CUNDALL

Farington Cricket Ground

Air Quality Assessment

Eric Wright Construction Ltd

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Executive Summary

Cundall has been commissioned by Eric Wright Construction to carry out an Air Quality Assessment to support proposals for the construction of a new cricket-led development at the Woodcock Estate in Farington, Lancashire. The Proposed Development includes two full-sized cricket ovals with natural sloping terraces and training facilities including outdoor nets, a club pavilion including a gym, changing rooms, and hospitality space. Cycle and car parking will also be provided on site.

The Proposed Development does not lie within an Air Quality Management Area (AQMA); however, South Ribble Borough Council AQMA No.3 lies 0.8km to the north, and traffic from the Proposed Development has potential to pass through the AQMA. The AQMA was declared for likely breach of the nitrogen dioxide (NO_2) anneal mean objective.

Existing conditions within the study area indicate that there is potential for nitrogen dioxide (NO_2) concentrations near the site to exceed the European Limit Value and National Air Quality Objective threshold levels.

Emissions of construction dust have been assessed using the qualitative approach outlined in the IAQM guidance. It was concluded that in the absence of any adequate mitigation, there is a **high** risk from the earthworks activities and **medium** risk for construction and trackout activities associated with the Proposed Development. However, with appropriate mitigation measures implemented, it is anticipated that the dust generation and harmful emissions from construction site activities will not be significant.

The Energy Strategy for the Proposed Development considers a number of potential options for the provision of heating and hot water including natural gas, natural gas/solar power and air source/ground source heat pumps with panel heaters. The recommended option is currently based on air source heat pumps and panel heaters, and should this option be implemented, hot water and heating will be provided by all electric sources. However, should there be any change to incorporate natural gas combustion once final design details are confirmed, further screening of any potential air quality impacts may be required at a later stage.

The site is located in Stanifield Lane, and a car park will be located in the north-eastern area of the site; proposed car parking includes a total of 265 permanent parking spaces, with an overflow capacity of 235 temporary parking spaces.

Information provided by the transport consultant, WSP, has confirmed that the following levels of traffic could be generated in the opening year:

- Typical traffic for a busy summer non-event day - 330 cars entering and leaving the site
- Typical traffic for a full-capacity event day (up to 5,000 spectators for a white ball fixture) - 600 cars, 6 Light Goods Vehicles GVs and 16 Heavy Goods Vehicles entering and leaving the site

As the Proposed Development is located 0.8km to the south of an Air Quality Management Area (AQMA), the predicted increase in annual average daily traffic flows on nearby roads has therefore been screened against the IAQM threshold for detailed assessment within AQMA. As operational traffic is likely to result in an increase greater than 100 vehicles per day an assessment of operation phase traffic impacts was included within the main assessment.

Detailed assessment of operation phase traffic impacts indicated that the impacts at nearby sensitive receptors surrounding the Proposed Development are expected to be negligible for non-event and event days in the opening year of 2024. Further sensitivity tests indicated that increases of up to 0.4µg/m^3 NO_2 may occur at one location close to the junction with Lostock Lane to the north of the development if national pollutant background concentrations and vehicle emission factors fail to improve on 2019 levels. However, increases are expected to be lower as there is already anecdotal evidence to suggest that national background pollutant concentrations and vehicle emission rates have already improved since 2019.

Air quality within the vicinity of the Proposed Development complies with current national air quality objectives, and

ventilation of any buildings can be provided by natural means wherever practicable.

The Client will commit to the implementation of the best practice mitigation measures identified within the assessment. It is recommended that implementation of an appropriate Air Quality Dust Management Plan is utilised to manage emissions during the construction phase of the Proposed Development. It is assumed that this will be actioned via a pre-commencement condition.

Using these measures to manage emissions during the construction and operation phases of the Proposed Development, the proposals will be fully compliant with the requirements of Lancashire County Council and South Ribble Borough Council and the National Planning Policy Framework.

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Figures

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1.0

Introduction

1.0 Introduction

Cundall has been commissioned to prepare an Air Quality Assessment Report for Eric Wright Construction Ltd. The Proposed Development is located in Farington, Lancashire and is not located within an Air Quality Management Area (AQMA), but an AQMA is located 0.8km to the north.

1.1 Site Location

The site covers an area of approximately 13.7 hectares (137,000 m^2) and is currently comprised of agricultural fields. The surrounding land use can be summarised as follows:

- The site is bounded by fields to the north, beyond which is Farington Road (A582)
- Agricultural fields and Stanifield Lane are located to the east. There are two residential properties that line the eastern site boundary
- Fields form the southern boundary, beyond which is Fowler Lane
- Fowler Avenue, agricultural tenancies and residential properties form the western site boundary

The location of the site is shown in Figure 1-1 and additional context is provided by the aerial image (Figure 1-2).

Figure 1-1: Location of the Development Site (Courtesy of Google Maps)

Figure 1-2: Aerial Image (Courtesy of Google Earth)

1.2 Proposed Development

Proposals are for the construction of a new cricket-led development at the Woodcock Estate in Farington. The Proposed Development includes two full-sized cricket ovals with natural sloping terraces and training facilities including outdoor nets, a club pavilion including a gym, changing rooms, and hospitality space. Cycle and car parking will also be provided on site. Sympathetic natural landscaping, including new tree and wildflower planning and green spaces will be provided to create an attractive setting, encourage wildlife and provide natural screening for local residents.

The proposals will provide a high-quality professional and community cricket facility, supporting the development of community, recreational, youth and elite sport. The ground will be used as Lancashire County Cricket Club's second ground, hosting top tier professional cricket matches and elite training. The facility is proposed to become a Centre of Excellence for Women's Cricket in the north-west, hosting Women's matches and training sessions. Additionally, the ground will be used by youth, disability and community teams.

A landscape plan has been provided by Urban Green Architects[1] and is reproduced as Figure 1-3. The plan shows the two ovals, which will provide full-size cricket pitches. The natural sloping terraces will provide informal seating for spectators. It is anticipated that the sloping terraces could accommodate a maximum crowd of 5,000 spectators. The pavilion building will be located between the two pitches and will provide changing rooms, a gym and hospitality outlets.

An Upper Ground Floor Plan for the Proposed Development is provided in Figure 1-4[2], A typical elevation is provided in Figure 1-5[3] and an artist's impression of the completed development is provided within Figure 1-6[4].

[1] Urban Green Architects (2022) Woodcock Estate, Proposed Site Plan, UG_1016_LAN_GA_DRW-01, Revision: P20, 21/07/2022
[2] BDP Architects (2021) Woodcock Estate, Upper Ground Floor Plan, Ref: WDK-BDP-Z1-01-DR-A-(0-)-0000, Revision: P07, 11/02/2022
[3] BDP Architects (2021) Woodcock Estate, North Elevation, Ref: WDK-BDP-Z1-01-DR-A-(0-)-0010, Revision: P05, 21/01/2022
[4] Farington Aerial Issue 13 dated 22 July 2022.

The car park will be located in the north-eastern area of the site, with access onto Stanifield Lane. Proposed car parking includes a total of 265 permanent parking spaces with overflow capacity of 235 temporary parking spaces.

1.3 Scope of Assessment

In setting the scope of assessment, consideration has been made of South Ribble Borough Council's Air Quality and Planning Guidance[5].

This assessment has been prepared in support of the planning application and considers the potential for effects to occur during both the construction and operation phases of the development.

This air quality assessment outlines the relevant air quality legislation and policy guidance and presents the assessment methodology. The main pollutants of concern for this assessment are oxides of nitrogen (NOx), including nitrogen dioxide (NO_2), fine and very fine particulate matter (PM_{10} and $PM_{2.5}$). The existing air quality conditions are presented and the likely air quality impacts from construction and operation of the Proposed Development are considered. The effects are assessed in the context of relevant national, regional and local air quality legislation, polices and guidance. Mitigation measures are proposed, as required, to reduce the effect of the Proposed Development to negligible, as far as reasonably practicable. The scope of the assessment is detailed further in section 3.0.

This assessment has been undertaken by Cundall's Air Quality Team and managed by team members who are professionally chartered and are Members of the Institute of Air Quality Management (MIAQM). Full details are provided in Appendix A.

1.4 Consultation with South Ribble Borough Council

Following the execution of an initial screening and scoping exercise, consultation with South Ribble Borough Council's Environmental Health Officer (EHO) was undertaken in February 2022 to discuss and agree the scope of the assessment. This correspondence is outlined in Appendix B.

[5] Central Lancashire (2012) Adopted Core Strategy, Local Development Framework, July 2012 https://www.southribble.gov.uk/media/138/Central-Lancashire-Core-Strategy/pdf/CentralLancashireCoreStrategy2012.pdf?m=637369838249630000

Figure 1-3: Proposed Site Plan (Courtesy of Urban Green Architects)

Figure 1-4: Proposed Upper Ground Floor Layout (Courtesy of BDP Architects)

Figure 1-5: Proposed North Elevation (Courtesy of BDP Architects)

Figure 1-6: Aerial Over Competition Pitch Looking Northeast

2.0

Legislation, Policy and Guidance

2.0 Legislation, Policy and Guidance

2.1 Key Legislation and Policy

This assessment considers key air quality legislation, which is summarised in Table 2-1.

Legislation	Description
EU Ambient Air Quality Directive 2008/50/EC[6]	Establishes the requirements of Member States in terms of improvements required to air quality. Sets standards for a variety of pollutants for human-health and the environment.
The Air Quality Standards Regulations 2010[7]	Transposes formalised EU Limit Values set out in directive 2008/50/EC to UK law. An Amendment was published in 2016[8]
The Clean Air Quality Strategy 2019[9]	Defra published a Clean Air Strategy in January 2019, setting out a wide range of actions for UK Government to reduce pollutant emissions and improve air quality. The actions are grouped into four main emission sources: Transport, Domestic, Farming and Industry The Clean Air Strategy sets out the case for action and demonstrates the government's determination to improve air quality. In some cases, the goals are even more ambitious than EU requirements to reduce people's exposure to toxic pollutants like nitrogen oxides, ammonia, particulate matter, non-methane volatile organic compounds and sulphur dioxide.
Environment Act 1995, Part IV[10], amended by the Environment Act 2021	Defines the requirements for Local Air Quality Management (LAQM).
Environment Protection Act 1990, amended by the Pollution Prevention and Control Act 1999[11] and the Environment Act 2021.	Part III provides statutory nuisance provisions for nuisance dust. Nuisance complaints about dust would need to be investigated by the Local Authority. In practice, dust deposition is generally managed appropriately by suitable on-site practices and mitigation, avoiding the determination of statutory nuisance and/or prosecution or enforcement notices.
The Non-Road Mobile Machinery (Type-Approval and Emission of Gaseous and Particulate Pollutants) Regulations 2018[12]	Developers and contractors are required to meet compliance with the emission standards for Non-Road Mobile Machinery (NRMM). The Regulations exercise of the powers conferred by section 2(2) of, and paragraph 1A of Schedule 2 to, the European Communities Act 1972 in relation to the type, description, construction or equipment of vehicles.
Environment Act, 2021[13].	The Act makes provision about targets, plans and policies with the focus of improving the natural environment. This includes air quality, as well as water, nature and biodiversity, regulation of chemicals, waste and resource efficiency and recall of products failing to meet environmental standards. The Act introduces a duty on government to bring forward at least two air quality targets by October 2022 for consultation. These are to be to reduce the annual average level of fine particulate matter ($PM^{2.5}$) and to set a long-term (minimum of 15 year) target for its reduction. The 2021 Act amends the Environment Act 1995 Part IV by seeking to strength local air quality a management (LAQM) through greater cooperation at local level and broadening the range of organisations that play a role in improving air quality. Responsibility for tackling air pollution is to be shared between designated local authorities, all tiers of local

[6] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe
[7] HMSO (2010). Statutory Instrument 2010 No. 1001, The Air Quality Standards Regulations 2010, London: HMSO
[8] HMSO (2016). Statutory Instrument 2016 No. 1184, Environmental Protection, England, The Air Quality Standards (Amendment) Regulations 2016, London: HMSO, https://www.legislation.gov.uk/uksi/2016/1184/contents/made
[9] Department for Environment Food and Rural Affairs (Defra) (2019) Clean Air Strategy 2019, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf
[10] Environment Act 1995, Chapter 25, Part IV Air Quality
[11] Environmental Protection Act 1990, Chapter 43, Part III Statutory Nuisances and Clean Air https://www.legislation.gov.uk/ukpga/1990/43/part/III
[12] HMSO (2018) The Non-Road Mobile Machinery Type-Approval and Emission of Gaseous and Particulate Pollutants) Regulations 2018, UK Statutory Instruments, 2018 No. 764, https://www.legislation.gov.uk/uksi/2018/764/made
[13] HMSO (2021) Environment Act 2021, November 2021, https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted

Legislation	Description
	government and neighbouring authorities. The environment secretary will be required to review the Air Quality Strategy at least every five years and publish annual progress reports to parliament. The 2021 Act amends the Clean Air Act 1993 to give local authorities more power to reduce pollution in smoke control areas by replacing the criminal offence of emitting smoke from a chimney in a smoke control area with a civil penalty regime, seeking to enable simpler, quicker and more proportionate enforcement at local level. It also amends the Environmental Protection Act 1990 by extending the system of statutory nuisance to private dwellings in smoke control areas, which could result in abatement notice and issuing fines for criminal offence of breaches. The 2021 Act introduces new powers for the government to compel vehicle manufacturers to recall vehicles and non-road machinery that fails to meet legal binding standards.

Table 2-1: Key Legislation

The air quality EU limit values and UK Air Quality Objectives (AQOs) which apply to this assessment are shown in Table 2-2[14]. Some pollutants have long-term (annual mean) objectives due to the chronic way they affect human-health or the natural environment and others have short-term (1-hour, 24-hour mean) objectives due to the acute way they affect human health or the natural environment.

Pollutant	Averaging Period	Objective Threshold / EU Limit Value (µg/m^3)
Nitrogen Dioxide (NO_2)	Annual mean	40
	1-hour mean	200 Not to be exceeded more than 18 times per year (equivalent to the 99.79th percentile of 1-hour mean values)
Particulate Matter (PM_{10})	Annual mean	40
	24-hour mean	50 Not to be exceeded more than 35 times per year (Equivalent to the 90.4th percentile of 24-hour mean values)
Fine Particulate Matter ($PM_{2.5}$)	Annual mean	25
Oxides of nitrogen (NOx) as NO_2 (for protection of vegetation and ecosystems)	Annual mean	30
	Daily mean	70

Table 2-2: AQO and EU Limit Values

Previous research carried out on behalf of Defra identified that exceedances of the NO_2 1-hour mean are unlikely to occur where the annual mean is below 60 µg/m^3. This assumption is still considered valid; therefore, Defra's Technical Guidance document, LAQM.TG (16) confirms that this figure can be referenced where 1-hour mean monitoring data are not available (typically if monitoring NO_2 using passive diffusion tubes).

2.2 Planning Policy and Guidance

Consideration of the strategic location and design of new developments is of key important in the land-use planning process and can provide a means of improving air quality. Air quality considerations as part of development applications may become material in determining planning applications. Relevant planning policy and guidance at the National, Regional, and Local levels as summarised in Table 2-3.

[14] Other pollutants have been screened out of this assessment as exceedance of their respective objectives is not anticipated to be associated with the pollutant sources of relevance to this assessment.

Policy / Guidance	Description
National Policy and Guidance	
Ministry of Housing, Communities & Local Government – National Planning Policy Framework (NPPF) (2021)[15]	The National Planning Policy (NPPF) published March 2012 and last updated in July 2021 with the purpose of planning achieving sustainable development. Paragraph 186 of the NPPF states that: "*Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or National objectives for pollutants, taking into account the presence of AQMAs 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 105 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 174 discusses how planning policies and decisions should contribute to and enhance the natural and local environment. Of relevance 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"*
Planning Policy Guidance (updated 2019)[16]	Planning Practice Guidance (PPG) documents have been published as part of the NPPF. PPG relating to air quality was last updated in November 2019. It provides guidance on the significance of air quality in determining the local impact of proposed developments and highlights the importance of local and neighbourhood plans with regard to air quality. A flowchart is provided to assist local authorities in determining how air quality considerations might fit into development management processes.
UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations. Detailed Plan. Defra / Department of Transport (DfT) (2017)[17]	This plan was produced in response to a UK Supreme Court Ruling and sets out how the UK will achieve compliance with EU Limit Values for nitrogen dioxide (NO_2) in the shortest possible time. The plan outlined infrastructure initiatives and grants and the requirements for Local Authorities to produce local action plans, with the aim of reducing NO_2 concentrations below the objective as soon as practically possible.
Regional Planning Policies	
Central Lancashire Adopted Core Strategy Local Development Framework (2012)[18]	This document was produced by the Central Lancashire authorities of Preston, South Ribble and Chorley to help "*co-ordinate development in the area and contribute to boosting investment and employment*".

[15] Ministry of Housing, Communities & Local Government, National Planning Policy Framework, June 2021 https://www.gov.uk/government/publications/national-planning-policy-framework--2

[16] Ministry of Housing, Communities and Local Government (2019) Planning Practice Guidance: Air Quality, updated 1 November 2019 https://www.gov.uk/guidance/air-quality--3

[17] Department for Environment, Food and Rural Affairs / Department for Transport (2017) UK plan for tackling roadside nitrogen dioxide concentrations, July 2017 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/633269/air-quality-plan-overview.pdf

[18] Central Lancashire (2012) Adopted Core Strategy Local Development Framework, July 2012 https://www.southribble.gov.uk/media/138/Central-Lancashire-Core-Strategy/pdf/CentralLancashireCoreStrategy2012.pdf?m=637369838249630000

Policy / Guidance	Description
	In addition, Policy 30: Air Quality states to *"Improve air quality through delivery of Green Infrastructure initiatives and through taking account of air quality when prioritising measures to recue road traffic congestion".*
Local Planning Policies	
South Ribble Borough Council Air Quality Action Plan 2018 (2018)[19]	South Ribble Borough Council have produced an Air Quality Action Plan (AQAP) as part of their statutory duties require by the Local Air Quality management framework. The AQAP was published in December 2018 and outlines the actions South Ribble Borough Council will take to improve air quality over the next 10 years. Actions have been developed *"under the following broad topics:* ▪ *Alternative to private vehicle use* ▪ *Freight and delivery management* ▪ *Policy guidance and development control* ▪ *Promoting low emission transport* ▪ *Promoting travel alternatives* ▪ *Public Information* ▪ *Transport Planning and infrastructure* ▪ *Traffic management* ▪ *Vehicle fleet efficiency"*
South Ribble Local Plan (2015)[20]	The South Ribble Local Plan 2015 was adopted in July 2015 by the South Ribble Borough Council and sets out a vision to enhance the South Ribble as both a place to live and do business. The polices of importance to air quality are the following: Policy 3: Travel *"Key objectives of the Core Strategy are to increase accessibility within the borough, influence travel patterns, encourage alternatives to the car and reduce emissions, congestion and poor air quality."* Policy 30: Air Quality *"Tackling climate change is a cross cutting theme of the Core Strategy. Improving the energy efficiency of new developments and encouraging renewable and low carbon energy generation in the borough are key aims of the Core Strategy."* *"The Core Strategy has a dedicated air quality policy, which aims to improve air quality through various initiatives."*
South Ribble Council. Planning Advisory Note. Low Emissions and Air Quality. A Guide for Developers. V4, September 2020.	This guidance encourages developers to support action through the planning system to improve air quality and lower transport emissions. It provides guidelines for the treatment of development sites through a planning appraisal. The approach seeks to minimise harmful pollutant emissions, avoid significant impact on local concentrations and protect the wider public from unacceptable exposure to pollution. In achieving this it seeks to tailor assessment and mitigation requirements according to specific site characteristics which relate to both the nature and scale of the associated impacts and risk. In particular the guidance seeks to explain: ▪ How to classify a development site in order to streamline its passage through the planning system ▪ What assessment and mitigation should be considered for specific type of site; and ▪ The submissions a developer should make as part of the planning application and how these will be considered by the Local Planning Authority.

