

North Lincolnshire Council

Barton Link Road

Air Quality Assessment

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Issue | 11 December 2023



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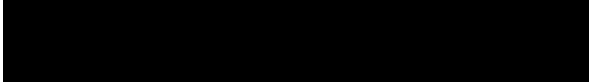
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Executive Summary

This report presents the air quality assessment for the Barton Link Road in Barton-upon-Humber, North Lincolnshire, henceforth referred to as the Proposed Development.

A review of current legislation, planning policy and a baseline assessment describing the current air quality conditions in the vicinity of the Proposed Development has been carried out. The Proposed Development is not considered to contradict policy or legislation relating to air quality.

There are no Air Quality Management Areas (AQMA) within close proximity to the Proposed Development. The nearest AQMAs are the Scunthorpe AQMA and the Hull AQMA No.1 (A). The Scunthorpe AQMA is located 18km to the south-west, which was first declared in 2005 and amended in 2018 due to exceedances of PM₁₀ 24-hour mean air quality objective. The Hull AQMA No.1 (A) is located 8km to north-east across the Humber Estuary and was declared in 2005 due to exceedances of the nitrogen dioxide (NO₂) annual mean air quality objective. Due to the distance between the Proposed Development and these AQMAs it is unlikely that the Proposed Development will have any significant impacts on the air quality in these areas.

A baseline assessment has been carried out to review the air quality conditions in the vicinity of the Proposed Development. The publicly available air quality data indicate that the annual mean NO₂, PM₁₀ and PM_{2.5} concentrations will be below the relevant air quality objectives at the Proposed Development.

Construction dust impacts have been considered and assessed using the qualitative approach described in the latest Institute of Air Quality Management (IAQM) guidance. It has been concluded that with the appropriate best practice mitigation measures in place (suitable for high-risk sites), there is likely to be a negligible effect on existing receptors from the dust-generating activities onsite.

The impacts of operational traffic as a result of the Proposed Development have been assessed. Negligible impacts or slight adverse impacts have been predicted for annual mean NO₂, PM₁₀ and PM_{2.5} concentrations at all worst case receptor locations. There are also no predicted exceedances of the air quality objectives for any of the modelled pollutants. Therefore, no significant effects have been predicted and mitigation measures are not required. The biggest improvements in air quality due to the Proposed Development were found to occur on the A1077 (Ferriby Road – Holydyke) between the A15 and B1218 (Brigg Road). Overall, the Proposed Development will benefit a number of receptors by creating bypass for traffic away from the populated areas and reducing the number of Heavy Goods Vehicles (HGVs) travelling through these areas.

Overall, it is considered that the Proposed Development would not have a significant effect on local air quality.

1. Introduction

Ove Arup & Partners Ltd (Arup) has been commissioned by North Lincolnshire Council to undertake an air quality assessment for the Barton Link Road in Barton-upon-Humber (Barton), North Lincolnshire, henceforth known as the 'Proposed Development'. The Proposed Development is located within the North Lincolnshire Council (NLC) area.

This air quality assessment includes a summary of relevant air quality policy and legislation, a description of the existing air quality conditions in the vicinity of the Proposed Development site, the methods used to consider and assess the potential impacts, any likely significant effects and, where necessary, recommended mitigation.

1.1 Description of Development

The Link Road will provide a 1-mile (1.6km) long, 24ft (7.3m) wide link road, including 10ft (3.0m) wide cycle route west of the carriageway, with 6.6ft (2.0m) footways either side of the carriageway between the A1077 and Caistor Road. The cross-section includes 6ft (1.8m) swale verges to support sustainable drainage (Figure 1).

It will serve to reduce Heavy Goods Vehicle (HGV) traffic to and from the Wren Kitchen headquarters known as 'The Nest', located just to the east of the town. This will avoid HGVs having to navigate the A1077, which runs through the centre of Barton or using the B1206 which runs through the adjacent town of Barrow upon Humber (Barrow).

1.2 Existing Site and Surroundings

The Proposed Development is located within Barton-upon-Humber in North Lincolnshire; the nearest postcode is DN18 5GP. The Site, outlined in red in Figure 1, is approximately 8.37 hectares (ha) in size and approximately 40m distance from the nearest residential dwellings. The nearest A road (A15) is approximately 2km west and the nearest motorway (M180) is located 9.5km south. The grid reference for the Proposed Development is TA042217. The Humber Estuary is located approximately 1.7km north.

The Proposed Development is located to the east of an existing housing development, with Barton town centre located 1km to the north-west. Wren Kitchen warehouse is approximately 420m north-east and Humber Bridge Industrial Estate is 730m north featuring a motor service centre, fitness studio, Royal Mail facility and commercial properties.

Densely populated residential areas are located along the north and west side of the Site, with the nearest property being 40m away. There are more sporadic, semi-detached and detached properties located to the north east and east, approximately 140m at their nearest. Beechgrove Farm is located 245m east and a caravan park is 135m north-east. Barrow-upon-Humber village is located 2.4km to the west and a combination of agricultural fields and villages are spread south of the Site until the A1080, located over 9km south and running east to west, fragments the land.

Agricultural fields lie on either side and to the south of the Proposed Development with a small woodland in the south where the new road is proposed to join the existing Caistor Road.

Baysgarth is the nearest school, situated 345m west and Options Barton, a specialist school for people with autism, is located 620m north-east, off Barrow Road.

There are no environmental designations within the Site. However, the Humber Estuary Ramsar, SPA and SSSI lie approximately 1.7km north.

There is currently no site access as the Proposed Development will be situated through existing agricultural fields that are currently undeveloped. Site access for operation will be to the west of the Site via Caistor Road and at the north via Barrow Road. Parking, access and site compounds locations for construction are to be confirmed.

An application for planning permission for a residential development by Strata Homes (Planning Application: PA/2023/1607) has been made just to the north of the Proposed Development. If consented, this development will have associated internal vehicular and pedestrian access, landscaping and infrastructure and formation of a new roundabout junction on Barton Road linking to a section of Barton upon Humber's relief road. While this assessment takes the current, undeveloped, status of the site as its baseline, cumulative impacts will be considered with regards to construction and operational traffic. It is important to note however that even if the above application did not come forward, the emerging Local Plan (specifically Policy H1P) allocates the same area for 225 dwellings and therefore, it is assumed that residential development in this area will eventually come forward.

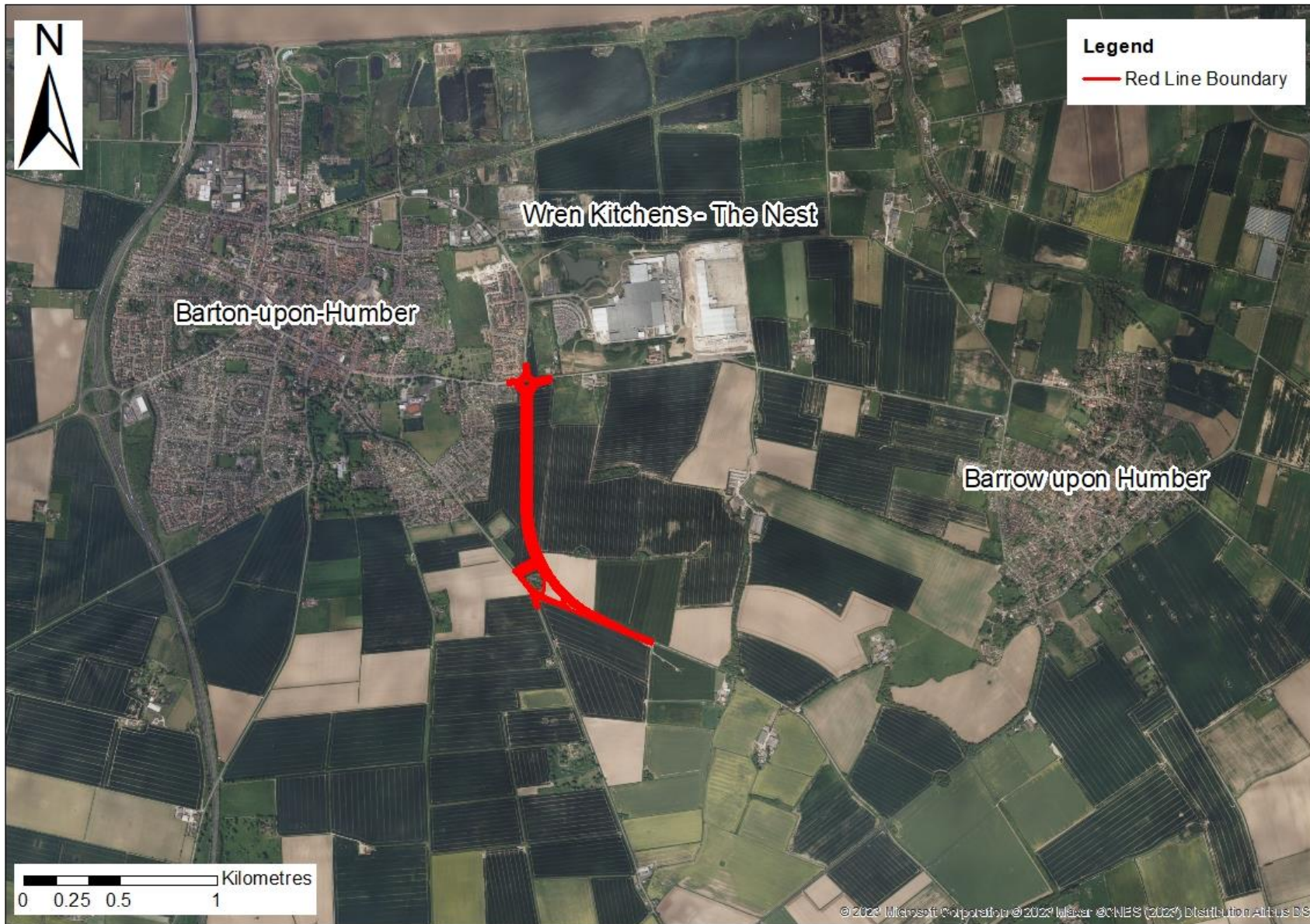


Figure 1: Site location plan

2. Air Quality Legislation

2.1 Environmental Act 2021

The Environment Bill become an Act¹ (law) in November 2021. The Environment Act 2021 amends the following legislation: Environment Act 1995² and the Clean Air Act 1993³ to give local authorities more power to reduce local pollution, particularly that from domestic burning; it also amends the Environmental Protection Act 1990⁴ to reduce smoke from residential chimneys by extending the system of statutory nuisance to private dwellings.

The following sections of the Environment Act 1995 have been transposed into the Environment Act 2021.

- For the Secretary of State to develop, implement and maintain an Air Quality Strategy. This includes the statutory duty, also under Part IV⁵ of the Environment Act 1995, for local authorities to undergo a process of local air quality management and declare an AQMA where pollutant concentrations exceed the national air quality objectives. Where an AQMA is declared, the local authority needs to produce an Air Quality Action Plan (AQAP), which outlines the strategy for improving air quality in these areas.

The Act will implement key parts of the government's Clean Air Strategy and include targets for tackling air pollution in the UK;

- for the Secretary of State to publish a report reviewing the Air Quality Strategy every five years;
- for the Government to set two targets: the first on the amount of PM_{2.5} pollutant in the ambient air (the figure and deadline for compliance remain unspecified) and a second long-term target set at least 15 years ahead to encourage stakeholder investment;
- for the Office for Environmental Protection to be established to substitute the watchdog function previously exercised by the European Commission;
- for local authorities' powers to be extended under the current Local Air Quality Management framework, including responsibilities to improve local air quality and to reduce public exposure to excessive levels of air pollution;
- for "air quality partners" to have a duty to share responsibility for dealing with local air pollution among public bodies; and

¹ Environment Act 2021. Available at: <https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted>. Accessed [Accessed October 2023].

² Environment Act 1995, Chapter 25, Part IV Air Quality

³ Clean Air Act 1993. Available at: <https://www.legislation.gov.uk/ukpga/1993/11/contents>. [Accessed October 2023]

⁴ Environmental Protection Act 1990. Available at: <https://www.legislation.gov.uk/ukpga/1990/43/contents>. [Accessed October 2023]

⁵ Environment Act 2021. Chapter 2. The Office for Environmental Protection.

- introduction of a new power for the government to compel vehicle manufacturers to recall vehicles and non-road mobile machinery if they are found not to comply with the environmental standards that they are legally required to meet.

2.2 Air Quality Standards Regulations 2010

The Air Quality Standards Regulations 2010⁶ (amended in 2016⁷) defines the policy framework for 12 air pollutants known to have harmful effects on human health or the natural environment. The Secretary of State for the Environment, Food and Rural Affairs has the duty of ensuring compliance with the air quality limit values (pollutant concentrations not to be exceeded by a certain date).

Following the UK's withdrawal from the European Union, the Air Quality Standards Regulations (EU-derived domestic legislation) were retained under S.2 of the European Union (Withdrawal) Act 2018 and updated to replace references to EU authorities with domestic equivalents in the Air Quality (Miscellaneous Amendment and Revocation of Retained Direct EU Legislation) (EU Exit) Regulations⁸.

Some pollutants have standards expressed as annual average concentrations due to the chronic way in which they affect health or the natural environment, i.e. effects occur after a prolonged period of exposure to elevated concentrations. Other pollutants have standards expressed as 24-hour, 1-hour or 15-minute average concentrations due to the acute way in which they affect health or the natural environment, i.e. after a relatively short period of exposure. Some pollutants have standards expressed in terms of both long and short-term concentrations. Air quality limit values and objectives are quality standards for clean air. Therefore, in this assessment, the term 'air quality standard' has been used to refer to the national limit values.

Table 1 sets out the national air quality standards for nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM_{2.5}) which are considered to be the primary pollutants of concern with regard to the Proposed Development. Other pollutants have been screened out of this air quality assessment, since they are not likely to cause exceedances of their respective standards.

Table 1: Air quality standards

Pollutant	Averaging period	Limit value / objective
Nitrogen Dioxide (NO ₂)	Annual mean	40µg/m ³
	1-hour mean	200µg/m ³ [1]
Particulate Matter (PM ₁₀)	Annual mean	40µg/m ³
	24-hour mean	50µg/m ³ [2]
Particulate Matter (PM _{2.5})*	Annual mean	20µg/m ³

⁶The Air Quality Standards Regulations 2010, SI 2010/1001

⁷The Air Quality Standards (Amendment) Regulations 2016, SI 2016/1184

⁸The Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019 Available at: <https://www.legislation.gov.uk/ukxi/2019/74/made> [Accessed October 2023]

Pollutant	Averaging period	Limit value / objective
	Annual mean	12µg/m ³ ^[3]
	Annual mean	10µg/m ³
<p>Note:</p> <p>^[1] not to be exceeded more than 18 times a year (99.79th percentile)</p> <p>^[2] not to be exceeded more than 35 times a year (90.41st percentile)</p> <p>* The Environmental Targets (Fine Particular Matter) (England) Regulations 2023 updated in 2023, to state that the “the annual mean level of PM_{2.5} in ambient air must be equal to or less than 10 µg/m³ (“the target level”)” by 31st December 2040^{9,10}. The Environmental Improvement Plan (2023) sets an interim target of 12 µg/m³, to be achieved by 31 January 2028¹¹.</p> <p>^[3] For the purpose of this assessment, a limit value of 12µg/m³ for PM_{2.5} has been used.</p>		

2.3 Dust Nuisance

Dust is the generic term used in the British Standard document BS 6069 (Part Two)¹² to describe particulate matter in the size range 1–75µm in diameter. Dust nuisance is the result of the perception of the soiling of surfaces by excessive rates of dust deposition. Under provisions in the Environmental Protection Act 1990¹³, dust nuisance is defined as a statutory nuisance.

