutant Concentration

The largest improvements in annual mean NO_2 concentrations were reported in the ES at receptor R10 situated along Chapel/Station Road and at receptor R14 situated along Manor Lane where reductions of 1.2 µg/m^3 and 1.1 µg/m^3 respectively were predicted to occur. The predicted improvement in air quality was due to decreases in traffic flows on the local roads. In the Updated Core traffic data AADT and HDV flows have decreased by a larger amount that in the ES Core by 161 AADT and 72 HDV nearest R10, and by 1,135 AADT and 69 HDV nearest R14.

A3 Conclusions

A qualitative review has been undertaken to determine whether the updated traffic data, background maps and emission factors would potentially affect the conclusions of the ES Air Quality Assessment **[CD7.1]**.

Overall, the ARNs between the two data sets are similar and sensitive receptors modelled would remain the same if the Updated Core data were used. If the Air Quality Assessment were to be updated, the results would be different, but as assessment conclusions would remain the same.

(CORE TRAFFIC COMPARISON) APPENDIX A – DEFRA BACKGROUND COMPARISON

Receptor ID	X	Y	2028 NO_2			2028 PM_{10}			2028 PM2.5		
			2018 Ref Year	2021 Ref Year	Dif	2018 Ref Year	2021 Ref Year	Dif	2018 Ref Year	2021 Ref Year	Dif
R01	488798	362893	7.7	6.2	-1.5	15.0	13.5	-1.6	8.3	6.0	-2.3
R02	490906	364377	7.6	6.3	-1.3	16.1	14.5	-1.6	8.5	6.1	-2.5
R03	492474	365529	8.0	6.7	-1.3	16.1	14.8	-1.3	8.6	6.5	-2.1
R04	492613	368773	12.0	9.7	-2.3	15.8	14.2	-1.6	8.8	6.5	-2.3
R05	492517	369815	8.5	7.0	-1.6	16.0	14.4	-1.6	8.7	6.3	-2.4
R06	493831	366566	8.4	7.1	-1.3	15.0	13.7	-1.3	8.4	6.6	-1.8
R07	494260	366058	8.3	6.9	-1.4	14.3	13.3	-1.1	8.3	6.8	-1.5
R08	493749	365305	7.5	6.4	-1.1	15.7	14.5	-1.2	8.4	6.6	-1.8
R09	493610	364586	6.9	5.8	-1.1	15.2	13.7	-1.5	8.1	6.1	-2.1
R10	492563	362682	6.5	5.5	-1.0	15.0	13.5	-1.6	8.0	5.9	-2.1
R11	495402	363391	6.5	5.5	-1.0	15.0	13.4	-1.6	8.0	5.9	-2.1
R12	497859	360924	6.2	5.2	-1.0	15.0	13.4	-1.6	8.0	5.8	-2.1
R13	496871	362301	6.3	5.3	-1.0	14.9	13.3	-1.6	7.9	5.8	-2.1
R14	497447	364319	7.0	5.9	-1.1	15.3	14.0	-1.3	8.2	6.3	-1.9
R15	497765	364503	7.0	5.9	-1.1	15.3	14.0	-1.3	8.2	6.3	-1.9
R16	497762	365239	6.9	5.7	-1.2	15.3	13.7	-1.6	8.2	6.1	-2.1
R17	496684	365130	7.1	5.9	-1.2	15.5	14.1	-1.4	8.3	6.4	-1.9
R18	496097	365387	7.1	5.9	-1.2	15.5	14.1	-1.4	8.3	6.4	-1.9
R19	499185	366727	6.7	5.6	-1.0	15.1	13.6	-1.6	8.1	6.0	-2.1
R20	498597	366824	7.1	5.9	-1.2	15.5	14.1	-1.4	8.3	6.4	-1.9
R21	496705	368138	9.1	7.7	-1.5	14.7	12.9	-1.8	8.6	6.4	-2.2
R22	497867	367838	7.8	6.3	-1.5	15.6	14.1	-1.5	8.5	6.5	-2.0
R23	498796	366601	7.1	5.9	-1.2	15.5	14.1	-1.4	8.3	6.4	-1.9
R24	498750	366653	7.1	5.9	-1.2	15.5	14.1	-1.4	8.3	6.4	-1.9
R25	497840	366000	6.9	5.7	-1.2	15.3	13.7	-1.6	8.2	6.1	-2.1
R26	493856	366541	8.4	7.1	-1.3	15.0	13.7	-1.3	8.4	6.6	-1.8
R27	496701	368168	9.1	7.7	-1.5	14.7	12.9	-1.8	8.6	6.4	-2.2
R28	498193	365992	6.6	5.8	-0.8	15.1	13.6	-1.5	8.1	6.0	-2.0