[19] South Ribble Borough Council (2018) Air Quality Action Plan, December 2018, https://www.southribble.gov.uk/media/422/Air-Quality-Action-Plan/pdf/Air_Quality_Action_Plan_2018.pdf?m=637425364922300000
[20] South Ribble Borough Council (2015) Local Plan, July 2015, https://www.southribble.gov.uk/media/125/The-Adopted-Local-Plan-July-2015/pdf/Local_Plan_-_Adopted_July_2015_0.pdf?m=637369819342800000

Policy / Guidance	Description
Central Lancashire Design Guide (2012)[21]	The purpose of this SPD document is to ensure that new developments are designed to a high standard. The SPD sets out *"a number of well-established principles of good design and sets out how these can be applied through a process of appraisal through to the development of a clear design concept."*. Pollution levels are noted as one of the health and wellbeing key elements of site and context appraisal.
Other Relevant Policy and Guidance	
Defra Local Air Quality Management (LAQM) Policy Guidance (2016)[22] and Technical Guidance (2021)[23]	The guidance issued under Part IV of the Environment Act 1995 is designed to help local authorities with their LAQM duties. The guidance sets out the general approach to use and detailed technical guidance to guide local authorities through the Review and Assessment process.
EPUK/IAQM Land Use Planning & Development Control (2017)[24]	This guidance has been produced to ensure that air quality is adequately considered in the land use planning and development control processes by relevant officers within local authorities, developers, and consultants involved in the preparation of development proposals and planning applications. This document is best practice guidance and has no formal or legal status.
IAQM Assessment of Dust from Demolition and Construction (2016)[25]	The document provides guidance for developers, their consultants and environmental health practitioners on how to undertake a construction impact assessment (including demolition and earthworks). The guidance provides a method for assigning a magnitude of risk (high, medium or low) and identifies appropriate mitigation measures.
Covid-19: Supplementary Guidance, Local Air Quality Management Reporting in 2021[26]	The guidance had been informed by responses from an impact survey received following the release of the interim statement on Covid-19 impacts to the LAQM regime. The guidance is to be read in conjunction with LAQM.TG16
IAQM assessment of air quality impacts on designated nature conservation sites[27]	This guidance signposts the appropriate thresholds used by local authorities, the Environment Agency and other regulators to determine the potential for air quality damage on sensitive ecological sites. Should threshold be likely to be exceeded, a suitably qualified and experienced ecologist is required to determine whether there is likely to eb a significant impact on the habitat.
World Health Organisation (WHO) Global Air Quality Guidelines (2021)[28]	Since 1987, WHO has periodically issued health-based air quality guidelines to assist governments and civil society to reduce human exposure to air pollution and its adverse effects. The WHO air quality guidelines published in 2006 provided health-based guideline levels for the major health-damaging air pollutants, including particulate matter (PM),1 ozone (O_3), nitrogen dioxide (NO_2) and sulfur dioxide (SO_2). These guidelines had a significant impact on pollution abatement policies all over the world and led to the first universal frame of reference. Following extensive research which started in 2016 and has referred to numerous epidemiological studies, WHO have reassessed their guideline values and recently (September 2021) provided updated values.

[21] Central Lancashire (2012) Design Guide SPD, October 2012, https://www.southribble.gov.uk/media/137/Design-guide/pdf/SRE007_-_SPD_-_Design_Guide.pdf?m=637369819386330000
[22] Defra (2016) Local Air Quality Management Policy Guidance PG(16) https://laqm.defra.gov.uk/documents/LAQM-PG16-April-16-v1.pdf
[23] Defra (2021) Local Air Quality Management Technical Guidance TG(16) April 2021 https://laqm.defra.gov.uk/documents/LAQM-TG16-April-21-v1.pdf
[24] EPUK/IAQM, (2017) Land-Use Planning & Development Control: Planning for Air Quality https://iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf
[25] Institute of Air Quality Management (IAQM) (2016) Guidance on the Assessment of Dust from Demolition and Construction (Version 1.1) https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf
[26] Department for Environment, Food and Rural Affairs (Defra) / Greater London Authority (2021). Covid-19: Supplementary Guidance, Local Air Quality Management Reporting in 2021, April 2021, Version 1.0, https://laqm.defra.gov.uk/supporting-guidance.html
[27] Institute of Air Quality Management (IAQM) (2020) A guide to the assessment of air quality impacts on designated nature conservation sites, version 1.1, May 2020, https://iaqm.co.uk/text/guidance/air-quality-impacts-on-nature-sites-2020.pdf
[28] World Health Organisation (WHO) (2021) WHO global air quality guidelines, Particulate matter ($PM_{2.5}$ and PM_{10}), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide, https://apps.who.int/iris/handle/10665/345329.

Policy / Guidance	Description
IAQM Indoor Air Quality Guidance (2021)[29]	The IAQM have provided guidance on the assessment of indoor air quality. This was published in September 2021 and covers assessment, monitoring, modelling and mitigation relating to indoor air quality.

Table 2-3: Key Policy and Guidance

[29] Institute of Air Quality Management (IAQM) (2021), Indoor Air Quality Guidance: Assessment, Monitoring, Modelling and Mitigation, version 1.0, September 2021, https://iaqm.co.uk/wp-content/uploads/2013/02/iaqm_indoorairquality.pdf

3.0

Approach and Methodology

3.0 Approach and Methodology

3.1 Overall Approach

The overall approach of this air quality assessment comprises the following:

- A review of existing conditions within the study area, defined as 2km from the boundary of the Proposed Development
- An assessment of the potential to change in air quality conditions as a result of the construction and operation of the Proposed Development; and
- The formulation of appropriate mitigation measures, where required, to mitigate any adverse impacts on air quality as a result of the construction and/or operation of the Proposed Development.

3.2 Existing Conditions

Existing ambient air quality conditions relates to relevant pollution that is already present in the environment from various sources such as industrial processes, commercial and domestic activities, road traffic emissions and natural resources.
Existing sources of emissions within the study area (2km) have been defined using several approaches, as follows:

- Industrial and waste management sources that may affect the area have been identified using the Environment Agency's Pollution Inventory Data[30].
- Local sources have also been reviewed through examination of the latest available Air Quality Annual Status Report .
- Information on existing air quality has been obtained by collating the results of monitoring carried out by South Ribble Borough Council
- Background concentrations have been defined using the national pollution maps published by Defra[31]. These cover the whole country on a 1x1 km grid.

3.3 Construction Phase

The site does not require demolition as part of the Proposed Development.

The development proposals comprise the following activities:

- Construction of a new cricket-led development at the Woodcock Estate in Farington, as summarised in section 1.2 of this report.

Machinery used during construction can generate new sources of emissions, as well as traffic movements to/from the site and the works themselves. When assessing the effect of dust emissions generated during construction works, receptors include those nearest to the construction boundary of the site in each direction. These receptors have the potential to experience effects of greater magnitude due to emissions of dust generated by the works, when compared with more distant receptors.

Without appropriate mitigation controls in place, there is the potential for adverse effects to occur during to the construction of the Proposed Development. The implementation of best practice mitigation controls can ensure any potential adverse effects would be not significant.

The impact of anticipated construction activities has been assessed in accordance with IAQM Guidance on the Assessment of Dust from Demolition and Construction v1.1 (2016). The construction phase assessment considers the anticipated physical activities occurring on-site that are likely to result in the generation of dust which gives rise

[30] Environment Agency, Pollution Inventory https://data.gov.uk/dataset/cfd94301-a2f2-48a2-9915-e477ca6d8b7e/pollution-inventory
[31] Department for Environment, Food and Rural Affairs (Defra) (2019). Background Mapping data for local authorities, https://uk-air.defra.gov.uk/data/laqm-background-home

to impacts on dust soiling and human health, especially through the generation of PM_{10} and $PM_{2.5}$.

The assessment involves the identification of whether each phase of on-site activity (demolition, earthworks, construction, and trackout) represents a low, medium, or high risk of causing a significant effect and then identifies suitable mitigation measures for the relevant level of risk assigned. Details of the IAQM construction impact assessment procedure are presented in Appendix C.

Best practice mitigation controls have been identified in accordance with IAQM guidance.

3.4 Operation Phase

IAQM's guidance note 'Land-Use Planning & Development Control: Planning for Air Quality' (updated in January 2017) was issued to ensure that air quality is adequately considered in the land-use planning and developmental control process. Full details are provided in Appendix D. To determine the need for operational assessment, a screening assessment has been undertaken using the criteria outlined in the IAQM guidance note (Appendix E).

3.4.1 Combustion Plant Impact

Any on-site combustion plant such as boilers and combined heat and power (CHP) has the potential to impact air quality receptors both on and off-site. Emissions from combustion plant would include NO_2, and possibly also PM_{10} and $PM_{2.5}$ if diesel is used as a source.

The current Energy Strategy[32] for the Proposed Development considers a number of potential options for the provision of heating and hot water including natural gas, natural gas/solar power and air source/ground source heat pumps with panel heaters. The recommended option is currently based on air source heat pumps and panel heaters, and should this option be implemented, hot water and heating will be provided by all electric sources. However, should there be any change to incorporate natural gas combustion once final design details are confirmed, further screening of any potential air quality impacts may be required.

3.4.2 Road Traffic Impacts

The Proposed Development has the potential to impact existing air quality as a result of pollutants from road traffic exhaust emissions, such as NO_2, PM_{10} and $PM_{2.5}$, associated with traffic travelling to and from the development during the operation phase.

The guidance includes a method for screening the requirement for an air quality assessment, the undertaking of an air quality assessment, the determination of the air quality impact associated with a development proposal and whether this impact is significant. Interpretation of this guidance was used to develop a methodology for the assessment of road impact emissions. The site is not located within an AQMA, however, South Ribble Borough Council AQMA No.3 lies 0.8km to the north, and traffic from the Proposed Development has potential to pass through the AQMA. As such, the more stringent threshold criteria published within EPUK/IAQM guidance have been followed to establish whether detailed air quality assessment is required:

- A change of Light Duty Vehicle (LDV) flows of more than 100 Annual Average Daily Traffic (AADT) movements; and
- A change of Heavy-Duty Vehicle (HDV) flows of more than 25 AADT movements.

Information provided by client has indicated that at very peak periods during the construction phase, for example when stone is being delivered for the road construction, there might be as many as 4 movements per hour, which equates to 32 two-way HDV movements per day. However, the annual average daily HDV trips is likely to fall well below 25 AADT threshold for any given road link, particularly when flows are distributed across the wider road network. As such, consideration of construction phase transport impacts was scoped out of further assessment.

For the operation phase, information provided by the transport consultant (TC), WSP, has confirmed that the Proposed Development could potentially generate in excess of 300 vehicular two-way trips on non-event days, and in excess of 500 two-way trips on full-capacity event days. As annual average daily traffic flows on nearby roads are therefore likely to

[32] Farington Cricket Ground Energy Strategy, Hurstwood Environmental Consulting. Report Reference C3635-HEC-ZZ-ZZ-RP-N-LZC dated 30/03/2022.

increase by greater than 100 vehicles per day, an assessment of operation phase traffic impacts has been included within the assessment.

3.4.3 Human Exposure

Potential exposure of future site users was considered in accordance with Defra Technical Guidance and IAQM Planning Guidance. This assessment evaluated the exposure that future occupants or visitors might experience associated with existing baseline conditions, considering the following:

- The background and future baseline air quality, and whether this will be likely to approach, or exceed, the threshold values set by the air quality objectives
- The presence of any heavily trafficked roads, with emissions that could give rise to significantly higher concentrations of pollutants (e.g., NO_2), that would cause unacceptably high exposure for users of the new development; and
- The presence of non-road transport sources that may be significant, such as nearby airports, railway lines with high traffic usage of diesel locomotives[33] or coal-fired steam locomotive railway lines.

The current/baseline conditions were established qualitatively by reviewing relevant air quality information that is readily available from South Ribble Borough Council, including Review and Assessment Reports and historic monitoring data. These data were used to understand current/baseline pollutant concentrations at receptors within the study area, and the risk that any changes in air quality may cause exceedance of AQOs at these locations.

The exposure that future site users might experience was considered in accordance with EPUK/IAQM Planning Guidance and Defra technical guidance Local Air Quality Management Technical Guidance (LAQM.TG(16)) . Detailed dispersion modelling was used to undertake assessment of human exposure at the development site and surrounding sensitive receptors.

3.4.4 Dispersion Model

Detailed dispersion modelling of traffic emissions has been carried out using the latest version of ADMS-Roads Extra (version 5.0.0.1), which is an internationally recognised new generation dispersion model developed by CERC. ADMS uses advanced algorithms to describe the boundary layer structure, turbulence and stability.

The inputs required for the modelling are outlined in the following sections.

3.4.5 Meteorological Data

Hourly sequential meteorological data is required as an input to the model. Data from Manchester Airport meteorological station for 2019 has been obtained used for this assessment. Manchester Airport is located approximately 38km to the south-east from the Proposed Development. Due to its inland urban location and elevation, Manchester Airport is considered to be the most representative meteorological station for the Proposed Development. Both the location of the Proposed Development and Manchester Airport are inland sites, without significant terrain influence. Sensitivity testing was also carried out modelling with Blackpool Airport 2019 meteorological data. Blackpool Airport is located 24km to the west of the Proposed Development, close to the coast. Using Manchester Airport, modelled pollutants concentrations were approximately double those predicted using Blackpool Airport, presumably due to reduced levels of dispersion in comparison with coastline conditions. All subsequent calculations and conclusions were based on the more conservative data set incorporating Manchester meteorological data.

Defra's LAQM.TG16 guidance recommends that meteorological data should only be used if the percentage of usable hours is greater than 75% and preferably greater than 90%. Unusable hours include missing hours and calm hours[34]. The 2019 Manchester Airport dataset has been checked for usability. There are 8,469 lines of usable hourly data for

[33] Defra (2021), Local Air Quality Management Technical Guidance (TG16) - which lists rail lines with a heavy traffic of diesel passenger trains
[34] Wind speeds <0.75m/s would be classed as calm. ADMS Roads sets the speed to 0.75m/s for speeds <0.75m/s and uses the wind direction from the previous hour. ADMS-5 does not model calm conditions, so data with wind speeds <0.75m/s are skipped in the modelling.

2019, which equates to 96.7% of the hourly values in a given year. As this is well above the 90% threshold, the data is considered to be adequate for dispersion modelling, in accordance with LAQM TG16 guidance.

A wind rose for Manchester Airport 2019 dataset is included in Appendix G. It can be seen that the predominant wind direction is southerly.

Surface roughness is a component of surface texture. Air travelling over the surface is affected by the surface roughness, rough surface would result in higher roughness to smoother surfaces. Typical surface roughness values range from 1.5m (for cities, forests and industrial areas) to 0.0001m (for water or sandy deserts). The future setting of the Proposed Development has been considered in the modelling by setting the surface roughness length to 0.5m. This is the value recommended by the model developers for parkland and open suburbia. A lower surface roughness of 0.2m has been selected for the meteorological station, which is described in the model as representative of 'agricultural areas (min)'.

The Monin-Obukhov length is used to describe the effects of buoyancy on turbulence kinetic energy, particular in the lowest atmospheric boundary layer. This relates to the urban heat island effect, and its effects on turbulence due to surface topology and the effects from heated and shaded building surfaces. Monin-Obukhov values typically range from 2m to 10m in rural settings but can be higher in urban area where buildings and traffic results in more heat generation. In this assessment, the minimum Monin-Obukhov Length Scale for both the site and the Manchester Airport meteorological station was set to 10 m (the recommended model setting for small towns).

3.4.6 Traffic Data

Local air quality at the Proposed Development is likely to be affected during operation by local traffic flows. For each road link for each scenario, the following data has been included in the model.

- Average Annual Daily Traffic (AADT) flows
- Heavy Good Vehicles (HGVs)
- Estimated vehicle speed, based on posted speed limits and evaluation of traffic congestion patterns using Google Maps

To allow for reduced speeds and increased acceleration/deceleration near junctions, traffic speeds on road links within 25 m of junctions have been assumed to account for junction delay. In accordance with Defra LAQM.TG (16) guidance, it has been assumed that traffic approaching the junction slows to an average of 20 kph.

Information provided within the Transport Assessment (TA)[35] was supplemented with additional traffic data supplied by the Transport Consultant via personal communication[36]. Subsequent calculations assumed an opening year of 2024 (Appendix F).