There are currently no standards or guidelines for dust nuisance in the UK, nor are formal dust deposition standards specified. This reflects the uncertainties in dust monitoring technology and the highly subjective relationship between deposition events, surface soiling and the perception of such events as a nuisance. In law, complaints about excessive dust deposition would have to be investigated by the local authority and any complaint upheld for a statutory nuisance to occur. However, dust deposition is generally managed by suitable on-site practices and mitigation rather than by the determination of statutory nuisance and/or prosecution or enforcement notice(s).

⁹ Defra, 2023. Chief Planners Newsletter. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1140170/03_Chief_Planners_Newsletter_March_2023.pdf [Accessed November 2023]

¹⁰ The Environmental Targets (Fine Particular Matter) (England) Regulations 2023

¹¹ HM Government (2023) Environmental Improvement Plan 2023: First revision of the 25 Year Environment Plan.

¹² British Standards Institution (1994) BS 6069 Characterisation of air quality. General, Part 2, Glossary. British Standards Institution, London.

¹³ Environmental Protection Act 1990, Chapter 43, Part III Statutory Nuisances and Clean Air

3. Policy and Guidance

3.1 National Policy and Guidance

3.1.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF)¹⁴ was updated in December 2023 with the purpose of planning to achieve sustainable development. Paragraph 192 of the NPPF on air quality states that:

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

In addition, paragraph 109 states that:

“The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making.”

Paragraph 180 discusses how planning policies and decisions should contribute to and enhance the natural and local environment. In relation to air quality, NPPF notes that this can be achieved by:

“e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.”

3.1.2 Planning Practice Guidance

National Planning Practice guidance (NPPG) on various topics, including air quality was developed in order to support the NPPF. The guidance¹⁵ provides a concise outline as to how air quality should be considered in

¹⁴ Ministry of Housing, Communities and Local Government (2023) National Planning Policy Framework

¹⁵ Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2019) Air quality

order to comply with the NPPF and states when air quality is considered relevant to a planning application. This includes factors such as changes in traffic volumes, vehicle speeds, congestion or traffic composition, the introduction of new point sources of air pollution, exposure of people to existing sources of air pollutants, and the potential to give rise to air quality impacts at nearby sensitive receptors.

3.1.3 Clean Air Strategy

The Department for Environment, Food and Rural Affairs' (Defra) Clean Air Strategy¹⁶ was published in 2019 and sets targets for improving air quality across the country. It includes actions for reducing emissions from various sources, such as transport, domestic activities, farming and industry. There is also a long-term target for reducing population exposure to PM_{2.5} concentrations to meet the World Health Organisation's (WHO) target of 10µg/m³ as an annual mean. In particular, the Clean Air Strategy states:

“New legislation will create a stronger and a more coherent framework for action to tackle air pollution. This will be underpinned by new England-wide powers to control major sources of air pollution, in line with the risk they pose to public health and the environment, plus new local powers to take action in areas with an air pollution problem. These will support the creation of Clean Air Zones to lower emissions from all sources of air pollution, backed up with clear enforcement mechanism.”

3.2 Local Planning Policy and Guidance

3.2.1 North Lincolnshire Core Strategy

The Core Strategy¹⁷ sets out the long-term spatial planning framework for the development of North Lincolnshire up to 2026 by providing strategic policies and guidance to deliver the vision for the area including the scale and distribution of development, the provision of infrastructure to support it and the protection of our natural and built environment. It will also help to ensure that the investment decisions of key bodies are not made in isolation, but are properly co-ordinated, with a strong focus on the principles of sustainable development.

At the heart of the Local Development Framework and the Core Strategy, is the spatial vision for North Lincolnshire. This vision and associated spatial objectives aim to address the issues that face the area and provide a framework for the policies that will guide development in North Lincolnshire over the next 15 years up to 2026.

The 10 spatial objectives set out below show how the spatial vision will be delivered. Many of these objectives are identified as priorities in the Sustainable Community Strategy or reflect other key strategies such as the Regional Spatial Strategy.

¹⁶ Defra (2019) Clean Air Strategy 2019

¹⁷ North Lincolnshire Core Strategy – North Lincolnshire Council.

<https://m.northlincs.gov.uk/public/planningreports/corestrategy/adopteddpd/FullCoreStrategy.pdf> [Accessed November 2023].

- *“Spatial objective 1: An area wide renaissance;*
- *spatial objective 2: Delivering the global gateway;*
- *spatial objective 3: Delivering better homes;*
- *spatial objective 4: Creating greater economic success;*
- *spatial objective 5: Creating thriving towns and villages*
- *spatial objective 6: Protecting and enhancing the world class environment;*
- *spatial objective 7: Efficient use and management of resources;*
- *spatial objective 8: Promoting community health and wellbeing;*
- *spatial objective 9: Connecting North Lincolnshire; and*
- *spatial objective 10: Creating a quality environment.”*

3.2.2 2022 North Lincolnshire Local Plan

The 2022 North Lincolnshire Local Plan¹⁸ is currently in submissions draft but is designed to cover the period 2020 – 2038 and outlines an ambition to make the area and its communities safe, well, prosperous and connected. One of the key challenges to achieving this goal is improving air quality generated by heavy industry and traffic.

Policy DM3: Environmental Protection of the local plan states that:

“Development proposals as appropriate to their nature and scale, should demonstrate that environmental impacts on receptors have been evaluated and appropriate measures have been taken to minimise the risks of adverse impacts to air, land and water quality, whilst assessing vibration, heat, energy, light and noise pollution.”

With regards to air quality specifically it states:

- *“The Council will seek to ensure that proposals for new development will not have an unacceptable negative impact on air quality and will not further exacerbate air quality in the Scunthorpe Town AQMA or contribute to air pollution in areas which may result in a new AQMA. Applicants will be required to provide an air quality impact assessment to demonstrate this.*
- *The Council will seek to ensure that where a sensitive use is being proposed in an area of known poor air quality, the applicant will be required to provide an air quality impact assessment to demonstrate the development will not result in adverse effects on human health and local amenity. Residential*

¹⁸ North Lincolnshire Local Plan 2022 – North Lincolnshire Council. <https://localplan.northlincs.gov.uk/> [Accessed October 2023].

development within the Scunthorpe AQMA will not be permitted where there is evidence of adverse effects on human health and local amenity.

- *The Council will support and promote the provision of charging points for ultra-low emission vehicles.”*

3.2.3 North Lincolnshire Local Transport Plan

The Local Transport Plan¹⁹ sets out the 15-year transport strategy for North Lincolnshire from 2011 to 2026.

The vision for 2026 is for:

“A well maintained transport system that supports sustainable communities within a safe and prosperous environment and which contributes to the wider environmental, economic and social well being of the people who live and work in North Lincolnshire”.

The plan identifies five Local Transport Goals, of which four will have an indirect impact to improvement of air quality:

- *“Reduce transport related carbon dioxide emissions and protect and enhance the natural and built environment through sustainable transport solutions;*
- *Improve transport safety and security relating to death or injury from transport, in order to contribute towards safer and stronger communities;*
- *Provide equal opportunities through improvements in accessibility to key local hubs and services by sustainable modes of transport;*
- *Enhance people’s health and wellbeing through the promotion of healthy modes of travel and provision of a high quality integrated transport system that contributes towards long term sustainable regeneration”.*

3.3 Other Relevant Policy and Guidance

3.3.1 Local Air Quality Management Policy and Technical guidance

The policy guidance note, LAQM.PG(22)²⁰ is for local authorities in England. It provides local authority-led action to improve local air quality using available levers, including planning, public health and transport responsibilities. This guidance is also relevant to Mayoral Combined Authorities²¹, and external organisations who may need to engage with the local authority to assist in the delivery of their statutory duties on managing air quality. There are several updates detailed in the LAQM.PG (22), as follows:

- Local AQAP are required to demonstrate that local air quality objectives are met and achieved;

¹⁹ North Lincolnshire Local Transport Plan – North Lincolnshire Council. <https://www.northlincs.gov.uk/transport-and-streets/local-transport-plan-2011-2026/> [Accessed October 2023].

²⁰ Defra (2022) LAQM.PG(22)

²¹ A legal body set up using national legislation that enables a group of two or more councils to collaborate and take /collective decisions across council boundaries.

- an Air Quality Management Area is required to be declared within 12 months of identifying an exceedance of the air quality objectives;
- local authorities are required to produce an AQAP within 18 months of declaring an AQMA; and
- the introduction of a system of reminder and warning letters to increase transparency and accountability on local air quality.

The technical guidance, LAQM.TG(22)²² is designed to support local authorities across the UK in carrying out their duties to review and assess and take action to improve air quality under the Environment Act 1995² as amended by the Environment Act 2021¹. It provides detailed guidance on how to assess the impact of measures using existing air quality tools. Where relevant, this guidance has been taken into account in this air quality assessment.

3.3.2 Institute of Air Quality Management Dust Guidance

The Institute of Air Quality Management (IAQM) Guidance on the assessment of dust from demolition and construction²³ provides guidance to development consultants and environmental health officers on how to assess air quality impacts from construction. The IAQM guidance provides a method for classifying the significance of effect from construction activities based on the ‘dust magnitude’ (high, medium or low) and proximity of the Proposed Development to the closest receptors. The guidance recommends that once the significance of effect from construction is identified, the appropriate mitigation measures are implemented. Experience has shown that once the appropriate mitigation measures are applied, in most cases the resulting dust impacts can be reduced to negligible levels.

3.3.3 Guidance on Land-use Planning and Development Control

The 2017 Land-Use Planning & Development Control guidance document²⁴ produced by Environmental Protection UK (EPUK) and the IAQM provides a framework for professionals operating within the planning system to provide a means of reaching sound decisions, with regard to the air quality implications of development proposals.

The document provides guidance on when air quality assessments are required by providing screening criteria regarding the size of a development, changes to traffic flows/composition, energy facilities or combustion processes associated with the Proposed Development.

²² Defra (2022) LAQM.TG(22)

²³ IAQM Guidance on the assessment of dust from demolition and construction, v2.1. (2023) Institute of Air Quality Management, London.

²⁴ EPUK/IAQM (2017) Land-Use Planning & Development Control: Planning for Air Quality

4. Methodology

4.1 Assessment Methodology

The overall approach to the air quality assessment comprises the following:

- a review of the existing air quality conditions at, and in the vicinity of the Proposed Development;
- an assessment of the potential changes in air quality arising from the construction and operation of the Proposed Development;
- conclusions on the significance of any effects on local air quality; and
- formulation of mitigation measures, where appropriate, to ensure any adverse effects on air quality are minimised.

4.1.1 Methodology of Baseline Assessment

Existing or baseline ambient air quality refers to the concentration of relevant substances that are already present in the environment. These are present from various sources, such as industrial processes, commercial and domestic activities, road traffic and natural sources.

A desk-based review of the following data sources has been undertaken to determine the baseline air quality conditions in this assessment:

- North Lincolnshire Council Air Quality Annual Status Report (ASR)²⁵;
- the Environment Agency website²⁶; and
- the UK Air Information Resource website²⁷.

This review identified the main sources of air pollution within 2km of the Proposed Development, the local air quality monitoring data for recent years and local background pollutant concentrations. A 2km study area is generally considered to be appropriate to determine baseline conditions at the Proposed Development to provide an adequate amount of data.

4.1.2 Methodology of Construction Assessment

4.1.2.1 Construction Dust Assessment

The potential effects from demolition and construction of the Proposed Development have been assessed using the qualitative approach described in the latest guidance by the IAQM²³. The guidance considers the potential for dust emissions arising from activities such as demolition, earthworks, construction and trackout,

²⁵ North Lincolnshire Council (2023) 2023 North Lincolnshire Council Air Quality Annual Status Report (ASR).

²⁶ Environment Agency website; <https://environment.data.gov.uk/public-register/view/search-industrial-installations> [Accessed October 2023]

²⁷ Defra, <http://uk-air.defra.gov.uk> [Accessed October 2023]

and the effects these may have on human health, dust soiling and ecological harm. Further information for the approach is presented in Appendix A.

4.1.2.2 Construction Traffic Assessment

A screening assessment has been undertaken using the indicative criteria in the EPUK/IAQM land-use and planning guidance²⁴. As the Proposed Development is not located within or on close proximity to an AQMA, the following criteria apply:

- A change of Light Duty Vehicle (LDV) flows of more than 500 annual average daily traffic (AADT) movements; or
- a change of Heavy Duty Vehicle (HDV) flows of more than 100 AADT movements.

Meeting any of the criteria would indicate that detailed dispersion modelling of road traffic emissions would be necessary.

In line with the guidance²⁴, LDV constitutes cars and small vans which are <3.5t in gross vehicle weight. Whilst HDV are goods vehicles (HGVs) and buses which are >3.5t gross vehicle weight.

At this stage of design, the number of construction vehicles is not known. Construction traffic volumes generated by the Proposed Development are expected to be below the indicative screening criteria. When detailed construction traffic information is available at detailed design stage this will be reviewed against the screening thresholds to confirm whether further assessment is required.

4.1.3 Methodology of Operational Assessment

4.1.3.1 Operational Traffic Assessment

Operational traffic screening was undertaken using the same criteria described above in Section 4.1.2.2. Data on operational traffic was supplied by Arup Transport Consultants, which shows that the operational traffic movements for the Proposed Development would be in excess of 100 LDV movements per day. Therefore, a detailed air quality assessment has been undertaken.

Traffic data used in the assessment is inclusive of

The assessment follows the methodology set out in Defra's LAQM Technical Guidance LAQM.TG(22)²², and the inputs and processes used are detailed in the following sections.

4.1.3.2 Assessment Scenarios

The traffic assessment scenarios can be summarised as follows:

- Baseline Scenario (2022), which represents the current conditions at the Proposed Development (using 2022 traffic volumes and using 2022 emission factors);
- Do-Minimum (DM) Scenario (2025), which is the future year without the Proposed Development in place (using 2025 traffic volumes and using 2022 emission factors); and

- Do-Something (DS) Scenario (2025), which is the future year including the impact from the Proposed Development and other committed developments (using 2025 traffic volumes and using 2022 emission factors).