Receptor ID	X	Y	2028 NO_2			2028 PM_{10}			2028 PM2.5		
			2018 Ref Year	2021 Ref Year	Dif	2018 Ref Year	2021 Ref Year	Dif	2018 Ref Year	2021 Ref Year	Dif
R29	497045	364908	7.0	5.9	-1.1	15.3	14.0	-1.3	8.2	6.3	-1.9
R30	497128	364751	7.0	5.9	-1.1	15.3	14.0	-1.3	8.2	6.3	-1.9
R31	497213	364556	7.0	5.9	-1.1	15.3	14.0	-1.3	8.2	6.3	-1.9
R32	496993	364942	6.7	5.6	-1.1	15.1	13.5	-1.5	8.1	6.0	-2.1
R33	496951	364963	6.7	5.6	-1.1	15.1	13.5	-1.5	8.1	6.0	-2.1
R34	496915	364990	6.7	5.6	-1.1	15.1	13.5	-1.5	8.1	6.0	-2.1
R35	496895	365005	7.1	5.9	-1.2	15.5	14.1	-1.4	8.3	6.4	-1.9
R36	496842	365032	7.1	5.9	-1.2	15.5	14.1	-1.4	8.3	6.4	-1.9
R37	496784	365033	7.1	5.9	-1.2	15.5	14.1	-1.4	8.3	6.4	-1.9
R38	497189	364580	7.0	5.9	-1.1	15.3	14.0	-1.3	8.2	6.3	-1.9
R39	497167	364647	7.0	5.9	-1.1	15.3	14.0	-1.3	8.2	6.3	-1.9
R40	497157	364520	7.0	5.9	-1.1	15.3	14.0	-1.3	8.2	6.3	-1.9
R41	496734	365065	7.1	5.9	-1.2	15.5	14.1	-1.4	8.3	6.4	-1.9
R42	497343	368885	8.2	6.7	-1.5	15.9	14.1	-1.8	8.6	6.3	-2.3
R43	501531	364765	6.3	5.3	-1.0	14.9	13.2	-1.6	7.9	5.7	-2.1
R44	499709	368665	7.1	5.8	-1.2	15.3	13.6	-1.7	8.2	6.0	-2.1
R45	500544	373257	8.4	6.7	-1.7	16.4	14.6	-1.8	8.7	6.3	-2.5
R46	500748	372899	8.1	6.7	-1.4	17.6	16.0	-1.6	8.6	6.4	-2.2
R47	505455	366379	6.4	5.4	-1.0	14.9	13.3	-1.6	8.0	5.9	-2.1
R48	507198	367824	6.8	5.2	-1.5	14.8	13.1	-1.7	7.9	5.7	-2.2
R49	512021	369477	6.5	5.2	-1.2	14.9	13.2	-1.7	8.0	5.8	-2.1
R50	512869	368651	6.3	5.1	-1.2	14.7	12.9	-1.8	7.8	5.6	-2.2
R51	511950	369479	6.6	5.3	-1.2	14.4	12.7	-1.7	7.8	5.8	-2.1
R52	499620	373896	8.4	6.9	-1.5	14.9	13.0	-1.9	8.5	6.3	-2.3
R53	496567	373741	8.3	6.8	-1.6	15.6	13.6	-2.0	8.6	6.1	-2.5
BBH_01	492641	364193	7.0	5.9	-1.1	15.3	13.7	-1.5	8.2	6.0	-2.1
BBH_02	496021	365276	7.1	5.9	-1.2	15.5	14.1	-1.4	8.3	6.4	-1.9