Model verification was carried out using a base year of 2019, using traffic obtained from the DfT website[37]. This is considered to be the latest full year representative of normal conditions prior to suppression of traffic flows due to Covid lockdown. 2019 DfT data was factored to the opening year of 2024 using TEMPRO growth factors provided by the Transport Consultant (Appendix F). TEMPRO is a Trip End Model Presentation Program designed to allow detailed analysis of pre-processed trip-end, journey mileage, car ownership and population/workforce planning data from the National Trip End Model (NTEM).[38]

The assessment scenarios modelled are summarised as follows:

- **2019 baseline**
- **2024 opening year without the Proposed Development (Do-Minimum (DM) scenario)**
- **2024 opening year with the Proposed Development with typical traffic for a busy summer non-event day (Do-Something (DS) Scenario 1)**

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[35] Farington Cricket Facility Transport Assessment (Public Version). WSP (March 2022)
[36] Email from Hannah Barrett (WSP) to G.Hodgkiss (Cundall), 20/01/2022.
[37] https://roadtraffic.dft.gov.uk/local-authorities/76
[38] Trip End Model Presentation Program. See: https://www.transport-assessment.com/tempro.htm

- Training nets - up to 30 cars – based on 30 players independently driving to the site
- Possible Club Community Use for a morning or afternoon session on Ground 1 – up to 60 cars based on the parents or Guardians driving them to site
- 3 x Age Group games (based on, as an example, Ground 2 used AM for Under 13, Ground 1 PM for U15 and Ground 2 PM for U14) – Assume max of 15 people for 6 teams (including players and coaching staff) arriving by cars driven by spectating parents/guardian - 100 cars total
- Evening Pavilion use – up to 120 cars based on capacity for 160 covers, assuming many would car share or arrive in taxi etc
- Staff – Comprised of caterers, bar staff, cleaners, ground staff - up to 20 cars
- This equates to 330 cars entering and leaving the site across the day

- **2024 opening year with the Proposed Development with typical traffic for a full-capacity event day (up to 5,000 spectators for a white ball fixture) (Do-Something (DS) Scenario 2)**
  - Only Ground 1 in cricketing use
  - 500 cars parking in the permanent and temporary car park on site – this is a finite capacity so this can't be exceeded it on the site itself
  - Away Team Players Bus x 1
  - Buses for Lancashire spectators from Old Trafford or other pick-up points across the County – Up to 4
  - Bus for away team spectators – assume 1
  - Food/Beverage vehicles to arrive prior to gate opening time – Up to 6, assuming some might arrive the day prior (assume LGVs)
  - Shuttle bus from local rail / P+R locations – assume up to 10 2-way movements
  - Drop off/Taxi – Assume this could be up to 100
  - All the above equates to 600 cars, 6 LGVs and 16 HGVs (total 622 vehicles) entering and leaving the site across the day

3.4.7 Vehicle Emission Rates

Vehicle emission rates for NOx, PM_{10} and $PM_{2.5}$ were obtained from the latest version of Defra's Emission Factor Toolkit (EFT11.0)[39], for the 'England' area, with a basic split traffic format. Vehicle emission rates are expected to decrease in the future due to increasingly stringent Euro emission standards, but there is uncertainty as to the rate of improvement for NOx emissions from diesel vehicles, considering recent measurements of exhaust emissions and ambient air quality.

Emission factors for the baseline year (2019) have been used for baseline modelling to enable model verification against local monitoring data. For future (2024) modelling, sensitivity calculations have been undertaken assuming:

- Baseline year (2019) and 2019 emission factors (worst case)
- Reduction of emission factors to opening year (2024) in line with the values presented in the Defra EFT calculations (best case).

3.4.8 Receptors

Detailed dispersion modelling of NOx, PM_{10} and $PM_{2.5}$ emissions from operational traffic was used to undertake assessment of human exposure at the development site and existing residential receptors close to the modelled road network.

[39] Department for Environment Food & Rural Affairs (Defra), Emissions Factors Toolkit, https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html.

Modelled receptors include worst case locations, such as those closest to roads and junctions. The modelled receptors are shown in Figure 3-1 and listed in Table 3-1.

The proposed receptor locations include a height of 1.5m, which is approximately representative of exposure at ground floor level.

Receptor	Location	Coordinates		Modelled Height (m)
		Easting	Northing	
R1	Residential, Stanifield Lane	355000.7	424091.8	1.5
R2	Residential, Stanifield Lane	354995.4	424292.6	1.5
R3	Residential, Stanifield Lane	355002.7	425027.9	1.5
R4	Residential, Lostock Lane	355076.1	425122.5	1.5
R5	Residential, Watkin Lane	354894.0	425237.0	1.5
R6	Residential, Watkin Lane	354778.1	425322.1	1.5
R7	Residential, Farington Road	354082.0	424748.8	1.5
R8	Residential, Watkin Lane	354363.8	425794.5	1.5
R9	Residential, Watkin Lane	354347.9	425851.3	1.5
Site	Typical position near to site entrance	355001.0	424839.0	1.5

Table 3-1: Modelled Receptors

3.4.9 Results Processing

3.4.9.1 Atmospheric Chemistry

NO_2 is associated with effects on human health and therefore the air quality standards for the protection of human health are based on NO_2 rather than total NOx or NO. The model predicts NOx concentrations which comprise nitric oxide (NO) and nitrogen dioxide (NO_2). NOx is emitted from combustion processes primarily as NO with a small percentage (usually <5%) of NO_2. The emitted NO reacts with oxidants in the air (mainly ozone) to form secondary NO_2. Factors affecting the rate of this oxidation occurs include the concentration of oxidants in the air, wind speed and temperature.

Predicted NOx concentrations have been processed to determine annual mean nitrogen dioxide (NO_2) concentrations for comparison with the annual mean NO_2 objectives. A NOx:NO_2 conversion has been applied to the modelled NOx concentrations, in order to determine the impact of the NOx emissions on ambient concentrations of NO_2. Defra's NO_x to NO_2 calculator[40] was used with the 'All other urban UK traffic' mix assumed.

3.4.9.2 Background Pollutant Concentrations

The annual mean background and modelled roads from ADMS-Roads were added together to give total concentrations and enable a comparison to be made with the air quality criteria for annual mean concentrations.

Defra's mapped background pollutant concentrations were used in the results processing of NO_2, PM_{10} and $PM_{2.5}$.

The modelling has assumed that there will be no reduction in background NO_2 concentrations with the background value for the base year used in all years of modelling.

Sensitivity calculations have been undertaken assuming:

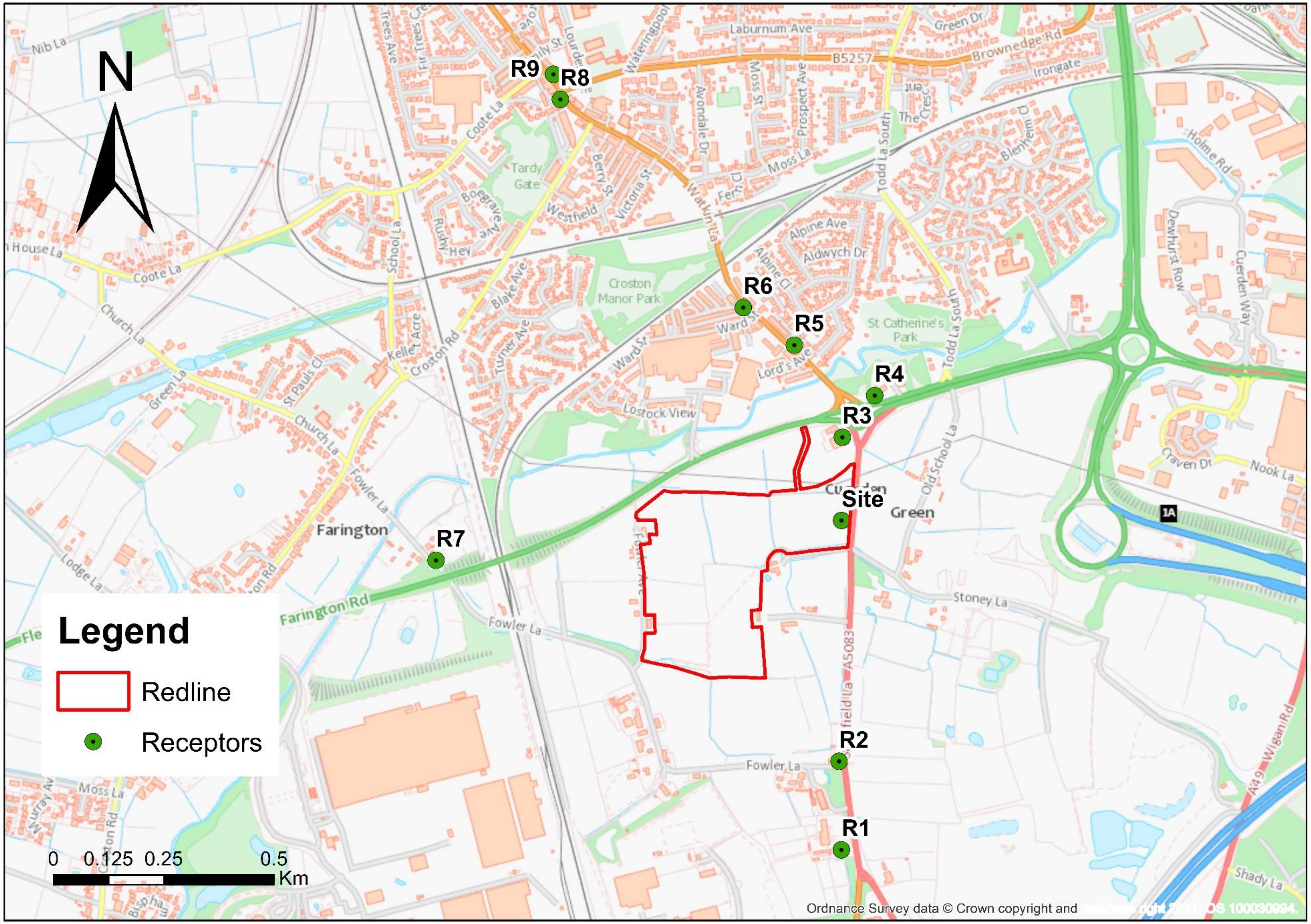
- No reduction in emission factors.

[40] Defra, Background Maps https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc.

- Reduction of emission factors in line with the values presented in the Defra EFT calculations

The results of dispersion modelling at sensitive residential receptors have been compared to relevant air quality objectives for the protection of human health listed in Table 2-2.

Figure 3-1: Modelled Receptors



3.4.9.3 Model Verification

Using the guidance provided in Chapter 7 of LAQM.TG (16) , the modelled output has been verified against local monitoring data obtained from diffusion tube surveys operated by South Ribble Borough Council. Full details are provided in Appendix H and Appendix I.

The performance of the dispersion model was assessed by comparing the modelled concentrations with measured concentrations. Monitoring data, meteorological data, vehicle emission rates and traffic data for 2019 were all used in the model verification process.

The model adjustment was undertaken using methodology which requires the determination of the ratio between the measured and modelled road contributed NO_x at each comparison site. The ratio between them, referred to as the adjustment factor, is applied to the modelled road contributed NO_x. The modelled NO_2 is then determined using the Defra NO_x/NO_2 calculator[41].

The modelled road contributed NO_x was adjusted by the factor 3.170 and then converted to total NO_2 using the Defra NO_x/NO_2 calculator. The results, in comparison with the measured total NO_2 concentrations, are shown in Appendix K.

The final adjusted total NO_2 concentration predicted at the two diffusion tubes is within ±25% of the measured values and is therefore considered satisfactory.

In accordance with Defra guidance, the road contributed NO_x adjustment factor was also applied to the road contributed PM concentration. The total PM_{10} and $PM_{2.5}$ concentrations are derived by adding the adjusted road contribution value to the Defra background concentrations.

[41] https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html.

4.0

Site Description and Baseline Conditions

4.0 Site Description and Baseline Conditions

To assess the significance of any new development proposal (in terms of air quality), it is necessary to identify and understand the baseline air quality conditions in and around the study area. This provides a reference against which any potential changes in air quality can be assessed. Since air quality is predicted to change in the future (mainly because of changes to vehicle emissions), the baseline situation is extrapolated forward to the opening year. The future baseline scenario is the predicted baseline for the opening year.

To identify the existing air quality conditions, a review of publicly available information has been undertaken, including the latest local authority air quality reports, monitoring data, and background concentration maps. This section presents the results of the review.

4.1 Local Sources of Pollution

Industrial air pollution sources are regulated through operating permits or authorisations, which list stringent emission requirements. Regulated industrial process are classified as either Part A or Part B processes and are regulated through the Pollution Prevention and Control (PPC) system[42] which has been transposed into National legislation[43]. The larger, more polluting, Part A processes are regulated by the Environment Agency for emissions to air, water and land. The smaller, less polluting processes are regulated by the local authority for emission to air.

A review of the Environment Agency Pollutant Inventory for 2018 indicated that there are two Part A permit sites within 2km of the Proposed Development. These are Global Renewables Lancashire Operations (recovery or mix of recovery and disposal of non-hazardous waste) and Dunbia (animal, vegetable and food; slaughtering animals).

The Part B processes are regulated and reviewed by the Local Authorities and given the nature of these processes, are unlikely to significantly affect ambient air quality in the vicinity of the Proposed Development. Eleven Part B permitted processes were identified which operate within a 2km radius of the Proposed Development. These are shown in Figure 4-1 and include petrol filling stations, handling of minerals and solvents and petroleum, gas and powder coating sector.

The most recent 2021 ASR[44] also confirmed that there were no new industrial and other sources identified.

Any emissions from these installations are assumed to be represented in the Defra background concentrations.

[42] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)
[43] The Environmental Permitting (England and Wales) (Amendment) Regulations 2013, SI 2013/390
[44] South Ribble Borough Council (2021) 2021 Air Quality Annual Status Report (ASR), August 2021

Figure 4-1: Part A Industrial Permit Sites within 2km.

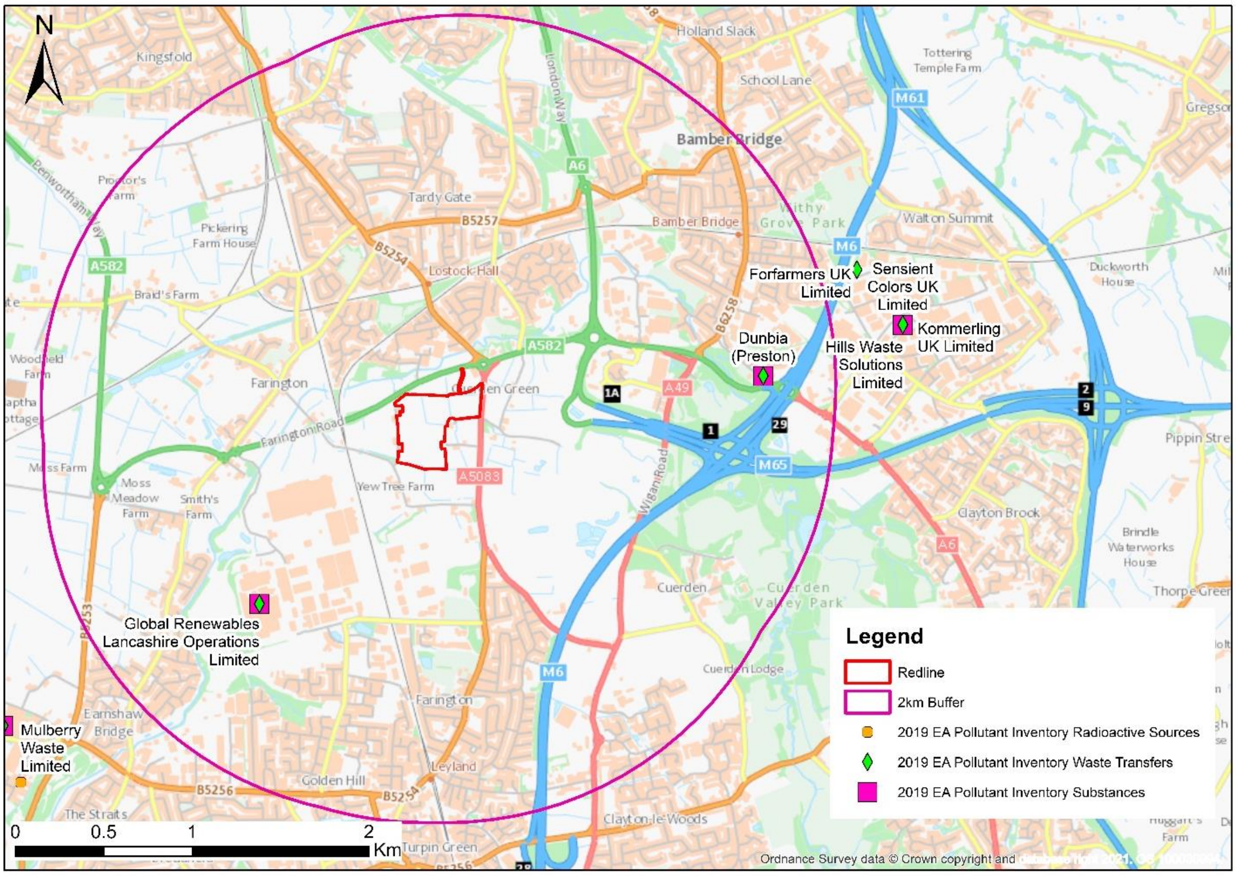
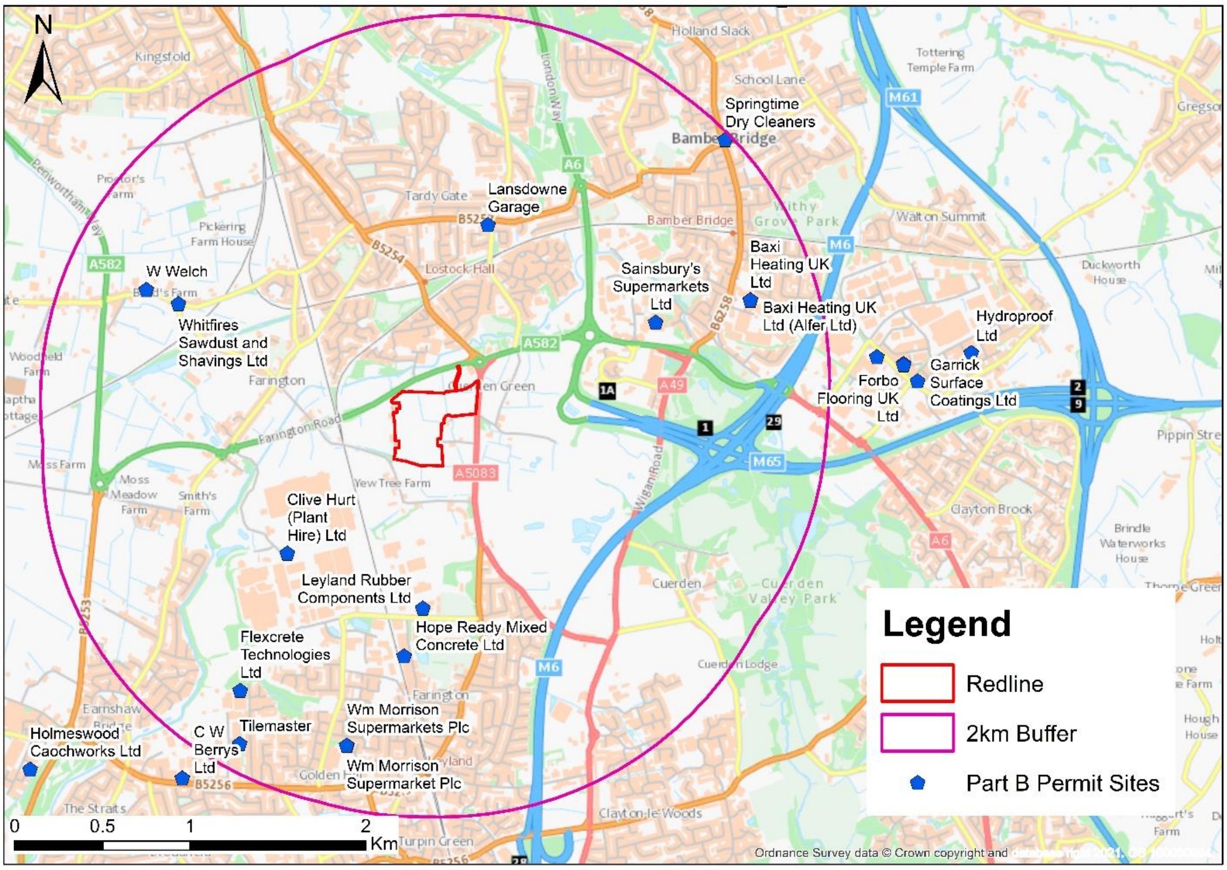


Figure 4-2: Part B Industrial Permit Sites within 2km.