The 2025 DM scenario represents the future baseline conditions for the first year of opening for the Proposed Development and it accounts for committed developments in the area. The 2025 DS scenario is the same as the 2025 DM but includes operational traffic generated by the Proposed Development and other committed developments such as the Strata Homes application (application reference number: PA/2023/1607).

The extent of the modelled road network for the operational traffic is shown in Figure 2, with Appendix C providing details of the modelled roads used in the assessment.

Emission rates for all road sources were calculated using Defra's Emissions Factor Toolkit (EFT) v11.0²⁸. Impacts on air quality during operation have been modelled using 2022 vehicle emission factors and 2022 background concentrations for all the scenarios to provide a pessimistic assumption of future concentrations.

²⁸ Defra, 2021. Emissions Factors Toolkit (EFT) v11.0. Available at: <https://laqm.defra.gov.uk/air-quality/air-quality-assessment/emissions-factors-toolkit/> [Accessed: October 2023].

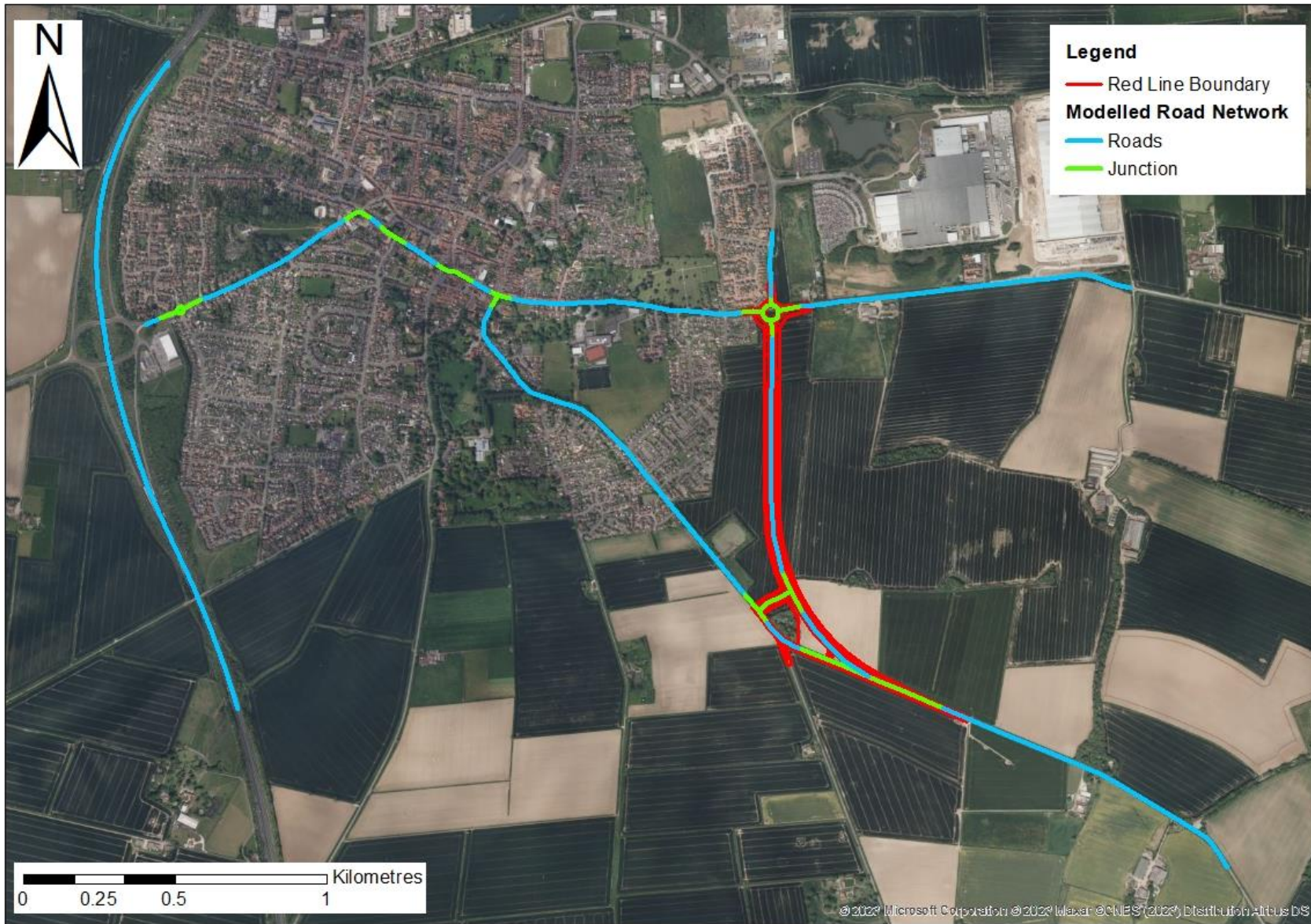


Figure 2: Modelled road network

4.1.3.3 Sensitive receptors

The operational traffic modelling was undertaken to calculate predicted concentrations at sensitive receptor locations. Sensitive receptors are defined as those residential properties/schools/hospitals that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction or operation of the Proposed Development. A desk-top study was undertaken to identify the sensitive receptors near the Proposed Development. Details of the sensitive receptors used in this assessment are shown in Table 2 and their locations are shown in Figure 3.

All residential receptors have been modelled at a height of 1.5m for ground floor receptors to be representative of typical human exposure. Where located on the modelled road network, care homes and schools have also been included as receptors.

No ecological receptors were identified within 200m of the modelled road network and therefore impacts to sensitive ecological receptors have not been considered further in this assessment.

There is one diffusion tube located on the modelled road network, diffusion tube 17 (receptor R11), on the A1077 (Holydyke) outside Beech House Care Home. This diffusion tube was included as a receptor to enable model verification and was modelled at a height of 2.0m (as per the ASR²⁵). The location of this diffusion tube is shown in Figure 3.

Table 2: Sensitive Human receptors

Receptor ID	Description	Type	OS grid reference		Height (m)
			X	Y	
R01	20 Market Place	Residential	503169	421842	1.5
R02	45 Barrow Road	Residential	503511	421758	1.5
R03	11 Ferriby Road	Residential	502795	422017	1.5
R04	69 Ferriby Road	Residential	502451	421800	1.5
R05	7 Caistor Road	Residential	503296	421614	1.5
R06	Baysgarth School	School	503755	421733	1.5
R07	90 Caistor Road	Residential	503765	421199	1.5
R08	18 Holydyke	Residential	502893	422031	1.5
R09	Cornhill Farn	Residential	504602	421750	1.5
R10	Options Barton	School	504894	421834	1.5
R11	Holydyke Barton*	Diffusion Tube	503032	421934	2.0
R12	Beech House Care Home	Care Home	503023	421952	1.5
R13	33 Whitecross Street	Residential	503287	421775	1.5
R14	Bluebell Court	Residential	503327	421779	1.5

Receptor ID	Description	Type	OS grid reference		Height (m)
			X	Y	
R15	94 Barrow Lane	Residential	504143	421715	1.5
R16	33 Falkland Way	Residential	504173	421757	1.5
R17	10 Glebe Way	Residential	504146	421658	1.5
R18	52 Appleleaf Lane	Residential	504062	421728	1.5
R19	16 Danson Close	Residential	504043	421488	1.5
R20	31 Fairfield Drive	Residential	503999	421128	1.5
R21	Caistor Road Farmhouse	Residential	505277	420187	1.5
R22	The Rancher	Residential	504344	421777	1.5
Note: *Receptor R011 is a diffusion tube monitoring site managed by NLC and is being used for verification purposes.					

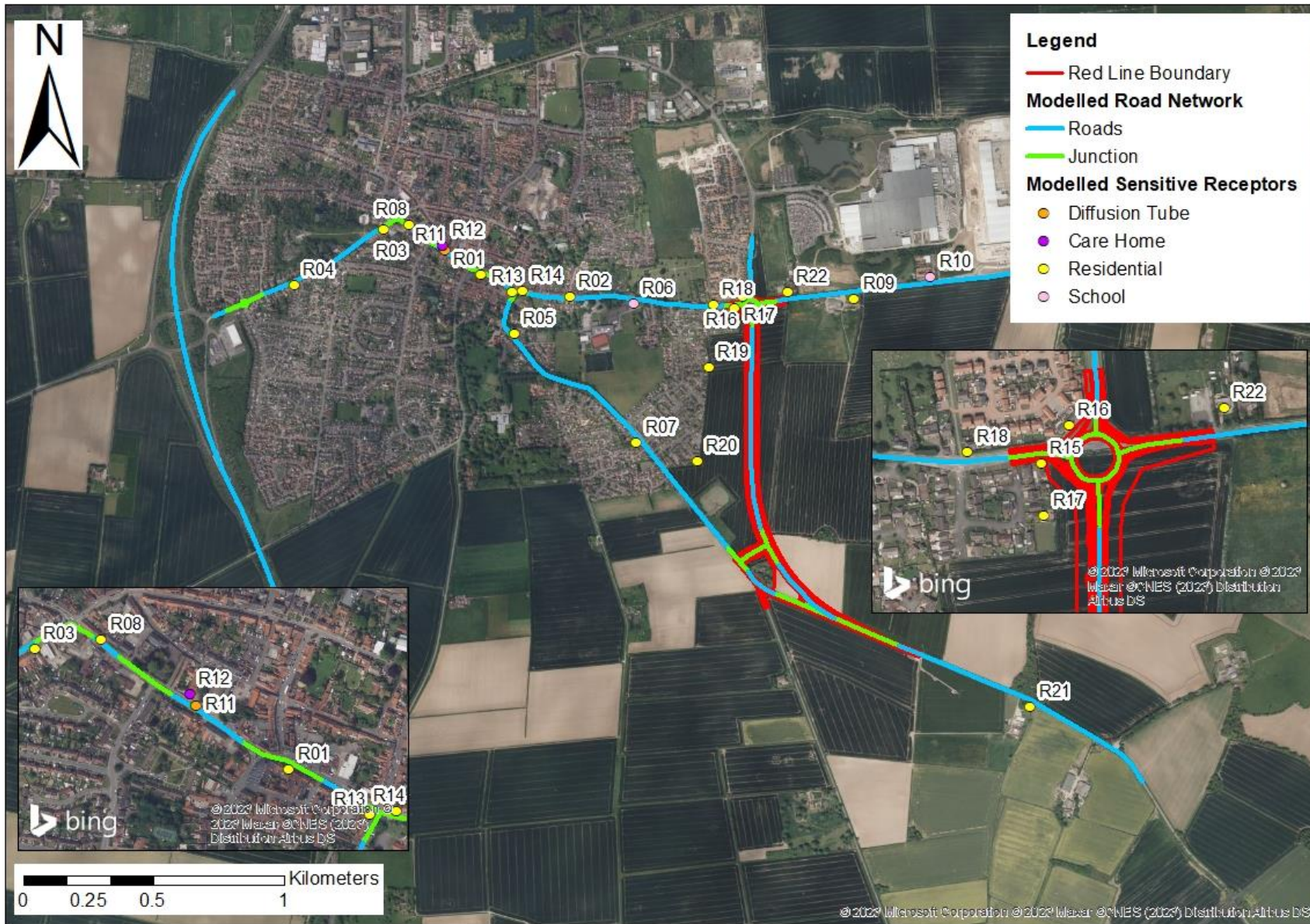


Figure 3: Modelled sensitive receptors

4.1.3.4 Dispersion model setup

This section details the inputs and set-up for the operational traffic dispersion modelling. The ADMS Roads dispersion model (version 5.0.0.1) has been used for the assessment of road traffic. All roads were modelled as ‘urban (not London)’ road types, with the exception of the A15 (Rd_5), which was modelled as ‘Motorway (not London)’ following the guidance set out in the EFT v11.0 User Guide²⁹.

4.1.3.5 Meteorological data

The meteorological data used in this assessment were measured at Humberside Airport meteorological station. The data was collected over the period 1st January 2022 to 31st December 2022 (inclusive). Humberside Airport is located approximately 10.5km south of the Proposed Development and was chosen due to its proximity to the Proposed Development.

Most dispersion models of roads do not use meteorological data if modelling calm wind conditions, as dispersion of air pollutants is more difficult to calculate in these circumstances. ADMS-Roads treats calm wind conditions by setting the minimum wind speed to 0.75m/s. Defra’s LAQM.TG22 guidance²² recommends that the meteorological data file is tested in a dispersion model and the relevant output log file checked to confirm the number of missing hours and calm hours that cannot be used by the dispersion model. This is important when considering predictions of high percentiles and the number of exceedances. The guidance recommends that meteorological data should only be used if the percentage of usable hours is greater than 85%.

Hourly sequential observation data was used in this assessment. The dataset includes 8,580 lines of usable hourly data, out of a total of 8,760 lines of data. This corresponds to 97.9% of the year. This is above the 85% threshold, so meets the requirements of the Defra guidance and is adequate for the dispersion modelling. Figure 4 shows the wind rose for Humberside Airport for 2022. It can be seen that the predominant wind direction is south westerly.

²⁹ Defra, 2021. Emissions Factors Toolkit (EFT) v11.0 User Guide. Available at: <https://laqm.defra.gov.uk/wp-content/uploads/2021/11/EFTv11.0-user-guide-v1.0.pdf> [Accessed: October 2023].

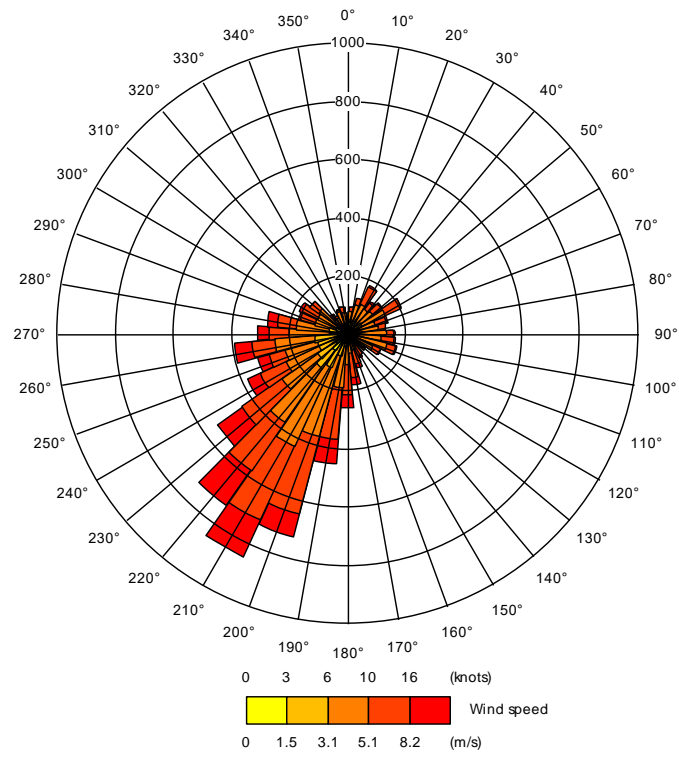


Figure 4 Wind rose for Humberside Airport 2022

4.1.3.6 *Other input parameters*

The extent of mechanical turbulence (and hence, mixing) in the atmosphere is affected by the surface/ground over which the air is passing. Typical surface roughness values range from 0.0001m (for water or sandy deserts) to 1.5 (for cities, forests and industrial areas). In this assessment, the general land use in the local study area can be described as “parkland, open suburbia” with a corresponding surface roughness of 0.5m. The surface roughness value used for the meteorological station site was “agricultural areas (min)”, with a surface roughness of 0.2m.