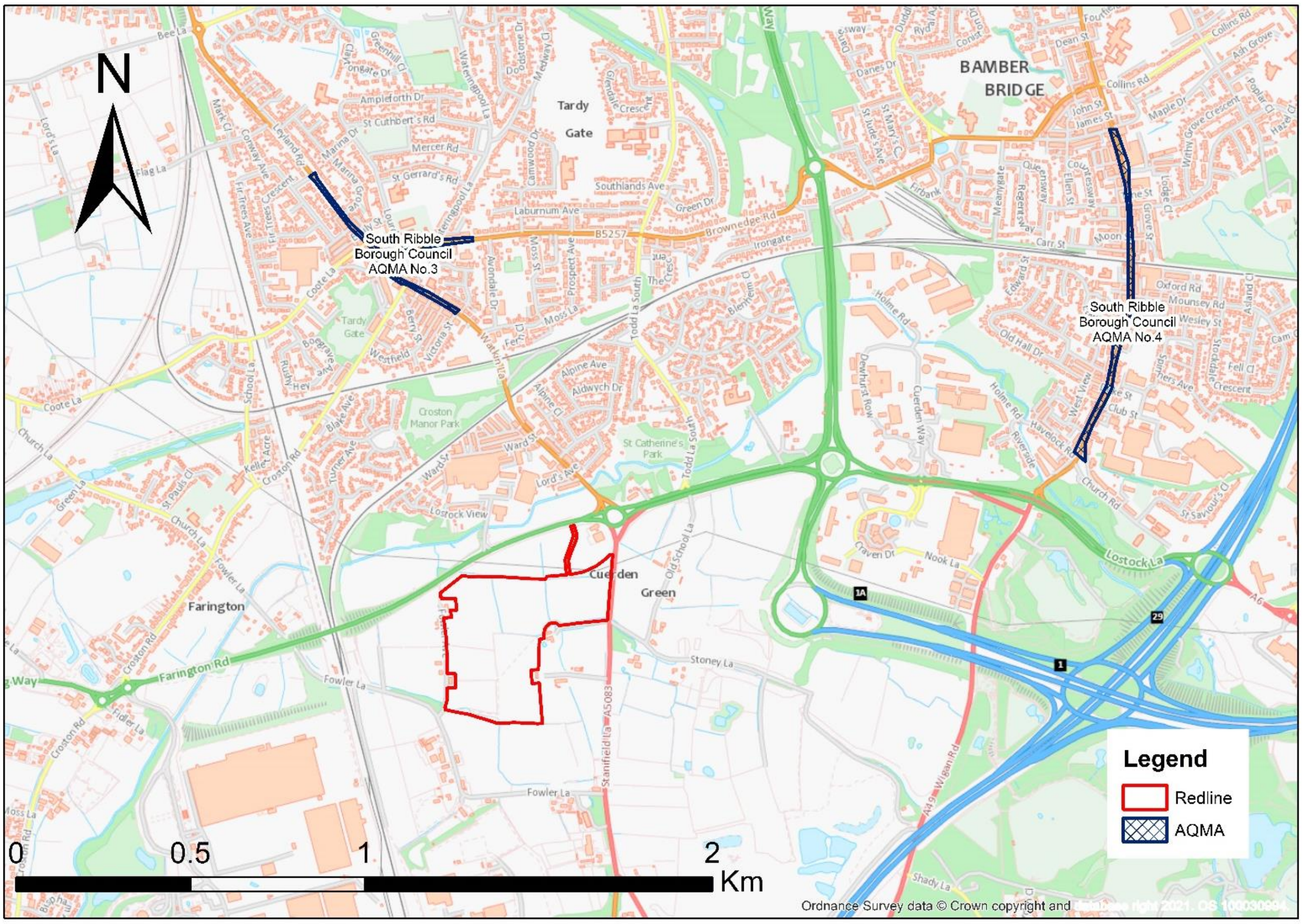
4.2 Local Air Quality Management

The Environment Act 1995 requires local authorities to review and assess air quality with respect to the objectives for seven pollutants specified in the National Air Quality Strategy. Local authorities are required to carry out an assessment and provide an Annual Status Report (ASR) of their area every year. If the ASR identifies any potential hotspot areas likely to exceed air quality objectives, a detailed assessment of those areas is required. If objectives are not predicted to be met, the local authority must declare the area as an Air Quality Management Area (AQMA). If an AQMA has been declared, the Local Authority will also need to produce an Air Quality Action Plan (AQAP), to includes measures to improve air quality in the AQMA.

The Proposed Development is in Farington, and the baseline assessment includes a brief review and summary of the Council's latest LAQM Annual Status Report (ASR). As the Proposed Development is located within 2km of the boundary with Chorley, monitoring data from the latest Chorley ASR[45] has also been reviewed.

The Site is located 0.8km south of South Ribble Borough Council AQMA No.3. The AQMA was declared for likely breach of the nitrogen dioxide (NO_2) anneal mean objective. The location of the Proposed Development in relation to the AQMA boundary is shown in Figure 4-3.

Figure 4-3: Air Quality Management Area



4.2.1 Local Air Quality Monitoring

A review of existing local air quality conditions in the vicinity of the Proposed Development has been undertaken. Automatic and diffusion tube monitors within 2km of the proposed development have been evaluated as part of this

[45] Chorley Council (2020) 2020 Air Quality Annual Status Report (ASR), June 2020, https://chorley.gov.uk/media/850/Annual-Status-Report-ASR-/pdf/ASR_Chorley_2020_v2_1.pdf??m=637475053264000000&ccp=true#cookie-consent-prompt

assessment.

Automatic or continuous monitoring involves drawing air through an analyser continuously to obtain near real-time pollutant concentration data. A review of the most recent ASRs from South Ribble Borough Council and Chorley Council showed that there are no automatic monitoring stations within 2km. The council's do not undertake any automatic monitoring.

The latest ASR indicates that South Ribble has 27 diffusion tubes monitoring NO_2 across the borough, 13 of which are within 2km of the proposed development. These are all classified as "Roadside". The latest ASR for Chorley indicates that has Chorley has 20 diffusion tubes monitoring NO_2 across the borough, none of which are within 2km of the proposed development; The locations of the sites of interest for this assessment are shown in Figure 4-4. Details of the diffusion tubes and recent monitoring results are given in Table 4-1 and Table 4-2. An exceedance is defined as an annual mean greater than 40µg/m^3 for NO_2.

Site ID	Site Location	OS Grid Reference		Site Type	Distance to kerb of nearest road (m)
		x	y		
7	36 Golden Hill Lane	354438	422645	Roadside	2.9
8	130 Golden Hill Lane	353890	422654	Roadside	2.9
11	28-30 Watkin Lane, Lostock Hall	354515	425695	Roadside	2.4
12	Spar, Watkin Lane, Lostock Hall	354368	425783	Roadside	5.4
13	13 Brownedge Road, Lostock Hall	354410	425835	Roadside	2.4
14	Tardy Gate PH, Leyland Rd, Lostock Hall	354353	425844	Roadside	2.7
15	477 Leyland Road, Lostock Hall	354296	425903	Roadside	4.1
26	146/Library, Station Road, Bamber Bridge	356437	426303	Roadside	2.0
27	243 Station Road, Bamber Bridge	356530	425840	Roadside	6.1
28	244 Station Road, Bamber Bridge	356506	425793	Roadside	8.9
29	266 Station Road, Bamber Bridge	356511	425692	Roadside	2.9
30	301 Station Road, Bamber Bridge	356000	425578	Roadside	3.0
31	361 Station Road, Bamber Bridge	356426	425364	Roadside	1.6

Table 4-1: Details of Diffusion Tube Monitoring Sites within 2km

Site ID	Site Type	Distance from Site	Annual Mean NO_2 Concentration (µg/m^3)				
			2016	2017	2018	2019	2020
7	Roadside	1.9km south	38.2	34.7	34.8	36.2	30.9
8	Roadside	2.0km south-west	38.0	32.5	34.1	34.6	28.2
11	Roadside	0.8km north-west	26.3	25.7	27.7	26.1	22.0
12	Roadside	0.9km north-west	32.3	33.1	32.8	32.1	23.8
13	Roadside	1.0km north-west	38.1	**40.0**	**40.3**	38.8	29.7
14	Roadside	1.0km north-west	37.7	35.3	37.8	35.4	27.7
15	Roadside	1.0km north-west	32.3	27.7	30.9	30.5	22.6
26	Roadside	2.0km north-east	32.5	29.2	32.1	29.8	23.5
27	Roadside	1.8km north-east	30.3	28.7	29.2	29.0	22.7
28	Roadside	1.7km north-east	25.0	24.8	22.9	22.3	19.1
29	Roadside	1.7km north-east	28.1	26.2	26.1	30.0	26.9

Site ID	Site Type	Distance from Site	Annual Mean NO_2 Concentration (µg/m^3)				
			2016	2017	2018	2019	2020
30	Roadside	1.2km north-east	24.7	22.9	25.6	24.8	20.3
31	Roadside	1.5km north-east	39.9	35.1	35.2	35.9	28.4

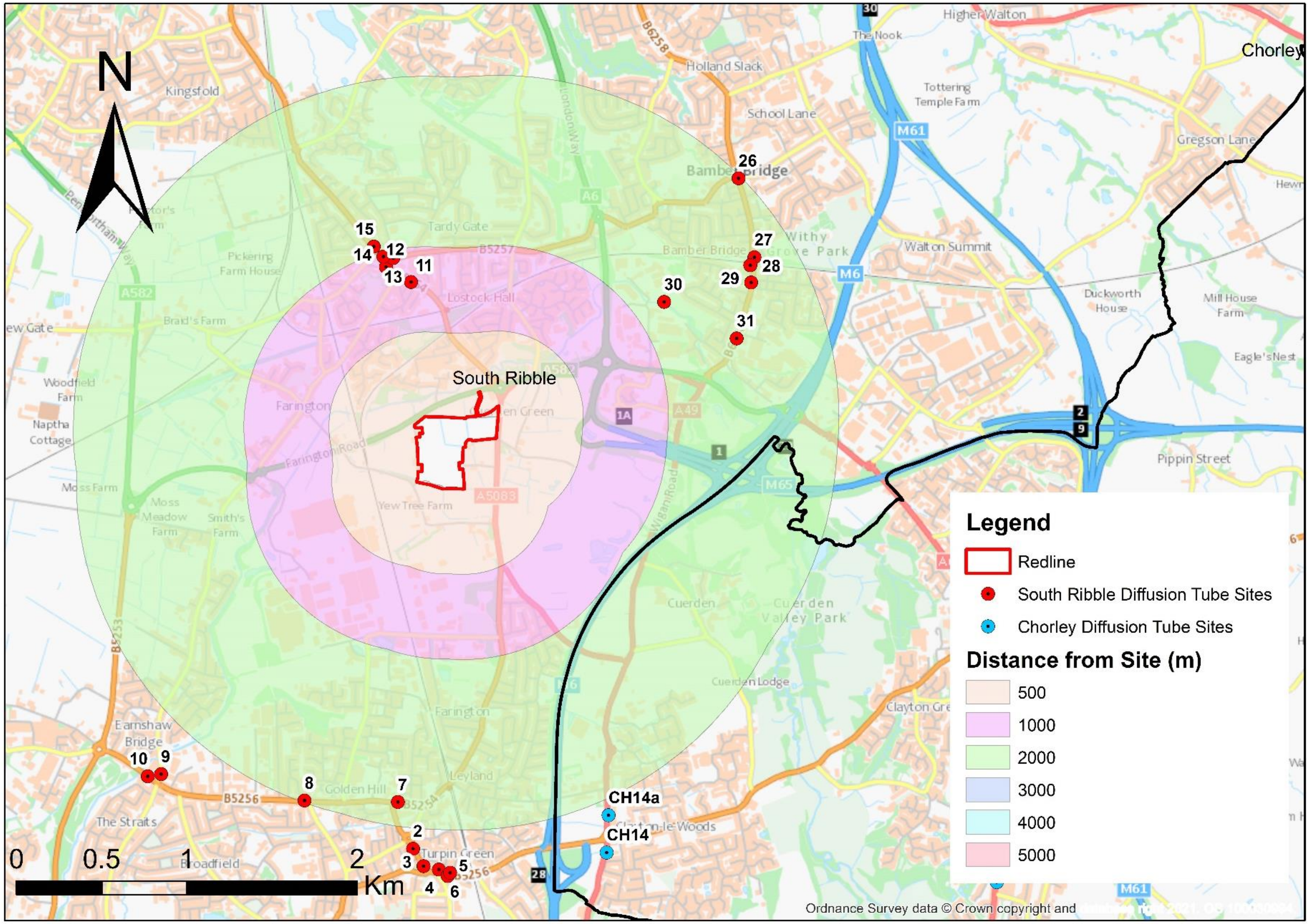
Table 4-2: Monitoring Data 2016 to 2021

Data is available between 2016 and 2020, however, the 2020 data set is considered to be unrepresentative due to impacts of Covid Lockdown. Interpretation and verification have therefore been based on the 2019 data set, which is considered to be the most conservative, and representative, of recent years.

Of the 13 roadside diffusion tube monitoring locations, only one of the sites exceeded the NO_2 objective (40µg/m^3) during the period between 2016 and 2020 (Site 13 during 2017 and 2018). In 2019, none of the roadside sites recorded NO_2 concentrations above the annual mean objective. The maximum recorded concentration in 2019 was 38.8 µg/m^3, which was recorded at Site 13 , which is located at 13 Brownedge Road, Lostock Hall.

The annual mean NO_2 concentrations recorded at all of the 13 sites within 2km during 2019 are below 60µg/m^3. Exceedances of the short-term objective are therefore considered to be unlikely.

Figure 4-4: Local Diffusion Tube Sites



4.3 Defra's Background Pollutant Concentration Mapping

Background concentrations refer to existing levels of pollution in the atmosphere, as a result of emission from a variety of sources, such as traffic, industrial and agricultural processes. Defra publishes background pollutant mapping for every 1km x 1km OS grid square across the UK for NO_x, NO_2, PM_{10} and $PM_{2.5}$. Background pollutant mapping has been reviewed for the grid square in which the Proposed Development lies and surrounding grid squares. The background concentrations (which are based on 2018 monitoring data) are presented in Table 4-3.

OS Grid Square		Annual Mean Concentration (µg/m^3)							
		NO_x		NO_2		PM_{10}		$PM_{2.5}$	
X	Y	2019	2020	2019	2020	2019	2020	2019	2020
354500	424500	16.7	15.8	12.5	11.9	11.4	11.2	7.4	7.3
354500	425500	18.4	17.2	13.6	12.8	11.7	11.5	8.1	7.9
355500	424500	22.9	21.6	16.6	15.8	13.1	12.9	8.3	8.2
354500	423500	19.4	18.6	14.2	13.7	12.8	12.6	9.0	8.9
353500	424500	17.2	16.3	12.8	12.2	11.3	11.0	7.3	7.1
Average		18.9	17.9	13.9	13.3	12.1	11.8	8.0	7.9

Table 4-3: Defra's 2019 and 2020 background concentrations of NOx, NO_2, PM_{10} and $PM_{2.5}$

Modelled Defra background concentrations are all below the air quality objectives for annual mean NO_2 and PM_{10} and $PM_{2.5}$. In the absence of any local urban background monitoring data, these were used in subsequent calculations.

4.4 Local Traffic Data

The presence of any heavily trafficked roads, with emissions that could give rise to significantly higher concentrations of pollutants (e.g., NO_2), may cause unacceptably high exposure for users of the new development.

Traffic count data for the area is reported in Appendix F. This includes 2019 traffic data for Stanifield Lane to the east and Farington Road to the north.

The emissions from wider roads in the area are assumed to be represented in the Defra background concentrations used in the calculations.

4.5 Sensitive Receptors

Sensitive receptors near the development were identified with reference to mapping data provided by Ordnance Survey.

Figure 4-5 shows the location of receptors in the area. This includes residential properties within 20m of the red line boundary.

Defra MAGIC mapping[46] has been reviewed to determine the presence of any sensitive ecological sites[47]. There are no designated ecological receptors within 1km of the site boundary. The closet designated ecological site is Preston Junction Local Nature Reserve, which is located approximately 1.2km north-east of the Proposed Development, as shown in Figure 4-6.

[46] Department for Environment, Food and Rural Affairs (Defra) (2019). MAGIC https://magic.defra.gov.uk/MagicMap.aspx

[47] Typical ecological receptors of significance include Special Conservation Areas (SACs), Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSIs), RAMSAR sites, Local Nature Reserves with dust sensitive features.