The minimum Monin-Obukhov length is a model parameter that describes the extent to which the urban heat island effect limits stable atmospheric conditions. A Monin-Obukhov length of 10m has been used in this dispersion modelling study. It is suggested in ADMS-Roads that this length is suitable for “small towns <50,000”. The same Monin-Obukhov length was used for the meteorological station site.

4.1.3.7 *NO_x to NO₂ conversion*

The dispersion model predicts nitrogen oxide (NO_x) concentrations which comprise nitric oxide (NO) and nitrogen dioxide (NO₂). NO_x is emitted from combustion processes, primarily as NO with a small percentage of NO₂. The emitted NO reacts with oxidants in the air (mainly ozone) to form NO₂. NO₂ is associated with effects on human health. The air quality standards for the protection of human health are based on NO₂ rather than total NO_x or NO.

LAQM.TG22²² details an approach for calculating the roadside conversion of NO_x to NO₂. This approach takes into account the difference between ambient NO_x concentrations with and without the Proposed Development, the concentration of ozone and the different proportions of primary NO₂ emissions in different years. This approach is available as a spreadsheet calculator, with the most up-to-date version being version 8.1, released in August 2020³⁰.

A suitable NO_x:NO₂ conversion has been applied to the modelled NO_x concentrations in order to determine the impact of the NO_x emissions on ambient concentrations of NO₂.

4.1.3.8 *Model verification*

Model verification refers to the comparison of modelled and measured pollutant concentrations at the same locations to determine the performance of the model. Should the majority of model results for NO₂ be within ±25% of the measured values and there is no systematic over or under-prediction of concentrations, then the LAQM.TG22²² guidance advises that no adjustment is necessary. If this is not the case, modelled concentrations are adjusted based on the observed relationship between modelled and measured NO₂ concentrations to provide a better agreement.

The outcome of the model verification is reported in Section 7.1 and Appendix B.

³⁰ Defra NO_x to NO₂ calculator (version 8.1), 2020. Available at: <https://laqm.defra.gov.uk/air-quality/air-quality-assessment/nox-to-no2-calculator/> [Accessed: October 2023].

4.1.3.9 Significance criteria

The 2017 EPUK/IAQM guidance note ‘Land-Use Planning & Development Control’²⁴ provides an approach to determining the air quality impacts resulting from a Proposed Development and the overall significance of local air quality effects arising from a Proposed Development.

Firstly, impact descriptors are determined based on the magnitude of incremental change as a proportion of the relevant assessment level, in this instance the annual mean NO₂, PM₁₀, and PM_{2.5} objectives. The change is then examined in relation to the predicted total pollutant concentrations in the assessment year and its relationship with the annual mean NO₂, PM₁₀, and PM_{2.5} objectives.

If the impact descriptor is negligible or slight, this is considered to not have a significant effect. The overall significance is determined by professional judgement.

The assessment framework for determining impact descriptors at each of the assessed receptors is shown in Table 3.

Table 3: Impact descriptors

Annual average concentrations at receptor in the assessment years	% Change in concentrations relative to annual mean NO ₂ and PM ₁₀ objectives			
	1	2 - 5	6 - 10	>10
75% or less of objective	Negligible	Negligible	Slight	Moderate
76 – 94% of objective	Negligible	Slight	Moderate	Substantial
95 – 102% of objective	Slight	Moderate	Moderate	Substantial
103 – 109% of objective	Moderate	Moderate	Substantial	Substantial
110% or more of objective	Moderate	Substantial	Substantial	Substantial

Note: Changes in pollutant concentrations of less than 1% i.e. <0.5% would be described as negligible

The guidance also provides advice for determining the magnitude of change for hourly mean NO₂ concentrations, which is shown in Table 4. The impact descriptor is determined by considering the process contribution only. However, in assessing the significance, consideration is also given to total pollutant concentrations, including background concentrations, and comparison of these with the hourly mean NO₂ objective.

Table 4: Magnitude of change for hourly mean NO₂ concentrations

Changes in hourly mean concentrations at receptor in the assessment year	Magnitude of change	Impact descriptors
<10% of hourly mean NO ₂ threshold	Imperceptible	Negligible
10 – 20% of hourly mean NO ₂ threshold	Small	Slight
20 – 50% of hourly mean NO ₂ threshold	Medium	Moderate

Changes in hourly mean concentrations at receptor in the assessment year	Magnitude of change	Impact descriptors
>50% of hourly mean NO ₂ threshold	Large	Substantial

The impact descriptors at each of the assessed receptors can then be used as a starting point to make a judgement on the overall significance of effect of a Proposed Development, however other influences would also need to be taken into account, such as:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

Professional judgement should be used to determine the overall significance of effects of the Proposed Development, however in circumstances where the Proposed Development can be judged in isolation, it is likely that a ‘moderate’ or ‘substantial’ impact will give rise to a significant effect and a ‘negligible’ or ‘slight’ impact will not result in a significant effect.

5. Baseline Assessment

A 2km study area is generally considered to be appropriate to determine baseline conditions at the Proposed Development to provide an adequate amount of data.

5.1 Sources of Air Pollution

5.1.1 Industrial Processes

Industrial air pollution sources are regulated through a system of operating permits or authorisations, requiring stringent emission limits to be met and ensuring that any releases to the environment are minimised or rendered harmless. Regulated (or prescribed) industrial processes are classified as Part A(1), A(2), Part B or Medium Combustion Plant (MCP) processes, and are regulated through the Pollution Prevention and Control (PPC) system^{31,32}. The larger more polluting processes are regulated by the EA, and the smaller, less polluting ones by the local authorities. Local authorities regulate only for emissions to air, whereas the EA regulates emissions to air, water and land.

According to the EA website²⁶, there is one regulated industrial installation within 2km of the Proposed Development, relating to Mere Pigs Pig Unit at Mere Farm, North Lincolnshire, DN18 6DD (permit no. EPR/TP3633UW). It is considered that pollutant contributions from this industrial site are included in the background pollutant concentrations reported below.

5.1.2 Road Traffic

In recent decades, atmospheric emissions from transport on a national basis have grown to match or exceed other sources in respect of many pollutants, particularly in urban areas. The local air quality in the vicinity of the Proposed Development is mainly influenced by vehicle emissions, notably from the A1077 to the north, the B1206 to the west and the A15 and B1218 to the east of the Proposed Development.

5.2 Local Air Quality

The Environment Act 2021¹ requires local authorities to review and assess air quality with respect to the objectives for the pollutants specified in the National Air Quality Strategy. Local authorities were required to carry out an Updating and Screening Assessment (USA) of their area every three years and are now required to complete an Annual Status Report (ASR) every year. If the APR identifies potential hotspot areas likely to exceed air quality objectives, then a detailed assessment of those areas is required. Where objectives are not predicted to be met, local authorities must declare the area as an AQMA. In addition, local authorities are required to produce an Air Quality Action Plan (AQAP), which includes measures to improve air quality in the AQMA.

³¹ Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)

³² The Environmental Permitting (England and Wales) (Amendment) Regulations 2013, SI 2013/390

There are no AQMAs within 2km of the Proposed Development. The nearest AQMA to the Proposed Development is situated approximately 8km to the north and is the Hull AQMA No.1 (A), which was declared in 2005 due to exceedances of air quality objective for annual mean NO₂. The Scunthorpe AQMA is situated approximately 18km to the south and was originally declared in 2005 due to exceedances of the PM₁₀ 24-hour mean air quality objective and amended in 2018 to reduce the boundary of the AQMA. These AQMAs are shown in Figure 5.

Given the distance of these AQMAs from the Proposed Development, it is considered unlikely that these AQMAs would be affected by the Proposed Development and these AQMAs are not considered further.



Figure 5: Air quality management areas

5.3 Local Monitoring

Both automatic and passive diffusion tube monitoring are being undertaken by NLC for NO₂. The available monitoring data show that within 2km of the Proposed Development there is one diffusion tube monitoring location, with the nearest automatic monitoring location being 10.8km south east of the Proposed Development. Details for the diffusion tube monitoring site are shown in Table 5 and the monitoring data presented together in Table 6. The monitoring locations are presented in Figure 6.

5.3.1 Automatic Monitoring

There are no automatic monitors operated by NLC within 2km of the Proposed Development. The closest automatic monitor is CM6 (Killingholme School), situated 10.8km south east from the Proposed Development in the village of South Killingholme next to the Phillips 66 Humber Refinery. This monitoring site is not considered to be representative of the air quality conditions at the Proposed Development given the distance from the Proposed Development. As such, it is not considered further in this baseline review.

5.3.2 Diffusion Tube Monitoring

The available monitoring data shows that within 2km of the Proposed Development, there is one diffusion tube monitoring location, Site 17 (Holydyke Barton), a suburban monitoring location situated near the town centre of Barton, approximately 1.1km west of the Proposed Development. Despite this monitor being classified as a suburban monitoring location, it is in reality a roadside monitoring site as it is positioned approximately 1m from the kerb on the A1077, as described in line with the guidance in TG.22²².

Details for this diffusion tube monitoring site are shown in Table 5 and the results presented in Table 6. The monitoring locations are presented in Figure 6.

Table 5: Diffusion Tube Monitoring Sites within 2km of the Proposed Development

Site ID	Site name	Site type	OS grid reference (m)		Pollutants Monitored
			X	Y	
17	Holydyke Barton	Suburban	503025	421942	NO ₂

Table 6: Annual mean NO₂ monitoring data within 2km of the Proposed Development

Site ID	Site name	Site type	NO ₂ concentration (µg/m ³)				
			2018	2019	2020	2021	2022
17	Holydyke Barton	Suburban	20.0	21.0	17.6	20.9	22.3

Notes: * Automatic monitor

Exceedances of the NO₂ annual mean objective of 40µg/m³ are highlighted in bold.

n/a = no monitoring data available for this year

Table 6 shows that no exceedances of the NO₂ annual mean objective (40µg/m³) were recorded at the monitoring location between 2018 and 2022, with the highest measurement being 22.3µg/m³ in 2022. In the last five years, there were no recorded annual mean NO₂ concentrations above 60µg/m³, indicating exceedances of the hourly mean objective for NO₂ concentrations are unlikely.

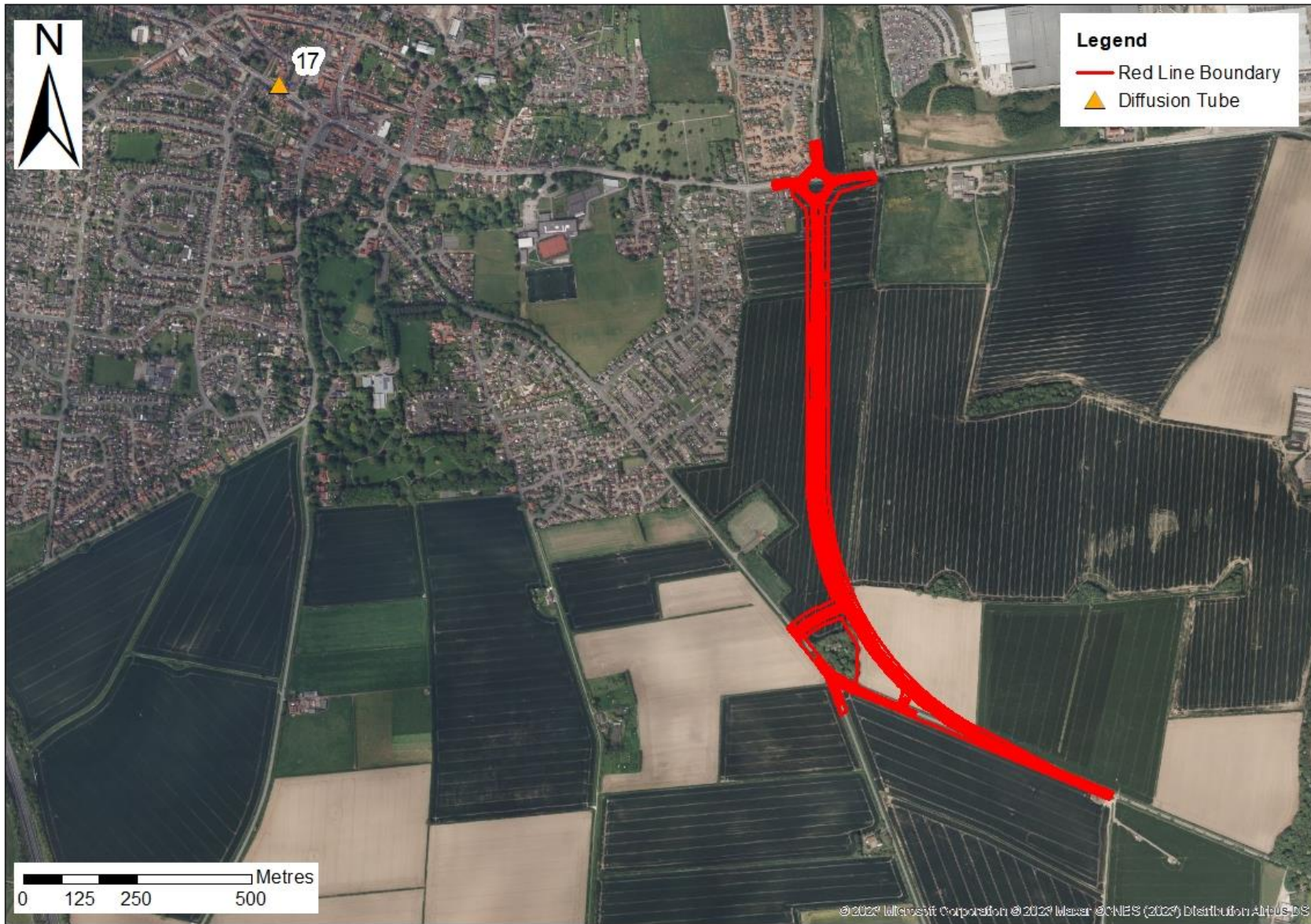


Figure 6: Air quality monitoring locations

5.4 Background Concentrations

Background concentrations refer to the existing levels of pollution in the atmosphere, produced by a variety of stationary and non-stationary sources, such as roads and industrial processes. The Defra website²⁷ includes estimated background pollutant concentrations for NO₂, PM₁₀ and PM_{2.5} for each 1km by 1km OS grid square in the UK.