Figure 4-5: Sensitive Receptor Locations

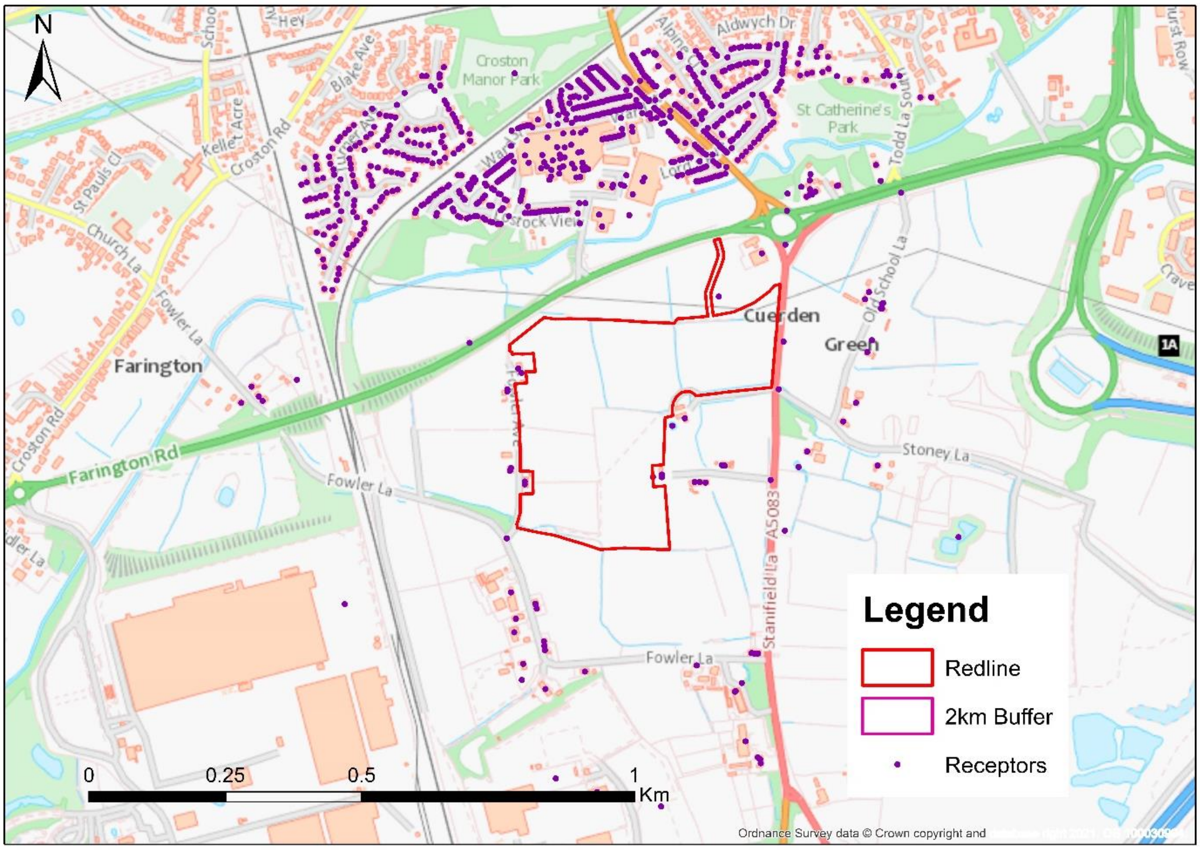
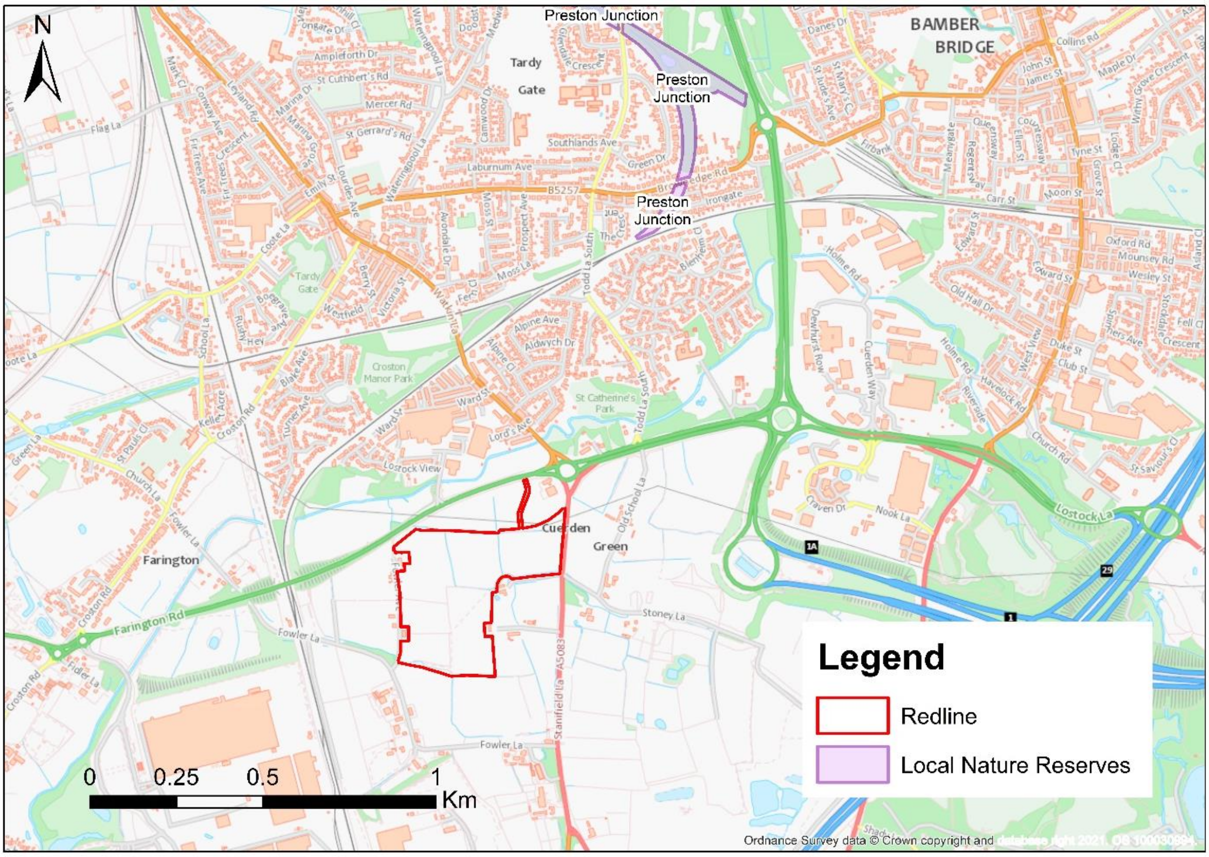


Figure 4-6: Ecological Locations



5.0

Impact Evaluation

5.0 Impact Evaluation

5.1 Construction Phase Impacts

5.1.1 Need for a Detailed Assessment

An assessment was undertaken as there are 'human receptors' within 350m of the boundary of the site; and 50m of the route used by construction vehicles on the public highway, up to 500m from the site entrance.

5.1.2 Risk of Dust Impacts Assessment

Dust Emission Magnitude Analysis

The dust emission magnitude is based on the scale of the anticipated work and classified as Table 5-1 below. Assumptions listed are based on indicative design information provided by BDP Architects.

Stage	Relevant Definition	Highest Potential Dust Emission Magnitude
Demolition	• No demolition activities proposed	N/A
Earthworks	• Estimated site area is >10,000 m^2 (estimated 134,000 m^2) • Potentially loamy dusty soil type	Large
Construction	• Estimated total building volume is 25,000 m^3 – 100,000 m^3 (estimated 49,000 m^3) • Potentially dust construction material (concrete piles)	Medium
Track out	• Anticipated to be 10-50 HDV (>3.5 tonnes) outward movements in any one day. • Moderately dusty surface material	Medium

Table 5-1: Determination of the potential dust emission magnitude

The highest dust emission magnitude is likely to be Large.

5.1.3 Sensitivity of the Area

The surrounding area has a significant density of sensitive receptors, which have wide range of sensitivities to dust soiling and health effects. The numbers of these receptors likely to be affected by demolition, earthworks and construction activities during the construction phase has been assessed. The analysis involved counting receptors, identified via the current Address Base Plus geographical data set, within each of the distance bands from the Application Site boundary. Buffers illustrating the assessment distances of 20, 50, 100, 200 and 350 metres from the Application Site boundary are illustrated in Figure 5-1. The analysis of sensitive receptors within each distance band is presented in Table 5-2.

Defra MAGIC mapping has been reviewed to determine the presence of any sensitive ecological sites[48]. There are no designated ecological receptors sensitive to dust within 500m of the site boundary and therefore the sensitivity of the area to ecological receptors is negligible.

[48] Typical ecological receptors of significance include Special Conservation Areas (SACs), Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSIs), RAMSAR sites, Local Nature Reserves with dust sensitive features.

Distance (metres)	Receptor Type					
	Residential / Development (High)	Non-Residential Development (High)	Commercial / Retail / Office (Medium)	Commercial / Leisure / Transport (Low)	Ecological	Totals
20	9	0	0	2	0	11
50	11	0	0	3	0	14
100	13	0	0	3	0	16
200	42	2	2	8	0	54
350	248	9	39	24	0	320

Table 5-2: Number of Receptors in Each Distance Band

Figure 5-1: Construction Dust Buffer Zones (courtesy of Google Earth)

In summary, the evaluation shows that:

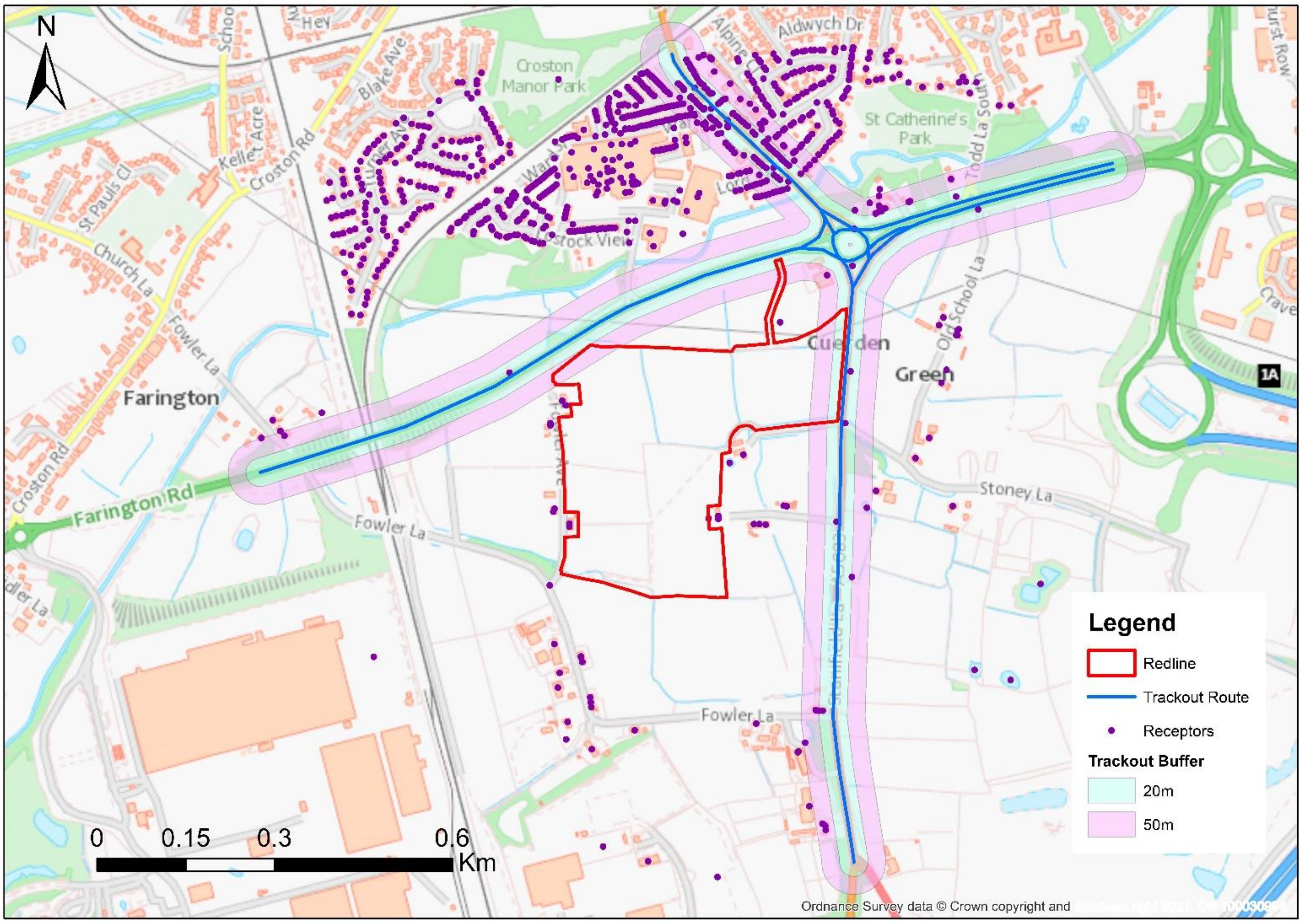
- 1-10 high risk residential receptors are located within 20m of the Proposed Development boundary
- 10-100 high risk residential receptors are located within 50m of the Proposed Development boundary

The sensitivity of the area to dust soiling effects on people and property from earthworks and construction activities is therefore **Medium**.

The Defra PM_{10} background concentration in the area of the Proposed Development are <14µg/m^3. There are 10 to 100 high sensitivity receptors within 20 m and 50m of the Proposed Development boundary. The sensitivity of the area to human health impacts for demolition, earthworks and construction activities is therefore **Low**.

Sensitive receptors are also susceptible to dust soiling and health effects resulting from construction vehicle trackout. The IAQM guidance states that trackout may occur from roads up to 500 m from large sites and 200m from medium sites. As the highest dust emission magnitude is large, a 500m distance band has been applied accounting for sensitive receptors 50m from the construction route (Figure 5-2).

Figure 5-2: Trackout 500m Distance Band around the Site Exit Route



An evaluation of numbers of sensitive receptors lying within 20m and 50m of the edge of the carriageway of those links identified in Step 2A has been carried out and the number of these receptors likely to be affected by trackout on roads used by construction vehicles is summarised in Table 5-3.

Distance (metres)	Receptor Type					
	Residential / Development (High)	Non-Residential Development (High)	Commercial / Retail / Office (Medium)	Commercial / Leisure / Transport (Low)	Ecological	Totals
20	72	4	0	0	0	76
50	179	11	2	0	0	192

Table 5-3: Number of Receptors Identified in Distance Bands from the Edge of Carriageways Potentially Included in Construction Traffic Routes

In summary, the evaluation shows that:

- 10-100 high risk receptors are located within 20m of the potential construction traffic routes
- >100 high risk residential receptors are located within 50m of the of the potential construction traffic routes

The sensitivity of the area to dust soiling effects on people and property from trackout activities is therefore **High**.

The Defra PM_{10} background concentrations in the area of the Proposed Development are <14µg/m^3. There are 10-

100 high sensitivity receptors within 20 m and >100 within 50m of the construction phase boundary of roads used by construction traffic within 250 m of the Site exits. The sensitivity of the area to human health impacts for demolition, earthworks, construction and trackout activities is **Low**.

Using the IAQM guidance, the sensitivity of the surrounding area has been determined for dust soiling effects and human health effects, based on the receptor type and density, as well as low annual mean PM_{10} concentrations. The determined sensitivities for each phase of construction are summarised in Table C4 in Appendix C.

There are no ecological sensitive receptors within 50 m of the boundary of the site; and within 50 m of the route used by construction vehicles on the public highway, up to 500 m from the site entrance. Therefore, no further consideration of dust impact on ecological receptors has been undertaken.

Sensitivity of Areas Analysis

The sensitivity of the receptors and area has been defined for both dust soiling and human-health impact as shown in Table 5-4.

Receptor Sensitivity	Relevant Definition	Sensitivity of the Receptors	Relevant Definition	Sensitivity of the Area
Dust Soiling for Earthworks, Construction	Dwellings	High	10 – 100 receptors within 50 m of site.	Medium
Dust Soiling for Trackout	Dwellings	Low	10-100 receptors within 20 m of route used by construction traffic.	High
Human-Health Effects of PM_{10} for Earthworks, Construction	Dwellings	Low	<24 µg/m^3 annual mean PM_{10} concentration. 10 – 100 receptors within 20 m of site.	Low
Human-Health Effects of PM_{10} for Trackout	Dwellings	Low	<24 µg/m^3 annual mean PM_{10} concentration. 10 – 100 receptors within 20 m of route used by construction traffic	Low

Table 5-4: Determination of the sensitivity of the surrounding area

5.1.4 Risk of Impact

The risk of dust impact to both dust soiling and human-health effects for each construction activities are summarised in Table 5-5.

Potential Impact (Sensitivity of the Area)	Dust Risk (Dust Emission Category)				
	Demolition (N/A)	Earthworks (Large)	Construction (Medium)	Trackout (Medium)	Overall Risk
Dust Soiling (Medium for Earthworks, Construction and High for Trackout)	N/A	Medium	Medium	Medium	Medium
Human-health (Low for Earthworks, Construction and Trackout)	N/A	Low	Low	Low	Low
Overall Risk	N/A	Medium	Medium	Medium	**Medium**

Table 5-5: Risk of Impacts

The dust impact assessment has demonstrated that the risk of dust soiling without any mitigation is Medium for earthworks, construction and trackout.

The risk of adverse human-health effects of PM_{10} without any mitigation is low for earthworks, construction and trackout.

The overall risk of unmitigated impacts is **Medium** for earthworks, construction and trackout.

5.2 Operation Phase

5.2.1 Human Exposure at the Proposed Development

Exposure conditions at the Proposed Development were modelled at the Site for the 2024 opening year, see Appendix K Tables J-1 to J-3. In summary, the following results were obtained:

- NO_2: 22.1 µg/m^3
- PM_{10}: 13. µg/m^3, 0 days exceedance of 24-hour mean short term objective
- $PM_{2.5}$: 8.9 µg/m^3

This confirms that air quality will meet both annual and short-term national air quality objectives at the Proposed Development.

5.2.1.1 Future Sensitive Receptors at the Proposed Development- Scenario 1 Non-Event Days

Air quality conditions for sensitive receptors in the vicinity of the Proposed Development are presented in Appendix J.

Results are presented for 2 different scenarios:

a) 2019 Background with 2024 traffic flows and 2022 emission factors (best-case)
b) 2019 Background with 2024 traffic flows and 2019 emission factors (worst-case)

Interpretation of modelled data indicates that concentrations of NO_2 are likely to meet the annual mean NO_2 objective at all receptors. The sensitivity test demonstrates that if pollutant background concentrations and national emission factors all fail to improve in line with Defra predictions and remain at 2019 levels, the impact at all receptors is still predicted to be negligible at all receptors.

Concentrations of PM_{10} and $PM_{2.5}$ are likely to meet the annual mean and short-term PM_{10} objective and annual mean $PM_{2.5}$ objective at all receptors. The sensitivity test demonstrates that if pollutant background concentrations and national emission factors all fail to improve in line with Defra predictions, the impact at all receptors is still predicted to be negligible.

5.2.1.2 Future Sensitive Receptors at the Proposed Development- Scenario 2 Event Days

Air quality conditions for sensitive receptors in the vicinity of the Proposed Development are presented in Appendix K.