The background pollutant concentrations are shown below in Table 7 for the relevant assessment years and all concentrations are well below the annual air quality objectives for NO₂ (40µg/m³), PM₁₀ (40µg/m³) and PM_{2.5} (12µg/m³).

Table 7: Estimated background annual mean pollutant concentrations for 2022, 2024 and 2025

Year	OS grid square		Annual mean concentration (µg/m ³)		
	X	Y	NO ₂	PM ₁₀	PM _{2.5}
2022 (Baseline year)	504500	421500	9.3	15.9	8.2
	504500	420500	8.5	15.5	8.2
2024 (Construction year)	504500	421500	8.8	15.7	8.0
	504500	420500	8.1	15.2	8.0
2025 (Opening year)	504500	421500	8.6	15.5	7.9
	504500	420500	7.9	15.1	7.9

The closest urban background diffusion tube monitoring site to the Proposed Development is monitoring site 15 (Humber Road Chip Shop), which is 11.4km to the south east of the Proposed Development. This site has consistently recorded NO₂ concentrations below the annual mean air quality objective since 2018. However, given the distance of this site from the Proposed Development, it is not considered to be representative.

Defra background concentrations have been used in this assessment as a result and 2022 data has been used to provide a conservative assessment.

5.5 Baseline Summary

The NLC monitoring location within 2km of the Proposed Development, monitoring location 17 (Holydyke Barton) is considered to be representative of the air quality at the Proposed Development. Particularly as the site is located on the A1077 (Holydyke), which forms part of the modelled road network around the Proposed Development.

The closest urban background monitoring site to the Proposed Development is not considered to be representative of conditions at the Proposed Development due to the distance from the site location. Defra background concentrations are well below the relevant air quality objectives and have been used in this assessment.

Both the diffusion tube data and the Defra background data indicate NO₂, PM₁₀ and PM_{2.5} concentrations are well below the annual air quality objectives. On this basis it is considered likely that the annual mean concentrations for NO₂, PM₁₀ and PM_{2.5} are likely to be below the relevant objectives at the Proposed Development.

6. Construction Assessment

6.1 Construction Dust

This section provides the results of the assessment of potential impacts from construction dust generating activities on air quality. The construction of the Proposed Development will involve demolition, construction, earthworks and associated trackout³³ activities.

6.1.1 Sensitive Receptors

Sensitive receptors are defined as those residential properties/schools/hospitals that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction and operation of a Proposed Development.

There are 10-100 residential receptors within 20m of the Proposed Development, with the nearest sensitive receptors being located on Appleleaf Lane to the north, and Glebe Way to the west of the Proposed Development. In addition, there are over 100 sensitive residential receptors within 20m of the construction traffic route within 200m of the Proposed Development. Residential properties are ‘*high sensitivity*’ receptors in accordance with the IAQM guidance²³.

There are no ecological sites within 50m of the Proposed Development. Following IAQM guidance²³ impacts on ecological receptors have therefore not been considered further in this assessment.

The construction dust buffers are presented in Figure 7.

³³ The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when HDVs leave the construction/demolition site with dusty materials, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site.

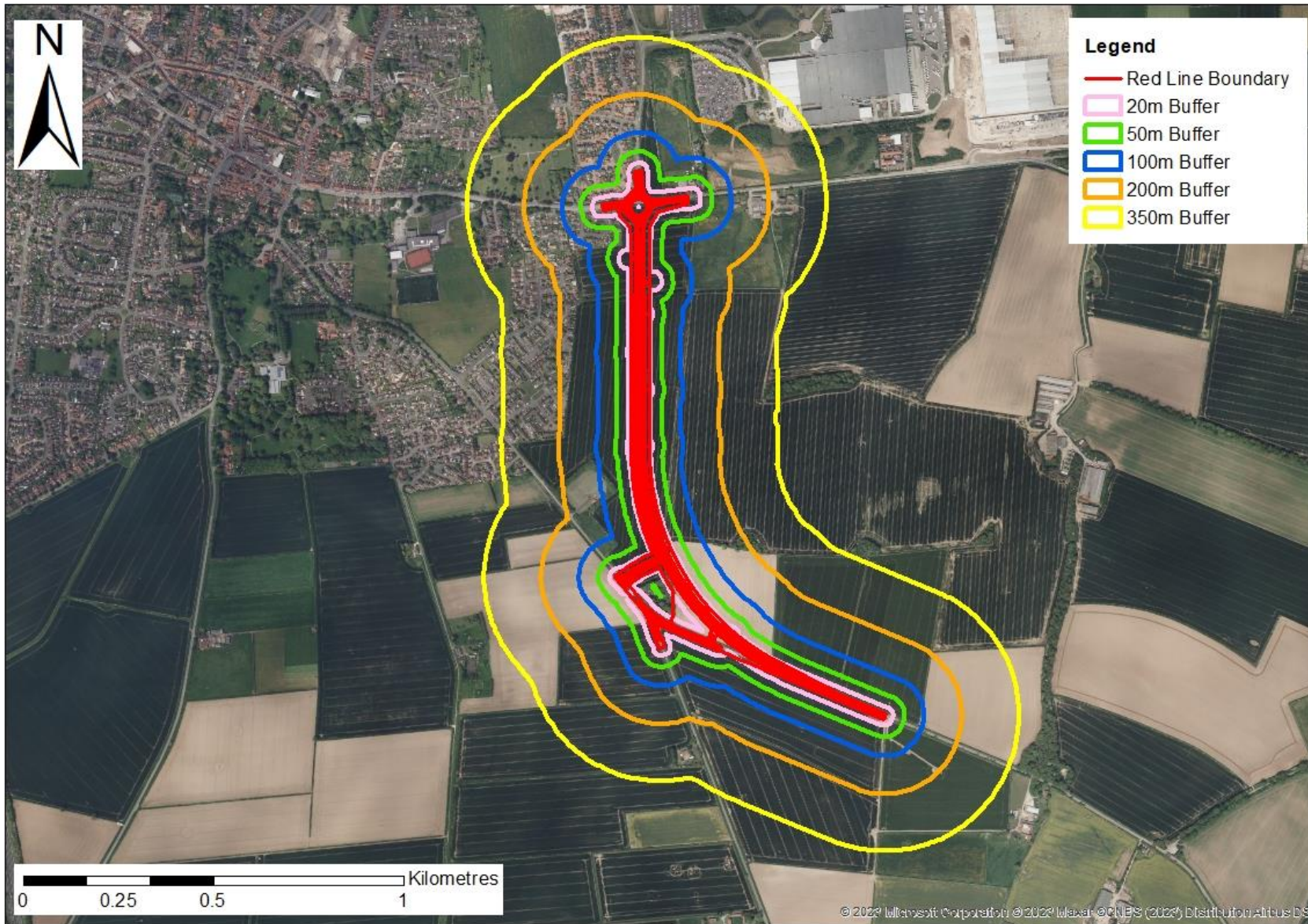


Figure 7: Construction dust buffers

6.1.2 Dust Emission Magnitude

Each dust-generating activity has been assigned a dust emission magnitude based on the data provided by the Arup design team for the Proposed Development. The dust emission magnitudes associated with construction of the Proposed Development are outlined in Table 8.

Table 8: Dust emission magnitude for construction activities at the Proposed Development

Activity	Dust emission magnitude	Reasoning
Demolition	Small	Volume to be demolished assumed to be <12,000m ³ ; Demolition activities < 6m above ground; and Material with low dust potential.
Earthworks	Medium	Total site area ~18,000 – 110,000m ² ; Dusty soil type (acid loam and clay); <20,000 tonnes of material to be moved; Number of heavy earth-moving vehicles active at any one time estimated to be < 5; and No bunds proposed at this stage.
Construction	Medium	Total building volume 12,000 – 75,000m ³ ; and Potentially dusty material (concrete).
Trackout	Large	Maximum 20-50 HDV outward movements at peak; Moderately dusty surface material; and >100m unpaved road.

6.1.3 Sensitivity of the Area

There are between 10 and 100 high sensitivity receptors within 20m of the Proposed Development. As such, the areas sensitivity to dust soiling has been classified as *high* in accordance with the IAQM guidance²³.

The Proposed Development is located in OS grid squares 504500, 421500 and 504500, 420500 where the average Defra PM₁₀ background concentration is 15.7µg/m³. Both of these grid squares have a PM₁₀ background concentration below the 24µg/m³ threshold stipulated in the IAQM guidance²³ therefore the sensitivity of the area to human health has been assigned as *low*.

6.1.4 Risk of Impacts

Taking into consideration the dust emission magnitude and the sensitivity of the area, the risk of impacts has been classified and presented in Table 9. The risks for potential dust soiling and human health impacts have been determined to be *high risk*.

Table 9: Summary dust risk table prior to mitigation for the Proposed Development

Activity	Dust soiling	Human health
Demolition	Medium Risk	Negligible
Earthworks	Medium Risk	Low Risk
Construction	Medium Risk	Low Risk

Activity	Dust soiling	Human health
Trackout	High Risk	Low Risk

The potential impacts of dust soiling and potential impacts on human health are predicted to be *high risk*. Specific mitigation to minimise the risk of dust soiling and human health impacts from the Proposed Development is described in section 8.

Following the implementation of appropriate mitigation, the potential impacts of dust soiling and potential impacts on human health should be negligible and therefore be not significant.

There is likely to be construction dust impacts on sensitive receptors from the nearby Strata Homes development (application reference: PA/2023/1607). If works occur at the same time, there is likely to be cumulative effects between the two developments. However, as the potential impacts on human health are already predicted to be *high risk*, the proposed mitigation measures described in section 8 are sufficient and should reduce the impacts to be *negligible* and therefore not significant. A separate construction dust assessment will likely be needed for the Strata Homes application to ensure they are applying the appropriate mitigation measures. If suitable measures are adopted, they should sufficiently reduce the potential impacts from dust soiling and impacts on human health at nearby sensitive receptors.

7. Operational Traffic Assessment

7.1 Model Verification

There is one diffusion tube monitoring site located on the modelled road network that could be used for model verification, site 17 – Holydyke Barton. This site is positioned approximately 1m from the A1077 (Holydyke), one of the main roads running through Barton. Despite this monitor being classified as a suburban monitoring location, it is in reality a roadside monitoring site. For the purpose of this assessment and for verification, Site 17 has been treated as a roadside monitoring location and is therefore suitable for use in model verification.

Details of the model verification can be found in Appendix B.

7.2 Operational Traffic

7.2.1 NO₂ results

The predicted annual mean concentrations of NO₂ for the DM and DS scenarios at each receptor are presented in Table 10. IAQM significance criteria²⁴ and results are also provided in Table 10.

Predicted concentrations are below the annual mean air quality objective (40µg/m³) at all of the sensitive receptor locations for each modelled scenario. The highest concentration was predicted at receptor R08 (18 Holydyke) and was 28.3µg/m³ in the DM scenario and 27.8µg/m³ in the DS scenario (to one decimal place) resulting in a negligible(beneficial) impact.

The biggest improvement in air quality was recorded at receptor R08 (18 Holydyke), where the predicted NO₂ concentration was 28.3µg/m³ in the DM scenario and 27.8µg/m³ in the DS scenario. All of the biggest positive changes in predicted NO₂ concentrations were found to be on the A1077 (Ferriby Road – Holydyke) between the A15 and B1218 (Brigg Road). Demonstrating that reducing HDV movements in Barton-upon-Humber is having a net positive effect with regards to NO₂.

The magnitude of change in annual mean NO₂ concentrations is considered to be negligible at all but one receptor, according to EPUK/IAQM guidance²⁴. There is one receptor, R15 (94 Barrow Lane) where there is a slight adverse impact.

This receptor (R15) is located closest to the new link road and the roundabout that is going to be created as a result of the Proposed Development. The receptor is therefore going to see an increase in traffic and emissions. The Proposed Development will also result in the receptor being closer to the road as the A1077 will be realigned to the south to meet the new roundabout, resulting in the road and traffic being closer to the boundary of the property. Despite the slight adverse impact reported, the modelled NO₂ concentration at this receptor is well below the air quality objective of 40µg/m³ in each modelled scenario, with the predicted concentration being 13.9µg/m³ in the DM scenario and 16.3µg/m³ in the DS scenario.

Table 10: Predicted annual mean NO₂ concentrations at the modelled sensitive human receptors

Receptor ID	Description	Height (m)	Baseline 2022 (µg/m ³)	DM 2025 (µg/m ³)	DS 2025 (µg/m ³)	DM – DS Change (µg/m ³)	Impact descriptor
R01	20 Market Place	1.5	19.3	16.4	16.4	+0.05	Negligible
R02	45 Barrow Road	1.5	21.5	18.7	18.8	+0.17	Negligible
R03	11 Ferriby Road	1.5	26.2	23.1	22.6	-0.49	Negligible
R04	69 Ferriby Road	1.5	22.0	18.8	18.5	-0.27	Negligible
R05	7 Caistor Road	1.5	16.4	13.4	13.4	<0.01	Negligible
R06	Baysgarth School	1.5	16.5	13.4	13.5	+0.09	Negligible
R07	90 Caistor Road	1.5	14.8	11.6	11.7	+0.05	Negligible
R08	18 Holydyke	1.5	31.2	28.3	27.8	-0.56	Negligible
R09	Cornhill Farn	1.5	14.6	11.8	12.0	+0.18	Negligible
R10	Options Barton	1.5	16.1	13.4	13.5	+0.15	Negligible
R11	Holydyke Barton	2.0	25.3	22.6	22.3	-0.35	Negligible
R12	Beech House Care Home	1.5	21.8	19.0	18.7	-0.29	Negligible
R13	33 Whitecross Street	1.5	19.7	16.7	16.8	+0.08	Negligible
R14	Bluebell Court	1.5	24.4	21.7	21.8	+0.18	Negligible
R15	94 Barrow Lane	1.5	16.6	13.9	16.3	+2.42	Slight adverse
R16	33 Falkland Way	1.5	17.8	15.1	16.5	+1.35	Negligible
R17	10 Glebe Way	1.5	13.6	10.8	11.6	+0.79	Negligible
R18	52 Appleleaf Lane	1.5	19.8	17.1	17.0	-0.13	Negligible
R19	16 Danson Close	1.5	12.9	10.0	10.2	+0.15	Negligible
R20	31 Fairfield Drive	1.5	13.9	10.7	10.8	+0.10	Negligible
R21	Caistor Road Farmhouse	1.5	12.1	9.6	9.6	+0.01	Negligible

Receptor ID	Description	Height (m)	Baseline 2022 ($\mu\text{g}/\text{m}^3$)	DM 2025 ($\mu\text{g}/\text{m}^3$)	DS 2025 ($\mu\text{g}/\text{m}^3$)	DM – DS Change ($\mu\text{g}/\text{m}^3$)	Impact descriptor
R22	The Rancher	1.5	16.1	13.4	13.9	+0.55	Negligible

7.2.2 PM_{10} results

The predicted annual mean concentrations of PM_{10} for the DM and DS scenarios at each receptor are presented in Table 11 along with IAQM significance criteria²⁴. Predicted concentrations are below the annual mean air quality objective ($40\mu\text{g}/\text{m}^3$) at all of the sensitive receptor locations for each modelled scenario.

The highest concentration was predicted at receptor R18 (52 Appleleaf Way) and was $16.5\mu\text{g}/\text{m}^3$ in both the DM and DS scenarios (to one decimal place).

As with the predicted NO_2 concentrations, the biggest improvements were found on the A1077 (Ferriby Road – Holydyke) between the A15 and B1218 (Brigg Road) as a result of the reduce traffic flows due to the Proposed Development. The receptor that saw the biggest improvement was receptor R08 (18 Holydyke), followed by R03 (11 Ferriby Road), these receptors saw net changes of -0.05 and -0.04 in predicted PM_{10} concentrations respectively.

The magnitude of change to annual mean PM_{10} concentrations at all receptor locations is considered to be negligible.

Table 11: Predicted annual mean PM_{10} concentrations at the modelled sensitive human receptors

Receptor ID	Description	Height (m)	Baseline 2022 ($\mu\text{g}/\text{m}^3$)	DM 2025 ($\mu\text{g}/\text{m}^3$)	DS 2025 ($\mu\text{g}/\text{m}^3$)	DM – DS Change ($\mu\text{g}/\text{m}^3$)	Impact descriptor
R01	20 Market Place	1.5	14.3	14.3	14.3	<0.01	Negligible
R02	45 Barrow Road	1.5	14.5	14.5	14.5	+0.01	Negligible
R03	11 Ferriby Road	1.5	15.1	15.2	15.1	-0.04	Negligible
R04	69 Ferriby Road	1.5	15.1	15.1	15.1	-0.02	Negligible
R05	7 Caistor Road	1.5	14.1	14.1	14.1	<0.01	Negligible
R06	Baysgarth School	1.5	14.1	14.1	14.1	+0.01	Negligible
R07	90 Caistor Road	1.5	14.0	14.0	14.0	<0.01	Negligible
R08	18 Holydyke	1.5	15.6	15.6	15.6	-0.05	Negligible
R09	Cornhill Farn	1.5	16.1	16.1	16.1	+0.01	Negligible
R10	Options Barton	1.5	16.2	16.2	16.2	+0.01	Negligible

Receptor ID	Description	Height (m)	Baseline 2022 ($\mu\text{g}/\text{m}^3$)	DM 2025 ($\mu\text{g}/\text{m}^3$)	DS 2025 ($\mu\text{g}/\text{m}^3$)	DM – DS Change ($\mu\text{g}/\text{m}^3$)	Impact descriptor
R11	Holydyke Barton	2.0	14.9	14.9	14.8	-0.03	Negligible
R12	Beech House Care Home	1.5	14.5	14.6	14.5	-0.02	Negligible
R13	33 Whitecross Street	1.5	14.3	14.3	14.3	+0.01	Negligible
R14	Bluebell Court	1.5	14.6	14.6	14.6	+0.01	Negligible
R15	94 Barrow Lane	1.5	16.2	16.2	16.3	+0.12	Negligible
R16	33 Falkland Way	1.5	16.3	16.3	16.4	+0.06	Negligible
R17	10 Glebe Way	1.5	16.0	16.0	16.1	+0.04	Negligible
R18	52 Appleleaf Lane	1.5	16.5	16.5	16.5	-0.02	Negligible
R19	16 Danson Close	1.5	16.0	16.0	16.0	+0.01	Negligible
R20	31 Fairfield Drive	1.5	14.0	14.0	14.0	+0.01	Negligible
R21	Caistor Road Farmhouse	1.5	15.6	15.6	15.6	<0.01	Negligible
R22	The Rancher	1.5	16.2	16.2	16.2	+0.03	Negligible

7.2.3 $\text{PM}_{2.5}$ results

The predicted annual mean concentrations of $\text{PM}_{2.5}$ for the DM and DS scenarios at each receptor are presented in Table 12 along with the IAQM significance criteria²⁴ and results. Predicted concentrations are below the interim air quality target for $\text{PM}_{2.5}$ ($12\mu\text{g}/\text{m}^3$) at all of the sensitive receptor locations for each modelled scenario.

The highest concentration was predicted at receptor R21 (a farmhouse on Caistor Road) and was $8.7\mu\text{g}/\text{m}^3$ in both the DM and DS scenarios (to one decimal place).

As with the predicted NO_2 and PM_{10} concentrations, the biggest improvements were found on the A1077 (Ferry Road – Holydyke) between the A15 and B1218 (Brigg Road) as a result of the reduce traffic flows due to the Proposed Development. The receptor that saw the biggest improvement was receptor R08 (18 Holydyke), followed by R03 (11 Ferry Road), these receptors saw net changes of -0.03 and -0.02 in predicted $\text{PM}_{2.5}$ concentrations respectively.

The magnitude of change to annual mean $\text{PM}_{2.5}$ concentrations at all receptor locations is considered to be negligible.

Table 12: Predicted annual mean PM_{2.5} concentrations at the modelled sensitive human receptors

Receptor ID	Description	Height (m)	Baseline 2022 (µg/m ³)	DM 2025 (µg/m ³)	DS 2025 (µg/m ³)	DM – DS Change (µg/m ³)	Impact descriptor
R01	20 Market Place	1.5	8.2	8.2	8.2	<0.01	Negligible
R02	45 Barrow Road	1.5	8.3	8.3	8.3	+0.01	Negligible
R03	11 Ferriby Road	1.5	8.2	8.3	8.2	-0.02	Negligible
R04	69 Ferriby Road	1.5	8.1	8.1	8.1	-0.01	Negligible
R05	7 Caistor Road	1.5	8.1	8.1	8.1	<0.01	Negligible
R06	Baysgarth School	1.5	8.1	8.1	8.1	<0.01	Negligible
R07	90 Caistor Road	1.5	8.0	8.0	8.0	<0.01	Negligible
R08	18 Holydyke	1.5	8.5	8.5	8.5	-0.03	Negligible
R09	Cornhill Farn	1.5	8.3	8.3	8.3	+0.01	Negligible
R10	Options Barton	1.5	8.4	8.4	8.4	+0.01	Negligible
R11	Holydyke Barton	2.0	8.5	8.5	8.5	-0.02	Negligible
R12	Beech House Care Home	1.5	8.3	8.3	8.3	-0.01	Negligible
R13	33 Whitecross Street	1.5	8.2	8.2	8.2	<0.01	Negligible
R14	Bluebell Court	1.5	8.3	8.4	8.4	+0.01	Negligible
R15	94 Barrow Lane	1.5	8.4	8.4	8.4	+0.07	Negligible
R16	33 Falkland Way	1.5	8.4	8.4	8.4	+0.04	Negligible
R17	10 Glebe Way	1.5	8.2	8.2	8.3	+0.03	Negligible
R18	52 Appleleaf Lane	1.5	8.5	8.5	8.5	-0.01	Negligible
R19	16 Danson Close	1.5	8.2	8.2	8.2	+0.01	Negligible
R20	31 Fairfield Drive	1.5	8.0	8.0	8.0	<0.01	Negligible

Receptor ID	Description	Height (m)	Baseline 2022 ($\mu\text{g}/\text{m}^3$)	DM 2025 ($\mu\text{g}/\text{m}^3$)	DS 2025 ($\mu\text{g}/\text{m}^3$)	DM – DS Change ($\mu\text{g}/\text{m}^3$)	Impact descriptor
R21	Caistor Road Farmhouse	1.5	8.7	8.7	8.7	<0.01	Negligible
R22	The Rancher	1.5	8.3	8.4	8.4	+0.02	Negligible

7.2.4 Assessment of significance

The air quality assessment considers the potential significance of effects the Proposed Development will have on all receptors.

For NO_2 , the impacts are predicted to be negligible or slight adverse, which is considered to be ‘not significant’ in line with the guidance.

For both PM_{10} and $\text{PM}_{2.5}$, the predicted impacts are negligible at all receptors. As such the effects are also considered to be ‘not significant’.

The overall effect of the proposed Development on local air quality is therefore considered to be ‘not significant’.

8. Mitigation

8.1 Construction Mitigation

8.1.1 Construction Dust

The dust emitting activities assessed can be greatly reduced or eliminated by applying the site-specific mitigation measures. As *high risk* has been determined for the construction activities, relevant high risk measures have been provided for this construction activity according to the IAQM guidance²³.

8.1.1.1 General

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Display the name and contact details of person(s) accountable for air quality and dust issues on the Site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.
- Develop and implement a Dust Management Plan, which will include measures to control other emissions, approved by the local authority.
- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site.

8.1.1.2 Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, both on- or off-site and the action(s) taken to resolve the situation in the logbook.
- Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.

8.1.1.3 Monitoring

- Carry out regular site inspections to monitor compliance with the Dust Management Plan, record inspection results and make an inspection log available to the local authority, when asked.

- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Agree dust deposition, dust flux, or real-time PM₁₀ continuous monitoring locations, if necessary, with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.
- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100m of site boundary, with cleaning to be provided if necessary.

8.1.1.4 Site Maintenance

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as practical or possible.
- Erect solid screens or barriers around dusty activities or the Site boundary that are at least as high as any stockpiles on site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.
- Cover, seed or fence stockpiles to prevent wind whipping.

8.1.1.5 Operating Vehicle/Machinery and Sustainable Travel

- Ensure all on-road vehicles comply with the requirements of London Low Emission Zone and the London NRMM standards, where applicable.
- Ensure all vehicles switch off engines when stationary – no idling vehicles.
- Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable

additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).

- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).

8.1.1.6 Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques, such as water sprays or local extraction.
- Ensure an adequate water supply on the Site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use the fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

8.1.1.7 Waste Management

- Avoid bonfires and burning of waste materials.

8.1.1.8 Measures Specific to Demolition

The following mitigation measures are highly recommended or desirable for medium risk demolition activities:

- Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
- Ensure effective water suppression is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.

8.1.1.9 Measures Specific to Earthworks

The following mitigation measures are desirable for medium risk earthworks sites:

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.

8.1.1.10 Measures Specific to Construction

The following measures are desirable or highly recommended for medium risk construction activities:

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in banded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.

8.1.1.11 Measures Specific to Trackout

The following measures are highly recommended for high risk trackout activities:

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the Site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site logbook.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

8.2 Operational Mitigation

8.2.1 Operational Traffic

No significant effects have been predicted and therefore mitigation measures are not required.

9. Conclusions

This report presents the air quality assessment for the Proposed Development of the Barton Link Road, Barton-upon-Humber, North Lincolnshire.

A review of current legislation, planning policy and a baseline assessment describing the current air quality conditions in the vicinity of the Proposed Development has been carried out. The Proposed Development is not considered to contradict policy or legislation relating to air quality.

A baseline assessment has been carried out to review the air quality conditions in the vicinity of the Proposed Development. The Proposed Development is not situated within or adjacent to any AQMA, with the nearest one being 8km to the north-east across the Humber Estuary; known as Hull AQMA No.1(A).

North Lincolnshire Council undertake automatic and passive air quality monitoring, with the nearest site being just over 1km west of the Proposed Development on the A1077 (Holydyke) outside the Beech House Care Home. This site is a suburban diffusion tube monitoring location - 17 (Holydyke Barton). At this site the annual mean NO₂ concentration was 22.3µg/m³ in 2022, with no exceedances of the NO₂ annual mean air quality objective being recorded between 2018 and 2022. Defra background estimates for NO₂ at the Proposed Development have been estimated as 9.3µg/m³ and 8.5µg/m³ for 2022. PM₁₀ and PM_{2.5} Defra background concentrations for the Proposed Development were also below the respective air quality objectives, being estimated as 15.9µg/m³ and 15.5µg/m³ for PM₁₀ and, 8.2µg/m³ for PM_{2.5}. Based on this information, the air pollution concentrations at the Proposed Development are likely to be within the legal limits.

Construction dust impacts have been considered and assessed using the qualitative approach described in the latest IAQM guidance. It has been concluded that with the appropriate best practice mitigation measures suitable for high risk sites in place, there is likely to be a negligible effect on existing receptors from the dust-generating activities onsite.

A modelling assessment using ADMS-Roads has been carried out to predict the NO₂, PM₁₀ and PM_{2.5} concentrations due to operational traffic associated with the Proposed Development. Negligible impacts have been predicted for annual mean NO₂, PM₁₀ and PM_{2.5} concentrations at all but one receptor location for operational traffic. The biggest improvements in air quality due to the Proposed Development were found to occur on the A1077 (Ferryby Road – Holydyke) between the A15 and B1218 (Brigg Road), specifically around receptors R08 (18 Holydyke) and R03 (11 Ferryby Road). This is likely due to the reduced traffic flow and re-routing of HDVs away from Barton and onto the new link road. Consequently, the biggest impacts were found to occur around the new link road and the construction of the roundabout between the A1077, Falkland Way and the link road. However, there are no predicted exceedances of the air quality objective for any of the modelled pollutants. Therefore, no significant effects have been predicted and mitigation measures are not required.

Overall, it is considered unlikely that there would be significant effects on local air quality as a result of the Proposed Development.

Appendix A

A.1 Construction Dust – Supplementary Information

A.1.1 Construction Dust Assessment Methodology

An ‘impact’ is described as a change in pollutant concentrations or dust deposition, while an ‘effect’ is described as the consequence of an impact. The main impacts that may arise during demolition and construction of the Proposed Development are:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes;
- Elevated PM₁₀ concentrations as a result of dust generating activities on site; and
- An increase in NO₂ and PM₁₀ (including PM_{2.5}) concentrations due to exhaust emissions from Non-Road Mobile Machinery (NRMM) and vehicles accessing the site.

The IAQM guidance considers the potential for dust emissions from dust-generating activities, such as demolition of existing structures, earthworks, construction of new buildings and trackout. Earthworks refer to the processes of soil stripping, ground levelling, excavation and land capping, while trackout is the transport of dust and dirt from the site onto the public road network where it may be deposited and then re-suspended by vehicles using the network. This arises when vehicles leave the site with dusty materials, which may then spill onto the road, or when they travel over muddy ground on-site and then transfer dust and dirt onto the public road network.

For each of these dust-generating activities, the guidance considers three separate effects:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and
- The risk of health effects due to a significant increase in PM₁₀ exposure.

The receptors can be human or ecological and are selected based on their sensitivity to dust soiling and PM₁₀ exposure. Sensitive receptors are defined as those properties/schools/hospitals that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction of the Proposed Development.