Results are presented for 2 different scenarios:

c) 2019 Background with 2024 traffic flows and 2022 emission factors (best-case)
d) 2019 Background with 2024 traffic flows and 2019 emission factors (worst-case)

Interpretation of modelled data indicates that concentrations of NO_2 are likely to meet the annual mean NO_2 objective at all receptors. The sensitivity test demonstrates that if pollutant background concentrations and national emission factors all fail to improve in line with Defra predictions and remain at 2019 levels, the impact at all receptors is still predicted to be negligible at all receptors, except for R4, where a worse case increase of 0.4 µg/m^3 could be expected. This would be classified as a moderate impact; however, increases are expected to be lower as there is already anecdotal evidence to suggest that national background pollutant concentrations and vehicle emission rates have already improved significantly since 2019. The assessment also assumes that Scenario 2 event days are likely to occur on a normal weekday, whereas in effect, these events are more likely to occur at weekends when traffic levels on the local network will generally be lower.

Concentrations of PM_{10} and $PM_{2.5}$ are likely to meet the annual mean and short-term PM_{10} objective and annual mean $PM_{2.5}$ objective at all receptors. The sensitivity test demonstrates that if pollutant background concentrations and national emission factors all fail to improve in line with Defra predictions, the impact at all receptors is still predicted to be negligible.

6.0

Assumptions and Limitations

6.0 Assumptions and Limitations

6.1 Construction Dust Assessment

Assumptions relating to quantities for earthworks, construction and trackout are based on the design details provided by BDP Architects and Eric Wright Construction.

Information provide by Eric Wright Construction confirms that daily construction vehicle movements will peak at around 32 two-way trips per day (See 3.4.2). However, the annual average daily HDV trips is likely to fall well below 25 AADT threshold for any given road link, particularly when flows are distributed across the wider road network. As such, consideration of construction phase transport impacts was scoped out of further assessment.

6.2 Combustion Plant

The Energy Strategy for the Proposed Development considers a number of potential options for the provision of heating and hot water including natural gas, natural gas/solar power and air source/ground source heat pumps with panel heaters. The recommended option is currently based on air source heat pumps and panel heaters, and should this option be implemented, hot water and heating will be provided by all electric sources. However, should there be any change to incorporate natural gas combustion once final design details are confirmed, further screening of any potential air quality impacts may be required.

6.3 Dispersion Modelling- General

No terrain data have been included within the model. Based on the topography of the site and surrounding area, this is not considered to be necessary.

6.4 Model Verification

The local air quality impacts were assessed based on the results from atmospheric dispersion modelling. A series of assumptions have been made in relation to the dispersion modelling used to predict impacts from the Proposed Development. These have been outlined in the impact assessment methodology outlined in Section 3.4.

The uncertainty in the predictions for the current baseline was reduced by carrying out model verification and adjustment of results to align with measured concentrations. This process is summarised in Appendix I.

6.5 Future Year Traffic Impacts

Future operational traffic flows utilised within the assessment are considered to be very much worst-case and have been calculated by adding potential future development trips to calculated weekday AADT values. In reality, major event days are likely to be held at weekends, when prevailing traffic flows on the local network are likely to be much lower.

6.6 Future Year Emission Factors

A greater level of uncertainty is associated with predictions for future years than for the base year, with greater uncertainty the further into the future the predictions are made. Sensitivity testing has therefore been undertaken with modelling using both the base year and future year EFT v11.0 factors produced by Defra.

Results are presented for 2 different scenarios in Appendices J and K.

a) 2019 Background with 2024 traffic flows and 2022 emission factors (best-case)

b) 2019 Background with 2024 traffic flows and 2019 emission factors (worst-case)

The likelihood is that the actual future predicted concentrations and impacts will lie somewhere between the two extremes.

7.0

Mitigation

7.0 Mitigation

7.1 Construction

The primary aim of the dust risk assessment is to identify the appropriate site-specific mitigation measures that will be adopted to ensure there will be no significant effect on local amenity and public health.

Full details of mitigation measures are presented in Appendix L and should be read in accordance with the findings of the construction dust assessment (Chapter 5).

The Client will commit to the implementation of the best practice mitigation measures identified above during the construction phase of the development. It is anticipated that the generation of dust and harmful pollutants emissions from construction site activities will be reduced with the correct implementation of these measures.

7.2 Operation

The assessment has indicated that ambient air quality in the vicinity of the Proposed Development is likely to meet the national air quality objectives.

As the Proposed Development has a commercial use, short-term rather than long-term objectives will apply for the future site users. Since the estimated NO_2 value is predicted to be well below 60 µg/m^3, it is concluded that there are unlikely to be any exceedances of the NO_2 1-hour mean objective at the Proposed Development.

It is anticipated that the impact of the operation phase on nearby receptors is likely to be negligible, and therefore no further mitigation measures are required. A supporting Travel Plan will be submitted to further reduce operational traffic impacts wherever practicable.

8.0

Residual Effects

8.0 Residual Effects

8.1 Construction

With appropriate mitigation in place, it is considered that the residual effects on dust soiling and human health from the construction phase activities would be reduced and not significant.

The mitigation measures required are detailed in Appendix L and are based upon the IAQM guidance. Selection of appropriate mitigation measures should be based on the findings of the construction dust assessment (section 5.1).

8.2 Operation

Residual effects on human health from operation phase emissions are expected to be negligible.

9.0

Conclusion

9.0 Conclusion

9.1 Conclusion

This report presents the air quality assessment for the construction of a new cricket-led development at the Woodcock Estate in Farington, Lancashire. The Proposed Development includes two full-sized cricket ovals with natural sloping terraces and training facilities including outdoor nets, a club pavilion including a gym, changing rooms, and hospitality space. Cycle and car parking will also be provided on site.

A review of current legislation and national and local policy has been made. An assessment has been made of existing baseline air quality conditions and potential impacts associated with construction and operational of the Proposed Development.

The Proposed Development does not lie within an AQMA; however, South Ribble Borough Council AQMA No.3 lies 0.8km to the north, and traffic from the Proposed Development has potential to pass through this AQMA. The AQMA was declared for likely breach of the nitrogen dioxide (NO_2) anneal mean objective. Existing conditions within the study area indicate that there is also potential for nitrogen dioxide (NO_2) concentrations in the wider area to exceed National Air Quality Objective threshold levels.

Emissions of construction dust have been assessed using the qualitative approach outlined in the IAQM guidance. It was concluded that in the absence of any adequate mitigation, there is a **medium** risk from earthworks, construction and trackout activities associated with the Proposed Development. However, with appropriate mitigation measures implemented, it is anticipated that the dust generation and harmful emissions from construction site activities will not be significant.

The Energy Strategy for the Proposed Development considers a number of potential options for the provision of heating and hot water including natural gas, natural gas/solar power and air source/ground source heat pumps with panel heaters. The recommended option is currently based on air source heat pumps and panel heaters, and should this option be implemented, hot water and heating will be provided by all electric sources. However, should there be any change to incorporate natural gas combustion once final design details are confirmed, further screening of any potential air quality impacts may be required.

Information provided by the transport consultant, WSP, has confirmed that the following levels of traffic could be generated in the opening year:

- Typical traffic for a busy summer non-event day - 330 cars entering and leaving the site
- Typical traffic for a full-capacity event day (up to 5,000 spectators for a white ball fixture) - 600 cars, 6 LGVs and 16 HGVs entering and leaving the site

As the Proposed Development is located 0.8km to the south of an Air Quality Management Area (AQMA), the predicted increase in annual average daily traffic flows on nearby roads has therefore been screened against the IAQM threshold for detailed assessment within AQMA. As annual average daily traffic flows on roads are therefore likely to increase by greater than 100 vehicles per day, the IAQM threshold for detailed assessment within AQMA, an assessment of operation phase traffic impacts was included within the main assessment.

Detailed assessment of operation phase traffic impacts indicated that the impacts at nearby sensitive receptors surrounding the Proposed Development are expected to be negligible for non-event and event days in the opening year of 2024. Further sensitivity tests indicated that increases of up to $0.4\mu g/m^3$ NO_2 may occur at one location close to the junction with Lostock Lane to the north of the development if national pollutant background concentrations and vehicle emission factors fail to improve on 2019 levels. However, increases are expected to be lower as there is already anecdotal evidence to suggest that national background pollutant concentrations and vehicle emission rates have already improved since 2019.

The exposure of future site users of the Proposed Development has been assessed, with the following results:

- Exceedances of the national annual mean and short-term mean fine nitrogen dioxide (NO_2) objectives are unlikely throughout the Proposed Development
- Exceedances of the national annual mean and short-term mean fine particulate (PM_{10}) objectives are unlikely throughout the Proposed Development
- Exceedance of the national annual mean fine particulate ($PM_{2.5}$) objective is unlikely throughout the Proposed Development

Air quality within the vicinity of the Proposed Development therefore complies with current national air quality objectives, and ventilation of the buildings can be provided by natural means, wherever practicable.

It is recommended that implementation of an appropriate Air Quality Dust Management Plan (DMP) is utilised to manage emissions during the construction phase of the Proposed Development. It is assumed that this will be actioned via a pre-commencement condition. As such, the development will be fully compliant with the requirements of Lancashire County Council and South Ribble Borough Council and the National Planning Policy Framework.

10.0

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10.0 References

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11.0

Glossary

11.0 Glossary

Term/Acronym	Details
µg/m^3	Micrograms (one-millionth of a gram) per cubic metre of air
AADT	Annual average daily traffic
AQAL	Air Quality Assessment Level
AQAP	Air quality action plan
AQMA	Air quality management area. Areas where the air quality objectives are likely to be exceeded. Declared by way of an order issued under the Section 83(1) of the Environment Act 1995.
AQO	Air quality objective. Air quality targets to be achieved locally as set out in the Air Quality Regulations 2000 and subsequent Regulations. Objectives are expressed as pollution concentrations over certain exposure periods, which should be achieved by a specific target date. Some objectives are based on long term exposure (e.g., annual averages), with some based on short term objectives. Objectives only apply where a member of the public may be exposed to pollution over the relevant averaging time.
AQS	Air quality strategy
ASR	Annual status report
COPD	Chronic obstructive pulmonary disease
Defra	Department for Environment, Food and Rural Affairs
DMP	Dust Management Plan
EA	Environment Agency
Earthworks	The process of soil stripping, ground-levelling, excavation and landscaping.
EfT	Emission Factor Toolkit
EU	European union
Exceedance	Concentrations of a specified air pollutant greater than the appropriate Air Quality Objective.
HDV	Heavy duty vehicle
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
LA	Local authority
LAQM	Local air quality management
LAQM, TG	Local air quality management technical guidance
LDV	Light duty vehicle
LGV	Light Goods Vehicle
Limit Values / EU limit values	The maximum pollutant levels set out in the EU Daughter Directives on Air Quality. In some cases, the limit values are the same as the national air quality objective but may allow a longer period for achieving.
LT	Long-term averaging period (i.e. Annual mean)
MSCP	Multi Storey Car Park
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NPPF	National Planning Policy Framework
NSSRI	North Staffordshire Royal Infirmary
NTEM	National Trip End Model
PCM	Pollution climate model
PM_{10}	The fraction of particulates in air of very small size (less than 10 micrometres).
$PM_{2.5}$	Fine particles in the (ambient) air 2.5 micrometres or less in size.
Ramsar/ Ramsar site	The Convention on Wetlands of International Importance, called the Ramsar Convention is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Ramsar sites are wetlands of international importance, designated under the Ramsar Convention.

Term/Acronym	Details
SAC/ pSAC/ cSAC	Special area of conservation / potential SAC / candidate SAC
SPA / pSPA	Special protection area / potential special protection area
SPG	Supplementary planning guidance
SSSI	Site of special scientific interest
ST	Short-term averaging period (i.e., Daily, hourly, or 15-min means)
TC	Transport Consultant
TEMPRO	Trip End Model Presentation Program
TP	Travel Plan
Trackout	The transfer of dust or dirt on the local road network and then re-suspended by vehicles on the network.
TS	Transport Statement
VCM	Vertical Circulation Model
$\mu g/m^3$	Micrograms (one-millionth of a gram) per cubic metre of air
AADT	Annual average daily traffic
AQAL	Air Quality Assessment Level
AQAP	Air quality action plan
AQMA	Air quality management area. Areas where the air quality objectives are likely to be exceeded. Declared by way of an order issued under the Section 83(1) of the Environment Act 1995.
AQO	Air quality objective. Air quality targets to be achieved locally as set out in the Air Quality Regulations 2000 and subsequent Regulations. Objectives are expressed as pollution concentrations over certain exposure periods, which should be achieved by a specific target date. Some objectives are based on long term exposure (e.g., annual averages), with some based on short term objectives. Objectives only apply where a member of the public may be exposed to pollution over the relevant averaging time.
AQS	Air quality strategy
ASR	Annual status report
COPD	Chronic obstructive pulmonary disease
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
Earthworks	The process of soil stripping, ground-levelling, excavation and landscaping.
EfT	Emission Factor Toolkit
EU	European union
Exceedance	Concentrations of a specified air pollutant greater than the appropriate Air Quality Objective.
HDV	Heavy duty vehicle
IAQM	Institute of Air Quality Management
LA	Local authority
LAQM	Local air quality management
LAQM, TG	Local air quality management technical guidance
LDV	Light duty vehicle
Limit Values / EU limit values	The maximum pollutant levels set out in the EU Daughter Directives on Air Quality. In some cases, the limit values are the same as the national air quality objective but may allow a longer period for achieving.
LT	Long-term averaging period (i.e. Annual mean)
MSCP	Multi Storey Car Park
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NPPF	National Planning Policy Framework
NSSRI	North Staffordshire Royal Infirmary
NTEM	National Trip End Model

Term/Acronym	Details
PCM	Pollution climate model
PM_{10}	The fraction of particulates in air of very small size (less than 10 micrometres).
$PM_{2.5}$	Fine particles in the (ambient) air 2.5 micrometres or less in size.
Ramsar/ Ramsar site	The Convention on Wetlands of International Importance, called the Ramsar Convention is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Ramsar sites are wetlands of international importance, designated under the Ramsar Convention.
SAC/ pSAC/ cSAC	Special area of conservation / potential SAC / candidate SAC
SPA / pSPA	Special protection area / potential special protection area
SPG	Supplementary planning guidance
SSSI	Site of special scientific interest
ST	Short-term averaging period (i.e., Daily, hourly, or 15-min means)
TC	Transport Consultant
TEMPRO	Trip End Model Presentation Program
TP	Travel Plan
Trackout	The transfer of dust or dirt on the local road network and then re-suspended by vehicles on the network.
TA	Transport Assessment

Table 11-1: Glossary

Appendices

Appendix A – Air Quality Assessment Authors

Author: **Brittany Huggins**

Brittany is a Graduate Air Quality Consultant with Cundall, having joined the company in 2021. She has a MSc degree in Air Pollution Management and Control from University of Birmingham, which explored air pollution management control technology, atmospheric data processing, micrometeorology and theoretical meteorology.

She also has a BSc degree in Environmental Science from Manchester Metropolitan University which included aviation and its environmental impacts, environmental monitoring and earth observation, environmental risk management and natural resources and pollution.

Reviewer: **Glyn Hodgkiss**

Glyn is a Principal Consultant in Cundall's Air Quality Team. He has 30 years' experience working in the environmental field and has specialised in Air Quality for over 15 years. He is a Chartered Environmentalist and Member of the Institute of Air Quality Management.

Working in both the private and public sectors, Glyn has gained extensive experience in monitoring and modelling air quality. His role in Local Government included air quality action planning, working with developers to minimise air quality impacts of new development, working on regional planning policy initiatives and on the delivery of government funded air quality improvement programs. He has also worked in private sector consultancy on the delivery of multiple air quality assessments ranging from small, single source dispersion modelling studies through to complex multi-source assessments and major road and infrastructure projects. This work has provided valuable support in the design, planning, construction and operation of new developments.

Glyn has a pedigree in collaborative working, bringing together the expertise of Cundall alongside other consultants and stakeholders to promote smooth project progression from inception to conclusion.

Reviewer: **Jenny Carrington**

Jenny Carrington is a Chartered Scientist (CSci) and is based in Birmingham, where she works as a Principal Air Quality Consultant. She has sixteen years' experience working in the environmental sector for a range of both public and private clients.

She is responsible for undertaking air quality assessments and is fully conversant with atmospheric dispersion modelling through the use of ADMS software as part of more detailed air quality assessments. She also has responsibility for managing air quality monitoring programs.

In her role as an environmental specialist Jenny has worked on a range of multi-disciplinary projects often fulfilling the role of project manager in coordinating third parties to enable a successful completion of the project.

She is experienced in producing air quality chapters for Environmental Statements for a range of different developments and has previously reviewed Environmental Statement's on behalf of Local Authorities.

Appendix B – EHO Correspondence

Hodgkiss, Glyn

From:	Neil Martin <neil.martin@southribble.gov.uk>
Sent:	10 February 2022 10:14
To:	Hodgkiss, Glyn
Subject:	RE: Woodcock Estate, Farington
Attachments:	Planning Advisory Note Low Emissions and Air Quality November 2020.pdf; 2019 figures.xlsx

Hi Glyn,
Thank you for the e-mail. Please find attached the Council's preferred methodology for AQA's which will help produce an appropriate report. I've also attached the 2019 data for assistance.

Kind regards
Neil

Neil Martin
Senior Environmental Health Officer

01772 (62) 5625

southribble.gov.uk

South Ribble
Borough Council

From: Hodgkiss, Glyn <g.hodgkiss@cundall.com>
Sent: 10 February 2022 09:38
To: Envhealth <envhealth@southribble.gov.uk>; Neil Martin <nmartin@southribble.gov.uk>
Subject: Woodcock Estate, Farington

Good Morning,

Cundall has been commissioned to carry out an Air Quality Assessment to support proposals for the construction of a new cricket-led development at the Woodcock Estate in Farington, Lancashire. The Proposed Development includes two full-sized cricket ovals with natural sloping terraces and training facilities including outdoor nets, a club pavilion including a gym, changing rooms, and hospitality space. Cycle and car parking will also be provided on site.

The Proposed Development does not lie within an Air Quality Management Area (AQMA); however, South Ribble Borough Council AQMA No.3 lies 0.8km to the north, and traffic from the Proposed Development has potential to pass through the AQMA. The changes in operational flows associated with the development are anticipated to be above the more stringent EPUK/IAQM thresholds for requiring an air quality assessment. We are therefore proposing detailed assessment of operational traffic including the following scope of work:

- Undertaking a detailed air quality assessment using the latest version of ADMS Roads Extra to investigate emissions from road sources to inform an assessment of exposure at the site
- Evaluation of potential operation phase traffic impacts on local receptors in accordance with IAQM screening criteria, and assessment of potential impacts using dispersion modelling
- Using a baseline year of 2019, with use of council monitoring data for model verification. In the absence of any further updated monitoring results, we will proceed with the latest data set in the public domain (2017) and assume that this is worse case and also representative of 2019. Please advise if you are able to supply a copy of 2019 monitoring data, or your most recent Annual Status Report?
- Undertaking a construction dust risk assessment following the latest IAQM dust guidance;
- Using the latest IAQM/EPUK guidance to assess significance; and
- Where appropriate, recommending appropriate mitigation measures in line with IAQM/EPUK guidance and Local policy.

If you disagree with any elements of the proposed scope please let us know, otherwise we will proceed with the assumption that it is acceptable.

Thank you for your assistance in this matter and feel free to call with any further queries.

Kind Regards,

Glyn Hodgkiss

Glyn Hodgkiss
Principal Air Quality Consultant
Cundall

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From: Hodgkiss, Glyn <g.hodgkiss@cundall.com>
Sent: 27 January 2022 09:49
To: envhealth@southribble.gov.uk
Subject: FW: Air Quality Annual Status Report

Good morning, I am not sure of Neil's availability due the out of office message, please could someone forward the latest air quality ASR if you have anything after 2017 please?

Many Thanks,

Glyn

From: Hodgkiss, Glyn
Sent: 27 January 2022 07:20
To: nmartin@southribble.gov.uk
Subject: Air Quality Annual Status Report

Good Morning,

The latest Air Quality Annual Status report on the council website is from 2017. Are you able to provide a copy of anything more recent please?

Many Thanks for your assistance in this matter,

Best Regards,

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Appendix C– IAQM Construction Assessment Methodology

Screening (Step 1)

As ‘human receptors’ were identified within 50 m of the boundary of the site; and within 50 m of the route(s) to be used by construction vehicles on the public highway, up to 500 m from the site entrance, a detailed risk assessment was undertaken.

Dust Emission (Step 2A)

The potential dust emission magnitude for different activities have been defined based on the criteria listed in Table C-1.

Stage	Description	Large	Medium	Small
Demolition	Definitions for demolition are:	1. Total building volume >50,000 m^3 2. Potentially dusty construction material (e.g., concrete) 3. On-site crushing and screening 4. Demolition activities >20 m above ground level	5. Total building volume 20,000 m^3 – 50,000 m^3 6. Potentially dusty construction material (e.g., concrete) 7. Demolition activities 10 – 20 m above ground level	8. Total building volume <20,000 m^3 9. Construction material with low potential for dust release (e.g., metal cladding or timber) 10. Demolition activities <10 m above ground, demolition during wetter months
Earthworks	Earthworks will primarily involve excavating material, haulage, tipping, and stockpiling. This may also involve levelling the site and landscaping.	11. Total site area >10,000 m^2 12. Potentially dusty soil type (e.g., clay, which will be prone to suspension when dry due to small particle size) 13. >10 heavy earth moving vehicles active at any one-time formation of bunds >8 m in height 14. Total material moved >100,000 tonnes	15. Total site area 2,500 m^2 – 10,000 m^2 16. Moderately dusty soil type (e.g., silt) 17. 5-10 heavy earth moving vehicles active at any one-time formation of bunds 4 m – 8 m in height 18. Total material moved 20,000 tonnes – 100,000 tonnes	19. Total site area <2,500 m^2 20. Soil type with large grain size (e.g., sand) 21. <5 heavy earth moving vehicles active at any one-time formation of bunds <4 m in height 22. Total material moved <20,000 tonnes, earthworks during wetter months
Construction	The key issues when determining the potential dust emission magnitude during the construction phase include the size of the building(s) / infrastructure, method of construction, construction materials, and duration of build.	23. Total building volume >100,000 m^3 24. On-site concrete batching and sandblasting	25. Total building volume 25,000 m^3 – 100,000 m^3 26. Potentially dusty construction material (e.g., concrete) 27. On-site concrete batching	28. Total building volume <25,000 m^3 29. Construction material with low potential for dust release (e.g., metal cladding or timber)

Stage	Description	Large	Medium	Small
Trackout	Factors which determine the dust emission magnitude are vehicle size, vehicle speed, vehicle numbers, geology, and duration. Only receptors within 50 m of the routes used by vehicles on the public highway and up to 500 m from the site entrances are considered to be at risk from the effects of dust.	30. >50 HDV (>3.5 tonnes) outward movements in any one day 31. Potentially dusty surface material (e.g., high clay content) 32. Unpaved road length >100 m	33. 10-50 HDV (>3.5 tonnes) outward movements in any one day 34. Moderately dusty surface material (e.g., high clay content) 35. Unpaved road length 50 m – 100 m	36. <10 HDV (3.5 tonnes) outward movements in any one day 37. Surface material with low potential for dust release 38. Unpaved road length <50 m

Table C-1: Potential Dust Emission Magnitude Criteria

Sensitivity of the Area (Step 2B)

The sensitivity of the area takes account of several factors:

1. The specific sensitivities of receptors in the area.
2. The proximity and number of those receptors.
3. In the case of PM_{10}, the local background concentration; and
4. Site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

Table C-2 provides guidance on the sensitivity of different types of receptor.

Description	High Sensitivity Receptor	Medium Sensitivity Receptor	Low Sensitivity Receptor
Sensitivities of People to Dust Soiling Effects	1. Users can reasonably expect enjoyment of a high level of amenity 2. The appearance, aesthetics, or value of their property would be diminished by soiling 3. The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land 4. Indicative examples include dwellings, museums, and other culturally important collections, medium, and long-term car parks, and car showrooms	5. Users would expect a to enjoy a reasonable level of amenity, but would not reasonably expect a to enjoy the same level of amenity as in their home 6. The appearance, aesthetics, or value of their property could be diminished by soiling 7. The people or property wouldn't reasonably be expected a to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land 8. Indicative examples include parks and places of work	9. The enjoyment of amenity would not reasonably be expected; or 10. Property would not reasonably be expected a to be diminished in appearance, aesthetics, or value by soiling 11. There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land 12. Indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short-term car parks, and roads

Description	High Sensitivity Receptor	Medium Sensitivity Receptor	Low Sensitivity Receptor
Sensitivities of People to the Health Effects of PM_{10}	13. Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day) 14. Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment	15. Locations where the people exposed are workers d, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). 16. Indicative examples include office and shop workers but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation	17. Locations where human exposure is transient. 18. Indicative examples include public footpaths, playing fields, parks, and shopping streets
Sensitivities of Receptors to Ecological Effects	19. Locations with an international or National designation and the designated features may be affected by dust soiling 20. Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List for Great Britain 21. Indicative examples include a Special Area of Conservation designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings	22. Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown 23. Locations with a National designation where the features may be affected by dust deposition 24. Indicative example is a Site of Special Scientific Interest with dust sensitive features	25. Locations with a local designation where the features may be affected by dust deposition. 26. Indicative example is a local Nature Reserve with dust sensitive features

Table C-2: Sensitivities of People to Dust Soiling Effects, Health Effects of PM_{10}, and Sensitivities of Receptors to Ecological Effects

Full details of the sensitivities of receptors are provided in the IAQM Guidance document.

Table C-3, Table C-4, and Table C-5 show how the sensitivity of the area has been determined for dust soiling, human-health, and ecosystem impacts respectively.

These tables take account of several factors which may influence the sensitivity of the area. The highest level of sensitivity from each table has been recorded.

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table C-3: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Annual Mean PM_{10} Concentration ($\mu g/m^3$)	Number of Receptors [d]	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<28	>10	Low	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low	Low

Table C-4: Sensitivity of the Area to Human-Health Impacts

Table C5 Receptor Sensitivity	Distance from the Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Table C-5:Sensitivity of the Area to Ecological Impact

The highest level of sensitivity from each table has been recorded. Professional judgement has been used to determine alternative sensitivity categories with consideration of additional factors, such as any pre-existing screening between the source and the receptors, the season during which the works will take place, and duration of the potential impact.

Risk of Impact Definition

The dust emission magnitude (Step 2A) was combined with the sensitivity of the area (Step 2B) to determine the risk of impact with no mitigation applied. Tables C-6 to C-9 provide the method of assigning the level of risk of each activity and used to determine the level of site-specific mitigation.

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High risk	Medium risk	Medium risk
Medium	High risk	Low risk	Low risk
Low	Low risk	Low risk	Negligible

Table C-6 Risk of Impact – Demolition

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High risk	Medium risk	Medium risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible

Table C-7: Risk of Impact – Earthworks

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High risk	Medium risk	Medium risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible

Table C-8: Risk of Impact – Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High risk	Medium risk	Medium risk
Medium	Medium risk	Low risk	Low risk
Low	Low risk	Low risk	Negligible

Table C-9: Risk of Impact – Trackout

Appendix D – IAQM Local Air Quality Assessment Screening Criteria

Comparison Against IAQM Criteria

IAQM's guidance note 'Land-Use Planning & Development Control: Planning for Air Quality' (updated in January 2017) was issued to ensure that air quality is adequately considered in the land-use planning and developmental control process.

It provides a decision-making process which assists with the understanding of air quality impacts and implications because of development proposals. It provides a framework for air quality considerations within local development control processes, promoting a consistent approach to the treatment of air quality issues within development control decisions.

The guidance includes a method for screening the requirement for an air quality assessment, the undertaking of an air quality assessment, the determination of the air quality impact associated with a development proposal and whether this impact is significant.

The guidance also provides some clarification as to when air quality constitutes a material consideration and highlights the links to other relevant issues (for example traffic speed reduction measure and the use of alternative technology to provide energy) and the importance of the understanding of these with the input from other discipline specialists. The 'creeping baseline' is another issue raised about cumulative impacts.

The guidance note is widely accepted as the most appropriate reference method for this purpose. This guidance refers to the Town and Country Planning (Development Management Procedure) Order (England) 2010 [(Wales) 2012] definition of a 'major' development when scoping assessments required for the planning process.

A 'major' development includes developments where:

- The number of dwellings is 10 or above.
- The residential development is carried out of a site of more than 0.5ha where the number of dwellings is unknown.
- The provision of more than 1,000m^2 commercial floor space; or,
- Development carried out on land of 1ha or more.

There are two types of air quality impacts to be considered:

- The impact of existing sources in the local area on the Proposed Development (governed by background pollutant levels and proximity to sources of air pollution); and,
- The impacts of the Proposed Development on the local area.

Regarding the changes in air quality or exposure to air pollution, the guidance indicates that each local authority will be likely to have their own view on the significance of this; these are to be described in relation to whether a National Air Quality Objective (NAQO) predicted to be met, or at risk of not being met. Exceedances of these objectives are considered as significant, if not mitigated.

As part of the impact of the Proposed Development on the local area, a two-staged assessment is recommended as per current guidance.

Stage 1: Determines whether an air quality assessment is required. In order to proceed to Stage 2, it requires any of the criteria under (A) coupled with any of the criteria under (B) in Table D-1 to apply.

Stage 2: Where an assessment is deemed appropriate, this may take the form of a Simple Assessment or a Detailed Assessment, using suitable guidance provided in Table D-2.

Criteria to Proceed to Stage 2
A. If any of the following apply: • 10 or more residential units of a site area of more than 0.5ha • More than 1,000m^2 of floor space for all other uses or a site area greater than 1ha
B. Coupled with any of the following: • The development has more than 10 parking spaces • The development will have a centralised energy facility or other centralised combustion process **Note:** Consideration should still be given to the potential impacts of neighbouring sources on the site, even if an assessment of impacts of the development on the surrounding area is screened out.

Table D-1: Stage 1 Criteria

The Development will		Indicative Criteria to Proceed to an Air Quality Assessment
1.	**Cause a significant change in Light Duty Vehicle (LDV) traffic slows on local roads with relevant receptors.** **(LDV = cars and small vans <3.5t gross vehicle weight).**	A change of LDV flows of: • More than 100 AADT within or adjacent to an Air Quality Management Area (AQMA) • More than 500 AADT elsewhere.
2.	**Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors.** **(HDV = goods vehicles + buses >3.5t gross vehicle weight).**	A Change of HDV flows of: • More than 25 AADT within or adjacent to an AQMA • More than 100 AADT elsewhere.
3.	**Realign roads, i.e., changing the proximity of receptors to traffic lanes.**	Where the change is 5m or more and the road is within an AQMA
4.	**Introduce a new junction or remove an existing junction near to relevant receptors.**	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g., Traffic lights, or roundabouts.
5.	**Introduce or change a bus station.**	Where bus flows will change by: • More than 25 AADT within or adjacent to an AQMA • More than 100 AADT elsewhere.
6.	**Have an underground car park with extraction system.**	The ventilation extract for the car park will be within 20m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).
7.	**Have one or more substantial combustion processes, where there is a risk of impacts at relevant receptors.** **NB. this includes combustion plant associated with standby emergency generators (typically associated with centralised energy centres) and shipping.**	Typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates. Conversely, where existing NO_2 concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable.

Table D--2: Indicative Criteria for Requiring an Air Quality Assessment

Impact Descriptors for Individual Receptors

The IAQM guidance contains a two Stage process for determining the likely significant effects of the impacts on air quality:

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

A framework for describing the impacts is set out in IAQM guidance and summarised in Table D-3 below.

Long-term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76 – 94% of AQAL	Negligible	Slight	Moderate	Moderate
95 – 102% of AQAL	Slight	Moderate	Moderate	Substantial
103 – 109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Table D-3: Indicative Criteria for Requiring an Air Quality Assessment

For air quality impacts arising from surrounding sources on new occupants of a development, then the impacts are best described in relation to whether an air quality objective will not be met or is at risk of not being met. Where the air quality is such that an air quality objective at the building façade is not met, the effect on residents or occupants will be judged as significant, unless provisions is made to reduce their exposure by some means.

Changes of less than 0.5%, will be described as Negligible.

Appendix E – Results of Screening Assessment

Where the Development will:	Indicative Criteria to Proceed to an Air Quality Assessment	Information Relevant to the Proposed Development
1. Cause a significant change in Light Duty Vehicle (LDV) traffic slows on local roads with relevant receptors.	IAQM Guidance states a change of LDV flows of: • More than 100 AADT within or adjacent to an Air Quality Management Area (AQMA) • More than 500 AADT elsewhere.	The development will generate more than 100 daily vehicle trips, therefore further assessment of increased transport emissions was scoped into further assessment via dispersion modelling
2. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors.	A Change of HDV flows of: • More than 25 AADT within or adjacent to an AQMA • More than 100 AADT elsewhere.	No increase in HDV flows is predicted
3. Realign roads, i.e., changing the proximity of receptors to traffic lanes.	Where the change is 5m or more and the road is within an AQMA	No realignment of >5m proposed
4. Introduce a new junction or remove an existing junction near to relevant receptors.	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g., Traffic lights, or roundabouts.	No new junctions proposed
5. Introduce or change a bus station.	Where bus flows will change by: • More than 25 AADT within or adjacent to an AQMA • More than 100 AADT elsewhere.	No bus station proposed
6. Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).	No underground car parking proposed
7. Have one or more substantial combustion processes, where there is a risk of impacts at relevant receptors.	Typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion.	No combustion plant proposed at present.

Table E-1: Indicative Criteria for Requiring a Detailed Air Quality Assessment

Appendix F Dispersion Model Traffic Data Inputs

Model verification was undertaken using a combination of relevant monitoring locations outlined in the latest Annual Status Report.

Traffic data were provided by the Transport Consultant (TC), with supplementary information provided by the Department of Transport (DfT). The modelled road network included all links within 200m of the Proposed Development and the monitoring locations included within the verification.

The modelled road network is shown in Figure F1.

Modelling Traffic Inputs

Base Flows obtained from the DfT were used in model verification for the base year of 2019. These were factored to 2024 using Tempro factors supplied by the Transport Consultant.

Model inputs were supplemented with network flow data provided by the TC. 2026 Flows with and without the development were provided by the Transport Consultant (see Figure F2)

Total trip numbers were provided by the Transport Consultant for two scenarios:

- 2024 opening year with the Proposed Development with typical traffic for a busy summer non-event day (Do-Something (DS) Scenario 1)- 330 cars entering and leaving the site across the day
- 2024 opening year with the Proposed Development with typical traffic for a full-capacity event day (up to 5,000 spectators for a white ball fixture) (Do-Something (DS) Scenario 2)- 600 cars, 6 LGVs and 16 HGVs entering and leaving the site across the day

These trips were distributed across the local road network in accordance with information provided by the Transport Consultant below:

Scenario 1 Non-Match-Day Traffic

Arrivals

- 95% routing via A582 (East)
- 3% from Stanifield Lane (South)
- 2% from Watkin Lane

Departures

- 84% routing via A582 (East)
- 14% from Stanifield Lane (South)
- 2% from Watkin Lane

Scenario 2 Match Day Traffic

Arrivals

- 93% routing via A582 (East)
- 0% from Stanifield Lane (South)
- 7% from Watkin Lane

Departures

- 76% routing via A582 (East)
- 18% from Stanifield Lane (South)
- 7% from Watkin Lane

A summary of traffic data inputs used within the dispersion models is summarised in Table F-3.