The methodology takes into account the scale at which the above effects are likely to be generated (classed as small, medium or large), the levels of background PM₁₀ concentrations and the distance to the closest receptor, in order to determine the sensitivity of the area. This is then taken into consideration when deriving the overall risk for the site. Suitable mitigation measures are also proposed to reduce the risk of the potential impacts on local air quality as a result of the construction works.

There are five steps in the assessment process described in the IAQM guidance, this is summarised in Figure A1 with further description provided in the following paragraphs.

Step 1: Need for assessment

The first step is the initial screening for the need for a detailed assessment. According to the IAQM guidance, an assessment is required where there are sensitive receptors within 250m of the site boundary of the scheme (for ecological receptors that is 50m) and/or within 50m of the route(s) used by the construction vehicles on the public highway and up to 250m from the site entrance(s)

For specific (high risk) schemes the planning authority may require a dust assessment despite the proposed site falling outside the distances above.

Step 2: Assess the risk of dust impacts

This step is split into three sections as follows:

- 2A. Define the potential dust emission magnitude;
- 2B. Define the sensitivity of the area; and
- 2C. Define the risk of impacts.

Each of the dust-generating activities is given a dust emission magnitude depending on the scale and nature of the works (step 2A) based on the criteria presented in Table A1.

The sensitivity of the surrounding area is then determined (step 2B) for each dust effect from the above dust-generating activities, based on the proximity and number of receptors, their sensitivity to dust, the local PM₁₀ background concentrations and any other site-specific factors. Table A2 to Table A4 show the criteria for defining the sensitivity of the area to different dust effects.

The overall risk of the impacts for each activity is then determined (Step 2C) prior to the application of any mitigation measures (Table A5) and an overall risk for the site derived.

Step 3: Determine the site-specific mitigation

Once each of the activities is assigned a risk rating, appropriate mitigation measures are identified. Where the risk is negligible, no mitigation measures beyond those required by legislation are necessary.

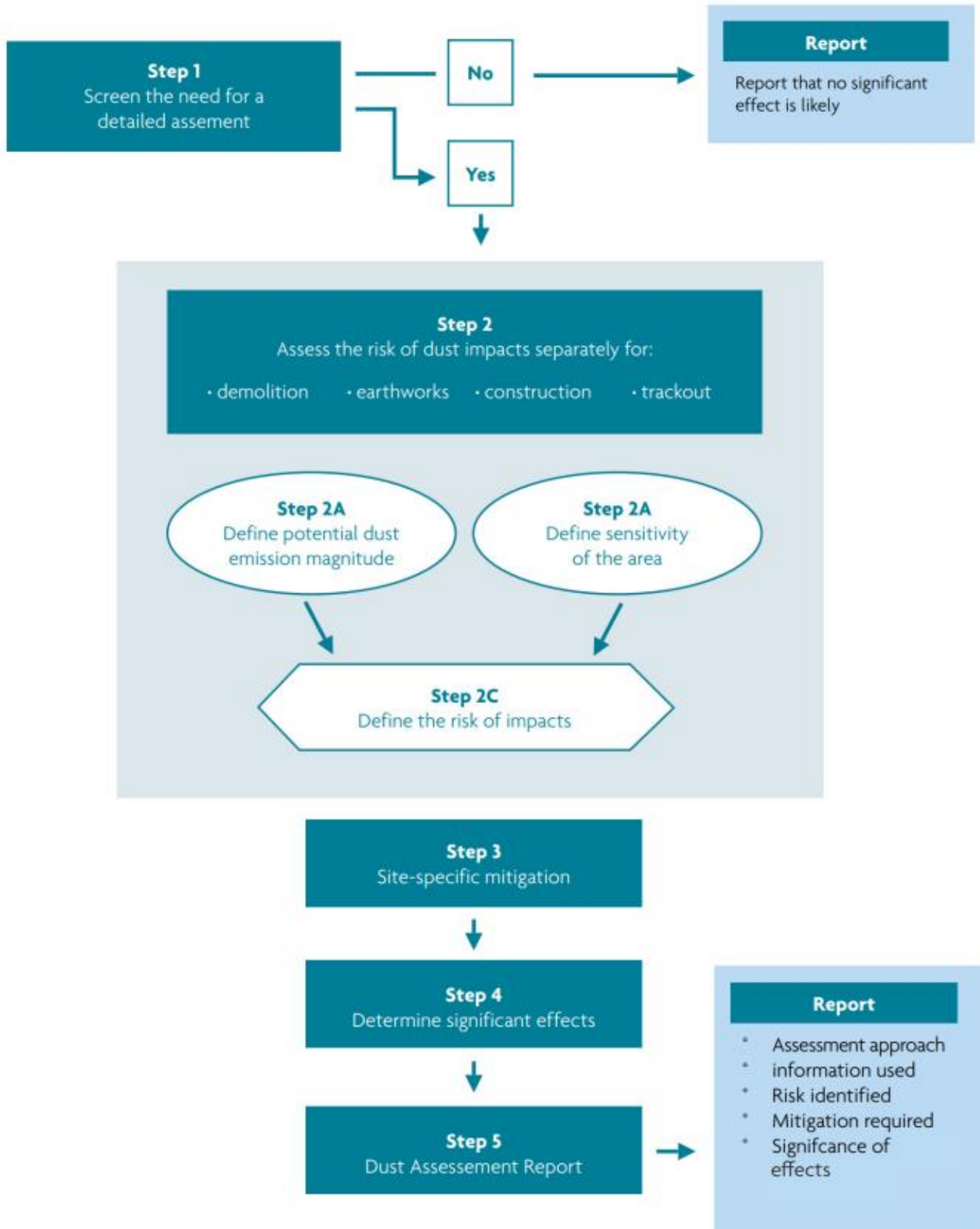
Step 4: Determine any significant residual effects

Once the risk of dust impacts has been determined and the appropriate dust mitigation measures identified, the final step is to determine whether there are any residual significant effects. The IAQM guidance notes that it is anticipated that with the implementation of effective site-specific mitigation measures, the environmental effect will not be significant in most cases.

Step 5: Prepare a dust assessment report

The last step of the assessment is the preparation of a Dust Assessment Report. This forms part of this report (Section 6.1).

Figure A1: IAQM dust methodology²³



A.1.2 Dust Emission Magnitude

Table A1: Dust emission magnitude

Small	Medium	Large
Demolition		
<ul style="list-style-type: none"> total building volume <12,000m³ construction material with low potential for dust release (e.g. metal cladding or timber) demolition activities <6m above ground demolition during wetter months 	<ul style="list-style-type: none"> total building volume 12,000 - 75,000m³ potentially dusty construction material demolition activities 6-12m above ground level 	<ul style="list-style-type: none"> total building volume >75,000m³ potentially dusty construction material (e.g. concrete) on-site crushing and screening demolition activities >12m above ground level
Earthworks		
<ul style="list-style-type: none"> total site area <18,000m² soil type with large grain size (e.g. sand) <5 heavy earth moving vehicles active at any one time formation of bunds <4m in height 	<ul style="list-style-type: none"> total site area 18,000m² – 110,000m² moderately dusty soil type (e.g. silt) 5 – 10 heavy earth moving vehicles active at any one time formation of bunds 3 - 6m in height 	<ul style="list-style-type: none"> total site area >110,000m² potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) >10 heavy earth moving vehicles active at any one time formation of bunds >6m in height
Construction		
<ul style="list-style-type: none"> <20 HDV (>3.5t) outward movements in any one day surface material with low potential for dust release unpaved road length <50m 	<ul style="list-style-type: none"> 20 – 50 HDV (>3.5t) outward movements in any one day potentially dusty surface material (e.g. high clay content) unpaved road length 50 – 100m 	<ul style="list-style-type: none"> >50 HDV (>3.5t) outward movements in any one day potentially dusty surface material (e.g. high clay content) unpaved road length >100m
Trackout		
<ul style="list-style-type: none"> <20 HDV (>3.5t) outward movements in any one day surface material with low potential for dust release unpaved road length <50m 	<ul style="list-style-type: none"> 20 – 50 HDV (>3.5t) outward movements in any one day moderately dusty surface material (e.g. high clay content) unpaved road length 50 – 100m 	<ul style="list-style-type: none"> >50 HDV (>3.5t) outward movements in any one day potentially dusty surface material (e.g. high clay content) unpaved road length >100m

A.1.3 Sensitivity of the Area to Dust Soiling Effects

Table A2: Sensitivity of the area to dust soiling effects

Receptor sensitivity	Number of receptors	Distance from the source (m)			
		< 20	< 50	< 100	< 350
High	> 100	High	High	Low	Low
	10 – 100	High	Medium	Low	Low
	< 10	Medium	Low	Low	Low
Medium	> 1	Medium	Low	Low	Low
Low	> 1	Low	Low	Low	Low

A.1.4 Sensitivity of the Area to Human Health Impacts

Table A3: Sensitivity of the area to human health impacts

Background PM ₁₀ concentrations (annual mean)	Number of receptors	Distance from the source (m)				
		< 20	< 50	< 100	< 200	< 350
High receptor sensitivity						
> 32µg/m ³	> 100	High	High	High	Medium	Low
	10 – 100			Medium	Low	
	1 - 10		Medium	Low		
28 – 32µg/m ³	> 100	High	High	Medium	Low	Low
	10 – 100		Medium	Low		
	1 - 10					
24 – 28µg/m ³	> 100	High	Medium	Low	Low	Low
	10 – 100					
	1 - 10	Medium	Low			
< 24µg/m ³	> 100	Medium	Low	Low	Low	Low
	10 – 100	Low				
	1 - 10					
Medium receptor sensitivity						
> 32µg/m ³	> 10	High	Medium	Low	Low	Low
	< 10	Medium	Low			
28 – 32µg/m ³	>10	Medium	Low	Low	Low	Low
	1 -10	Low				
24 – 28µg/m ³	>10	Low	Low	Low	Low	Low
	1 -10					
< 24µg/m ³	>10	Low	Low	Low	Low	Low
	1 -10					
Low receptor sensitivity						
–	> 1	Low	Low	Low	Low	Low

A.1.5 Sensitivity of the Area to Ecological Impacts

Table A4: Sensitivity of the area to ecological impacts

Receptor sensitivity	Distance from the source (m)	
	< 20	< 50
High	Medium	Medium
Medium	Medium	Low
Low	Low	Low

A.1.6 Risk of Dust Impacts

Table A5: Risk of dust impacts

Sensitivity of area	Dust emission magnitude		
	Large	Medium	Small
Demolition			
High	High risk site	Medium risk site	Medium risk site
Medium	High risk site	Medium risk site	Low risk site
Low	Medium risk site	Low risk site	Negligible
Earthworks			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Medium risk site	Low risk site
Low	Low risk site	Low risk site	Negligible
Construction			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Medium risk site	Low risk site
Low	Low risk site	Low risk site	Negligible
Trackout			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Medium risk site	Negligible
Low	Low risk site	Low risk site	Negligible

Appendix B

B.1 Model Verification

Model verification used the NLC NO₂ monitoring data from diffusion tube site 17 (Holydyke Barton), on the modelled road network. The location of this monitoring site is shown in Figure 6.

Other monitoring sites were not included in the model verification as they were not located on the modelled road network or were considered to be unsuitable for model verification.

Monitoring results for these locations for 2022 were obtained from the 2023 NLC ASR²⁵ and were compared with modelled concentrations at the same locations. The model verification was undertaken following the methodology described in LAQM.TG22²².

A comparison of the monitored and modelled data is shown in Table B1.

Table B1: Comparison of modelled and monitored annual mean NO₂ for 2022

Site Name	Pollutant	Monitored concentration (µg/m ³)	Modelled concentration (µg/m ³)	Difference of modelled vs monitored (%)
17	NO ₂	22.3	13.9	-37.6%

A comparison of monitored and modelled annual mean NO₂ concentrations for 2022 before and after adjustment are shown in Table B1. The percentage difference between the monitored and modelled results before adjustment is -37.6%, this is above the recommended guideline stated in LAQM.TG22²² of ±25%, indicating that model adjustment is required.

An adjustment factor of 3.27 as shown in Table B2 has been determined by the ratio of monitored road NO_x and modelled road NO_x calculated and applied to all modelled NO_x concentrations (which increases the resulting NO₂ concentrations).

Table B2: Comparison of adjusted modelled and monitored annual mean for 2022

Site Name	Pollutant	Monitored concentration (µg/m ³)	Modelled concentration (µg/m ³)	Ratio of Monitored Road NO _x / Modelled Road NO _x
17	NO _x	23.2	7.1	3.27

Graphical representations before and after adjustment are shown in Figure B1 and Figure B2.

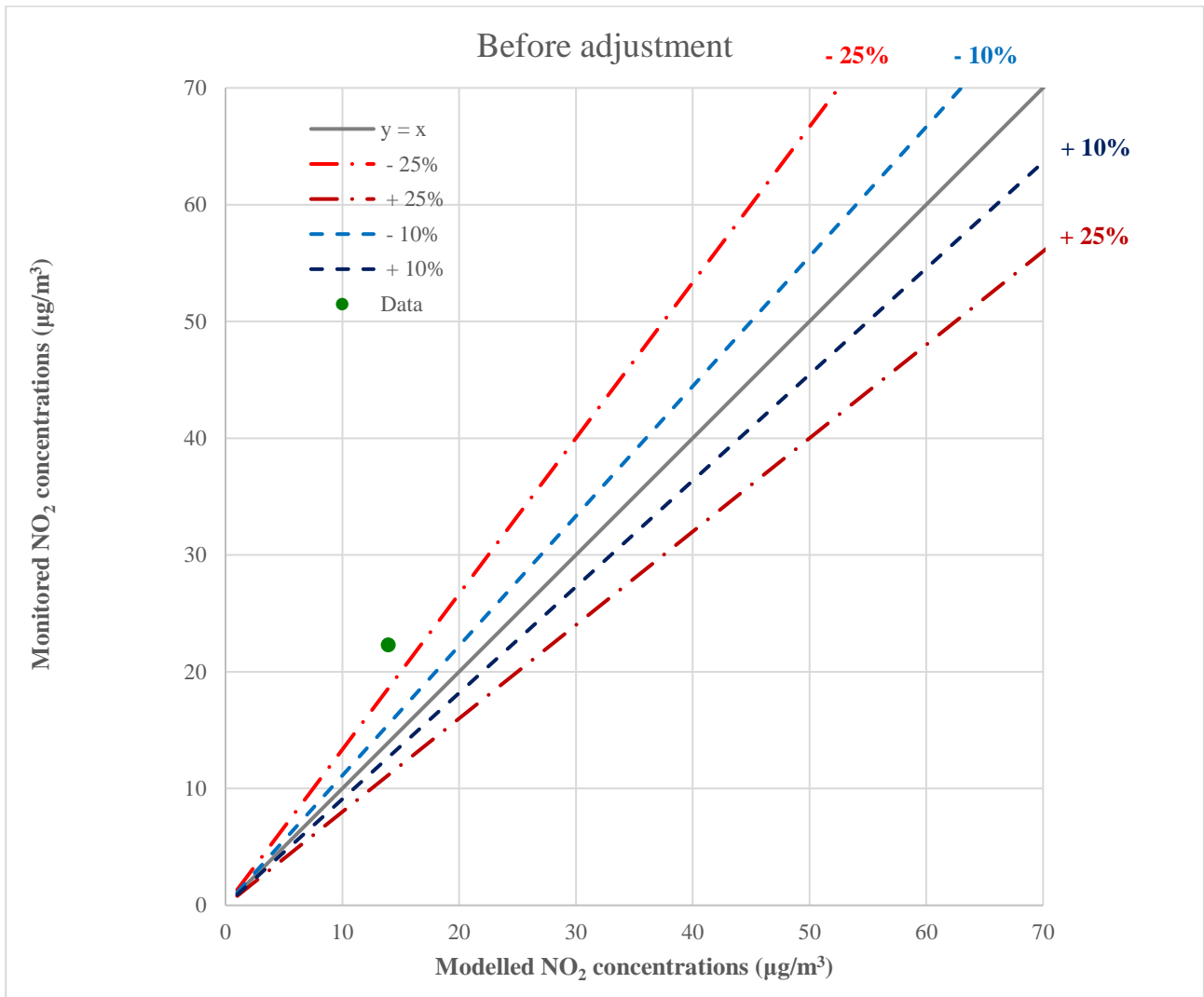


Figure B1: Monitored and modelled annual mean NO₂ concentrations before adjustment

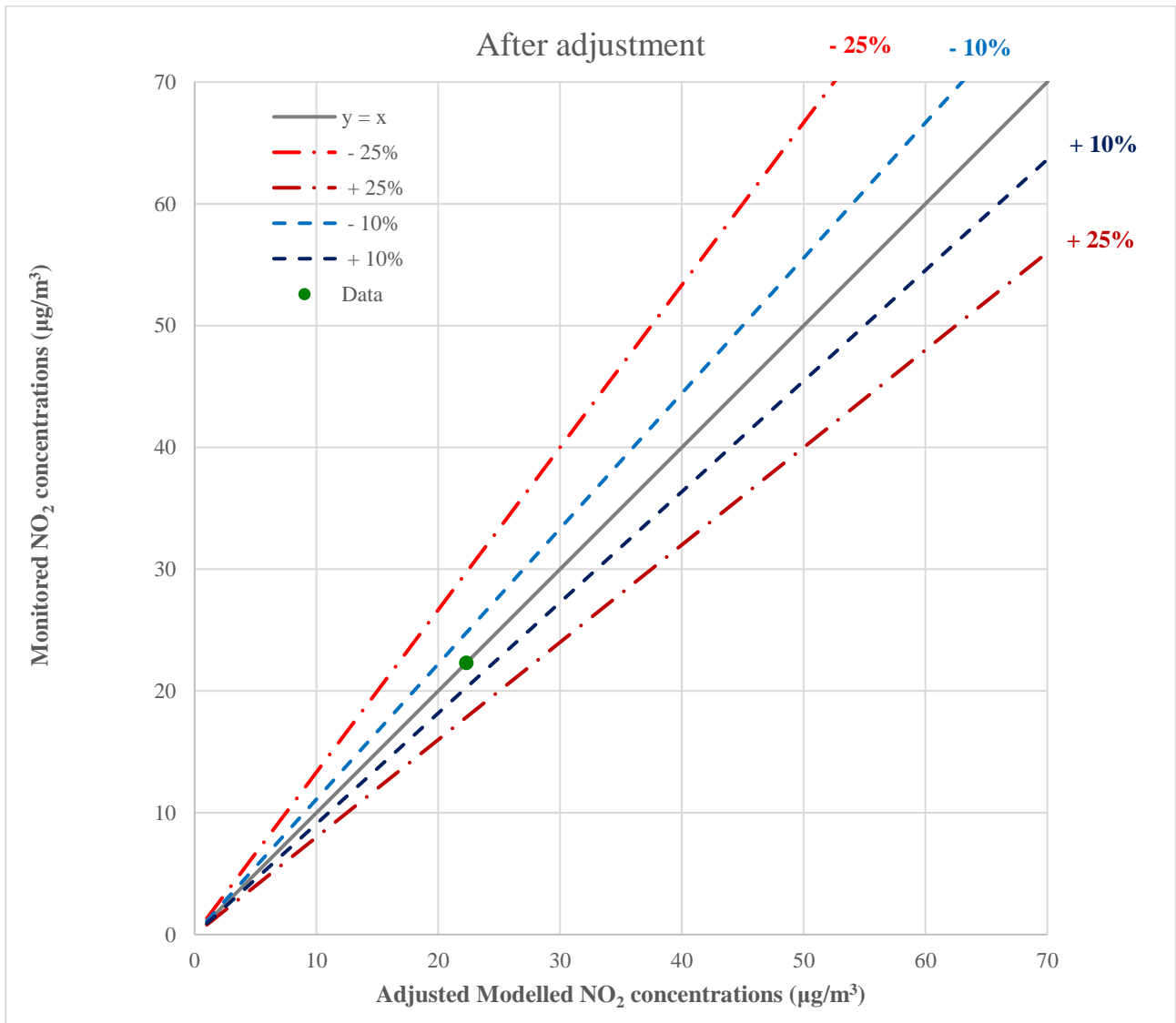


Figure B2 Monitored and modelled annual mean NO₂ concentrations after adjustment

Appendix C

C.1 Operational Traffic Assessment

C.1.1 Operational Traffic Data

Table C1: Modelled operational traffic network details - Baseline (2022) and Do Minimum (2025)

AQ ID	Road name	Modelled as junction	Road width (m)
Rd_1.01	A1077	Road	8.5
Rd_1.02	A1077	Junction	8.0
Rd_2.01	A1077 (Barrow Road)	Junction	7.2
Rd_2.02	A1077 (Barrow Road)	Road	8.8
Rd_2.03	A1077 (Barrow Road)	Junction	8.8
Rd_2.04	A1077 (Barrow Road)	Junction	8.8
Rd_2.05	A1077 (Market Place)	Road	8.8
Rd_2.06	A1077 (Market Place)	Junction	8.8
Rd_2.07	A1077 (Holydyke)	Junction	8.8
Rd_2.08	A1077 (Holydyke)	Road	8.4
Rd_2.09	A1077 (Holydyke)	Junction	8.4
Rd_2.10	A1077 (Holydyke)	Junction	8.1
Rd_2.11	A1077 (Holydyke)	Road	7.6
Rd_2.12	A1077 (Holydyke)	Junction	8.1
Rd_3.01	A1077 (Ferriby Road)	Junction	8.4
Rd_3.02	A1077 (Ferriby Road)	Road	8.8
Rd_3.03	A1077 (Ferriby Road)	Junction	8.9
Rd_3.04	A1077 (Ferriby Road)	Junction	8.9
Rd_3.05	A1077 (Ferriby Road)	Road	8.4
Rd_4.01	Whitecross Street	Junction	9.3
Rd_4.02	Whitecross Street / Caistor Road	Road	9.0
Rd_4.03	Caistor Road	Road	7.3
Rd_4.04	Caistor Road	Road	7.0
Rd_4.05	Caistor Road	Road	7.0
Rd_4.06	Caistor Road	Road	6.6
Rd_4.07	Caistor Road	Road	6.4

AQ ID	Road name	Modelled as junction	Road width (m)
Rd_4.08	Caistor Road	Road	6.4
Rd_4.09	Caistor Road	Road	6.4
Rd_5.01	A15	Road	20.4
Rd_5.02	A15	Road	20.0
Rd_5.03	A15	Road	21.2
Rd_8.01	Falkland Way	Junction	7.6
Rd_8.02	Falkland Way	Road	7.6
RND_02	Ferriby Road	Junction	9.2

Table C2: Modelled operational traffic network details - Do Something (2025)

AQ ID	Road name	Modelled as junction	Road width (m)
Rd_1.01	A1077	Road	8.5
Rd_1.02	A1077	Junction	8.0
Rd_2.01	A1077 (Barrow Road)	Junction	7.2
Rd_2.02	A1077 (Barrow Road)	Road	8.8
Rd_2.03	A1077 (Barrow Road)	Junction	8.8
Rd_2.04	A1077 (Market Place)	Junction	8.8
Rd_2.05	A1077 (Market Place)	Road	8.8
Rd_2.06	A1077 (Market Place)	Junction	8.8
Rd_2.07	A1077 (Holydyke)	Junction	8.8
Rd_2.08	A1077 (Holydyke)	Road	8.4
Rd_2.09	A1077 (Holydyke)	Junction	8.4
Rd_2.10	A1077 (Holydyke)	Junction	8.1
Rd_2.11	A1077 (Holydyke)	Road	7.6
Rd_2.12	A1077 (Holydyke)	Junction	8.1
Rd_3.01	A1077 (Ferriby Road)	Junction	8.4
Rd_3.02	A1077 (Ferriby Road)	Road	8.8
Rd_3.03	A1077 (Ferriby Road)	Junction	8.9
Rd_3.04	A1077 (Ferriby Road)	Junction	8.9
Rd_3.05	A1077 (Ferriby Road)	Road	8.4
Rd_4.01	Whitecross Street	Junction	9.3

AQ ID	Road name	Modelled as junction	Road width (m)
Rd_4.02	Whitecross Street / Caistor Road	Road	9.0
Rd_4.03	Caistor Road	Junction	7.3
Rd_4.04	Caistor Road	Junction	7.0
Rd_4.05	Caistor Road	Road	7.0
Rd_4.06	Caistor Road	Road	6.6
Rd_4.07	Caistor Road	Junction	6.4
Rd_4.08	Caistor Road	Junction	6.4
Rd_4.09	Caistor Road	Road	6.4
Rd_5.01	A15	Road	20.4
Rd_5.02	A15	Road	20.0
Rd_5.03	A15	Road	21.2
Rd_6.01	Barton Link Road	Junction	7.3
Rd_7.01	Barton Link Road	Road	7.3
Rd_7.02	Barton Link Road	Junction	7.3
Rd_7.03	Barton Link Road	Junction	7.3
Rd_7.04	Barton Link Road	Road	7.3
Rd_7.05	Barton Link Road	Junction	7.3
Rd_8.01	Falkland Way	Junction	7.6
Rd_8.02	Falkland Way	Road	7.6
RND_01	A1077 / Barton Link Road / Falkland Way Roundabout	Junction	8.8
RND_02	A1077 (Ferriby Road)	Junction	9.2

Table C3: Operational traffic data

AQ ID	2022 Baseline			2025 Do Minimum			2025 Do Something		
	AADT	%HDV	Speed (kph)	AADT	%HDV	Speed (kph)	AADT	%HDV	Speed (kph)
Rd_1.01	6881	1.8%	97	7065	1.8%	97	7218	1.7%	97
Rd_1.02	6881	1.8%	20	7065	1.8%	20	7218	1.7%	20
Rd_2.01	10705	3.1%	20	10991	3.1%	20	11060	1.6%	20
Rd_2.02	10705	3.1%	48	10991	3.1%	48	11060	1.6%	48
Rd_2.03	10705	3.1%	20	10991	3.1%	20	11060	1.6%	20
Rd_2.04	10705	3.1%	20	10991	3.1%	20	11060	1.6%	20
Rd_2.05	10705	3.1%	48	10991	3.1%	48	11060	1.6%	48
Rd_2.06	10705	3.1%	20	10991	3.1%	20	11060	1.6%	20
Rd_2.07	10705	3.1%	20	10991	3.1%	20	11060	1.6%	20
Rd_2.08	10705	3.1%	48	10991	3.1%	48	11060	1.6%	48
Rd_2.09	10705	3.1%	20	10991	3.1%	20	11060	1.6%	20
Rd_2.10	10705	3.1%	20	10991	3.1%	20	11060	1.6%	20
Rd_2.11	10705	3.1%	48	10991	3.1%	48	11060	1.6%	48
Rd_2.12	10705	3.1%	20	10991	3.1%	20	11060	1.6%	20
Rd_3.01	12435	2.9%	20	12767	2.9%	20	12682	1.6%	20
Rd_3.02	12435	2.9%	48	12767	2.9%	48	12682	1.6%	48
Rd_3.03	12435	2.9%	20	12767	2.9%	20	12682	1.6%	20
Rd_3.04	12435	2.9%	20	12767	2.9%	20	12682	1.6%	20

AQ ID	2022 Baseline			2025 Do Minimum			2025 Do Something		
	AADT	%HDV	Speed (kph)	AADT	%HDV	Speed (kph)	AADT	%HDV	Speed (kph)
Rd_3.05	12435	2.9%	48	12767	2.9%	48	12682	1.6%	48
Rd_4.01	3001	0.5%	20	3081	0.52%	20	3081	0.5%	20
Rd_4.02	3001	0.53%	48	3081	0.52%	48	3081	0.5%	48
Rd_4.03	3001	0.53%	48	3081	0.52%	48	3081	0.52%	48
Rd_4.04	3001	0.53%	48	3081	0.52%	48	3081	0.52%	48
Rd_4.05	3001	0.53%	48	3081	0.52%	48	3081	0.52%	48
Rd_4.06	3001	0.53%	48	3081	0.52%	48	3081	0.52%	48
Rd_4.07	3001	0.53%	48	3081	0.52%	48	3081	0.52%	48
Rd_4.08	3001	0.53%	48	3081	0.52%	48	3081	0.52%	48
Rd_4.09	3001	0.53%	48	3081	0.52%	48	3081	0.52%	48
Rd_5.01	21276	9.3%	113	21844	9.3%	113	21396	8.7%	113
Rd_5.02	21276	9.3%	113	21844	9.3%	113	21396	8.7%	113
Rd_5.03	21276	9.3%	113	21844	9.3%	113	21396	8.7%	113
Rd_6.01	-	-	-	-	-	-	1815	9.5%	20
Rd_7.01	-	-	-	-	-	-	1815	9.5%	41
Rd_7.02	-	-	-	-	-	-	1815	9.5%	20
Rd_7.03	-	-	-	-	-	-	1815	9.5%	20
Rd_7.04	-	-	-	-	-	-	1815	9.5%	41

AQ ID	2022 Baseline			2025 Do Minimum			2025 Do Something		
	AADT	%HDV	Speed (kph)	AADT	%HDV	Speed (kph)	AADT	%HDV	Speed (kph)
Rd_7.05	-	-	-	-	-	-	1815	9.5%	20
Rd_8.01	6430	4.3%	20	6602	4.3%	20	6679	4.3%	20
Rd_8.02	6430	4.3%	64	6602	4.3%	64	6679	4.3%	64
RND_01	-	-	-	-	-	-	6693	2.8%	20
RND_02	12435	2.9%	20	12767	2.9%	20	12682	1.6%	20
Notes “-“ indicates that this road was not modelled in this scenario, e.g. Proposed Development roads that would not exist in the Baseline or DM scenarios.									