Figure F1 Modelled Roads and DfT Census Points

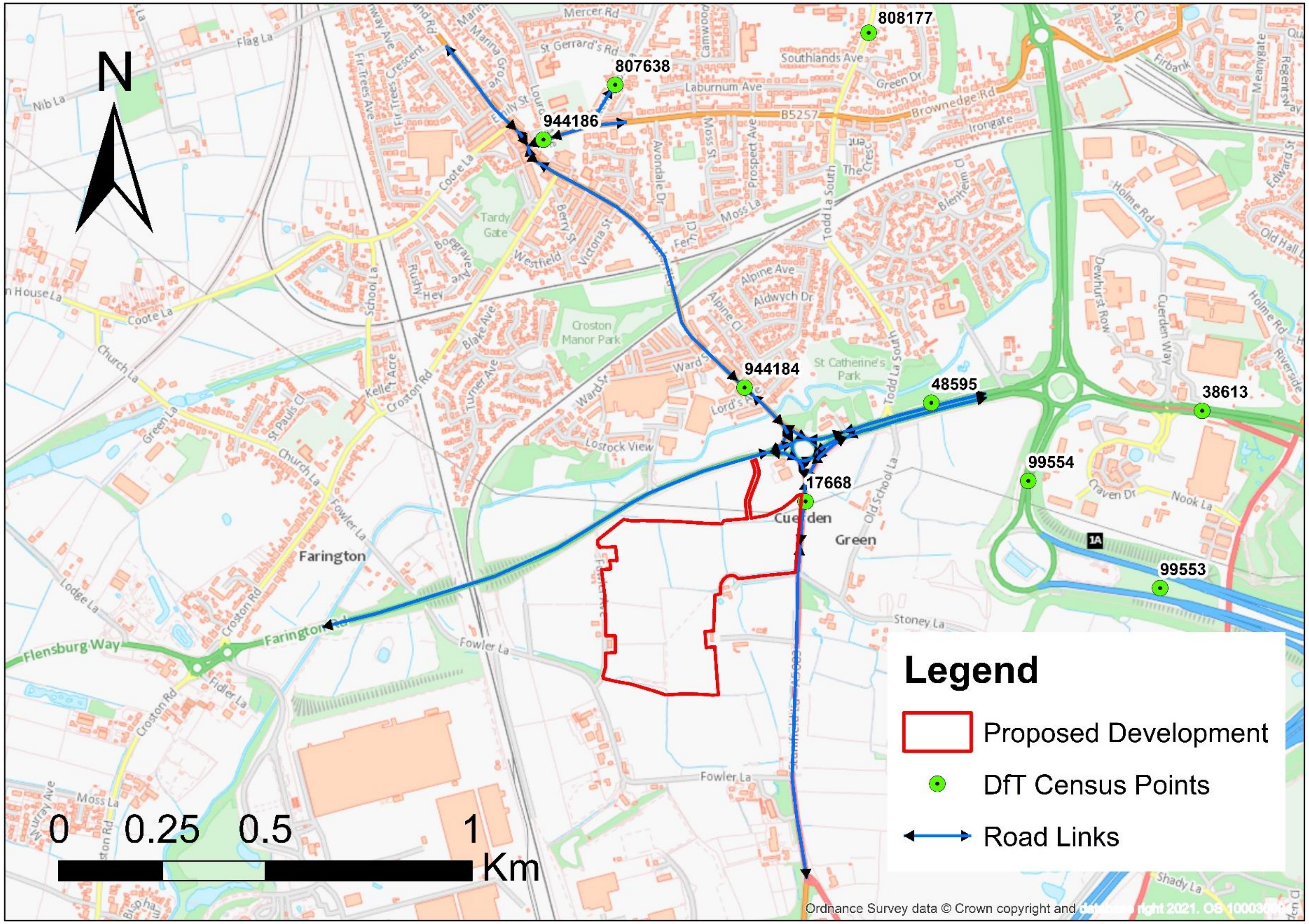
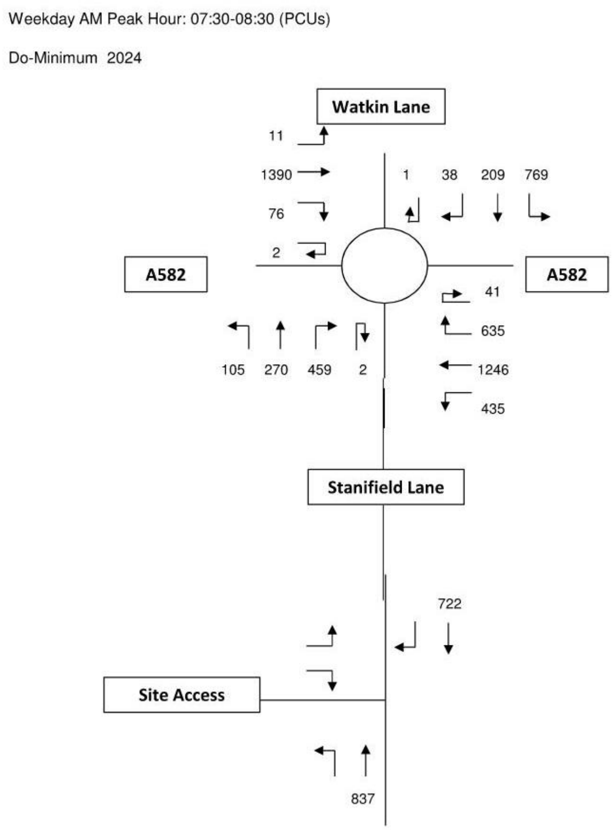
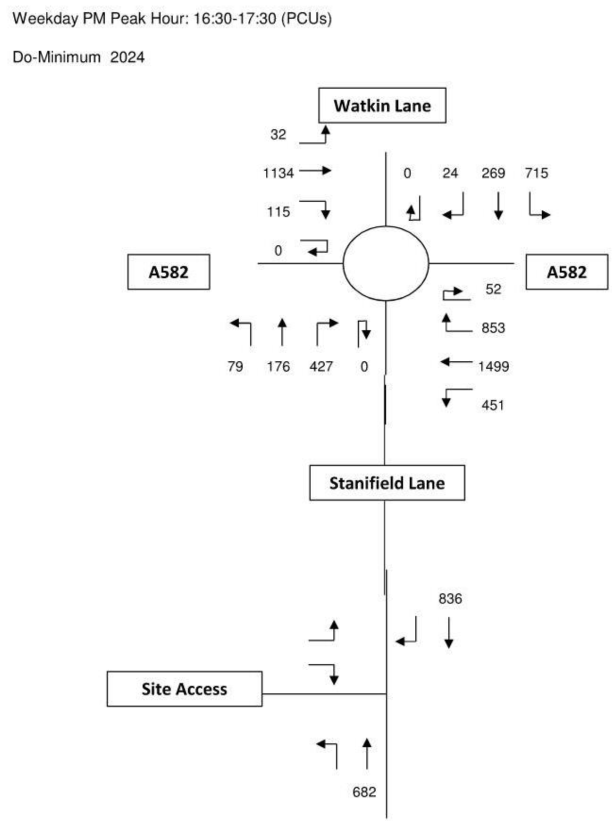


Figure F2 2024 Transport Flows Provided by the Transport Consultant



(a) AM Peak Flows 2024



(b) PM Peak Flows 2024

Approximate conversion to 24-hour AADT was obtained by multiplying combined AM/PM peak flows by a factor of 6.101 supplied by the Transport Consultant

Census Point	Road	AADT	HGV%
48595	A582	45328	4.75
807638	U	1842	0.81
17668	A5083	12368	4.31
944186	B5257	9925	1.99
944184	B5254	18884	2.40

Table F-1:*Traffic Count Data Used in the Assessment*

Year	Tempro Growth Factor (Average Weekday)
2016-2019	1.0343
2016-2024	1.0807
2019-2024	1.0449

Table F-2: Local Growth Factors supplied by Transport Consultant

Link	Road	Road Width (m)	2019 AADT- Model Verification		Estimated Average speed (kph)
			Total AADT	%HGV	
1	Roundabout 1	11.2	28826	4.7	48
2	Stanifield Lane	12.2	6184	4.3	46
3	Stanifield Lane	6.7	6184	4.3	46
4	A582 E	8.2	11332	4.7	48
5	A582 E	8.2	11332	4.7	48
6	A582 E	8.8	22664	4.7	64
7	A452W	8.8	29925	4.7	86
8	A452W	4.2	9975	4.7	32
9	A452W	8.1	9975	4.7	32
9a	A452W	8.1	9975	4.8	32
10	Watkin Lane	9.1	9442	2.4	38
11	Watkin Lane	9.1	9442	2.4	38
12	Stanifield Lane*	8.1	12368	4.3	56
13	Watkin Lane	8.7	18884	2.4	48
14	Watkin Lane	9.4	18884	2.4	48
15	Watkin Lane	8.5	18884	2.4	48
16	Watkin Lane	10.2	18884	2.4	48
17	Watkin Lane	11.9	18884	2.4	38
18	Brown Edge Road	9.7	9925	2.0	20
19	Brown Edge Road	6.8	9925	2.0	38
20	Watkin Lane	11.9	18884	2.4	20
21	A582 E	7.4	22664	4.7	64

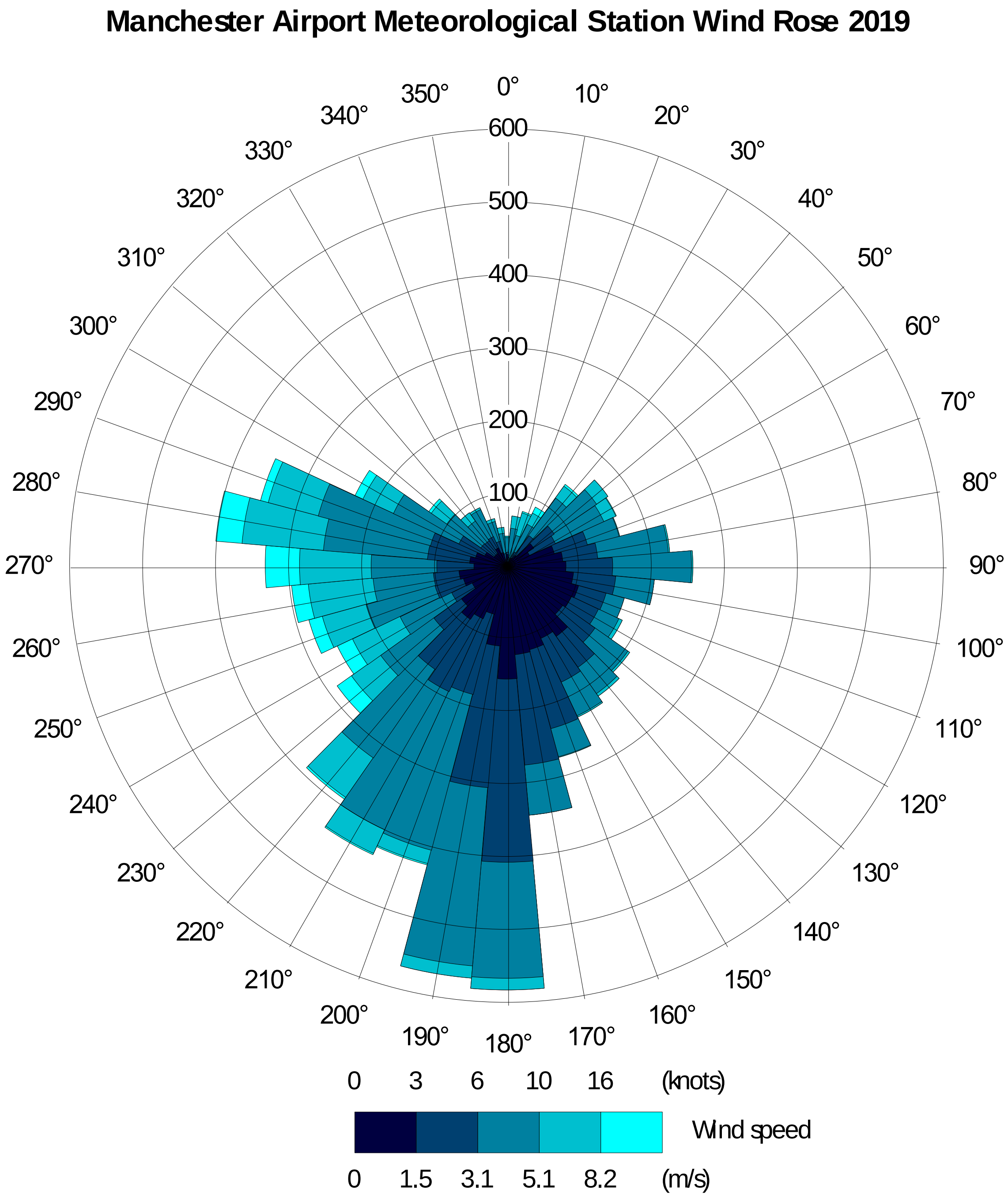
Link	Road	Road Width (m)	2019 AADT- Model Verification		Estimated Average speed (kph)
			Total AADT	%HGV	
22	A582 E	7.4	22664	4.7	48
23	Stanifield Lane*	8.1	12368	4.3	56
24	Wateringpool Lane	5.6	1842	0.8	38
* Traffic speed based on an average 34.9 mph derived from Transport Assessment speed survey.					

Table F-3:*Traffic Data Used in Verification Model Inputs*

Link	Road	2024 AADT-Evaluation of Proposed Development						Estimated Average speed (kph)
		Base Total AADT 2024 DM		Development AADT 2024 DS Scenario 1		Development AADT 2024 DS Scenario 2		
		AADT	%HGV	AADT	%HGV	AADT	%HGV	
1	Roundabout 1	30125	4.7	30427	4.8	30695	4.8	48
2	Stanifield Lane	6463	4.3	6616	4.4	6752	4.5	46
3	Stanifield Lane	6463	4.3	6616	4.4	6752	4.5	46
4	A582 E	11843	4.7	11843	4.7	11843	4.8	48
5	A582 E	11843	4.7	11996	4.8	12132	4.9	48
6	A582 E	23685	4.7	23839	4.8	23975	4.8	64
7	A452W	31274	4.7	31274	4.7	31274	4.8	86
8	A452W	10425	4.7	10425	4.7	10425	4.8	32
9	A452W	10425	4.7	10425	4.7	10425	4.8	32
9a	A452W	10425	4.8	10425	4.8	10425	4.8	32
10	Watkin Lane	9868	2.4	9879	2.4	9889	2.4	38
11	Watkin Lane	9868	2.4	9879	2.4	9889	2.4	38
12	Stanifield Lane	12925	4.3	12955	4.3	12981	4.3	56
13	Watkin Lane	19735	2.4	19758	2.4	19779	2.4	48
14	Watkin Lane	19735	2.4	19758	2.4	19779	2.4	48
15	Watkin Lane	19735	2.4	19758	2.4	19779	2.4	48
16	Watkin Lane	19735	2.4	19758	2.4	19779	2.4	48
17	Watkin Lane	19735	2.4	19758	2.4	19779	2.4	38
18	Brown Edge Road	10372	2.0	10372	2.0	10372	2.1	20
19	Brown Edge Road	10372	2.0	10372	2.0	10372	2.1	38
20	Watkin Lane	19735	2.4	19758	2.4	19779	2.4	20
21	A582 E	23685	4.7	23811	4.8	23922	4.8	64
22	A582 E	23685	4.7	23811	4.8	23922	4.8	48
23	Stanifield Lane	12925	4.3	13079	4.4	13215	4.4	56
24	Wateringpool Lane	1925	0.8	1925	0.8	1925	0.8	38

Table F-4:*Traffic Data Used in Opening Year Model Inputs*

Appendix G – 2019 Wind Rose for Manchester Airport



Appendix H – Model Verification Links and Modelling Locations

Overview

Model verification was undertaken using a combination of relevant monitoring locations outlined in the latest Annual Status Report.

Traffic data were provided by the Transport Consultant, with supplementary information provided by the Department of Transport (DfT). The modelled road network included all links within 200m of the Proposed Development and the monitoring locations included within the verification.

The sampling locations are illustrated in Figure H1 and the monitoring results used for model verification are summarised in Table H-1.

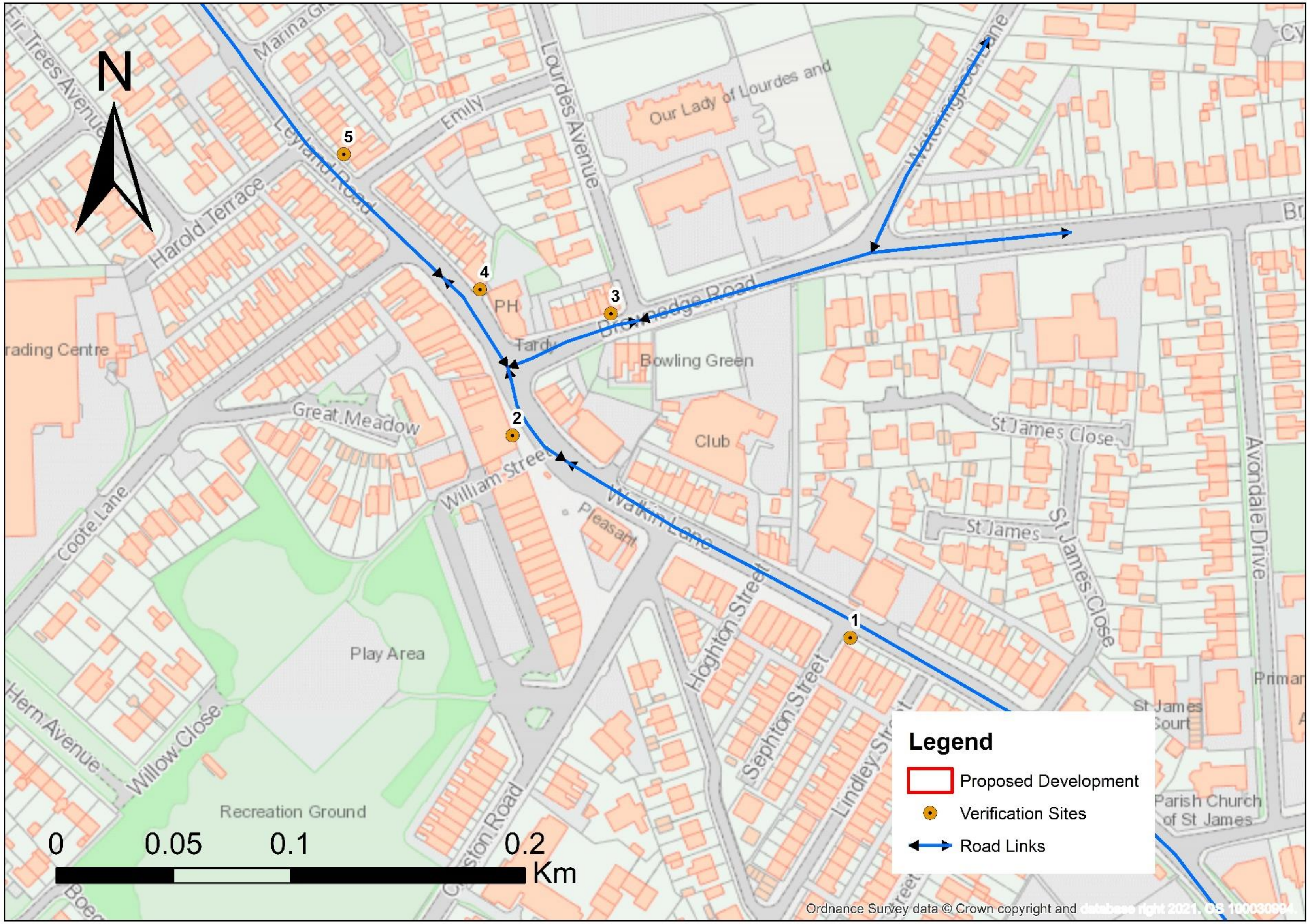
Site	Description	Site Classification	Easting	Northing	Receptor Height (m)	2019 Monitored NO_2 Value µg/m^3
1	28-30 Watkin Lane, Lostock Hall	Roadside	354512.2	425696.7	2.8	26.1
2	Spar, Watkin Lane, Lostock Hall	Roadside	354368.0	425783.0	2.4	32.1
3	13 Brownedge Road, Lostock Hall	Roadside	354410.0	425835.0	2.9	38.8
4	Tardy Gate PH, Leyland Rd, Lostock Hall	Roadside	354354.1	425845.3	2.8	35.4
5	477 Leyland Road, Lostock Hall	Roadside	354296.0	425903.0	2.9	30.5

Notes

1. ***Some adjustment of verification monitor positions*** *from those listed in the ASR* ***was undertaken based on a local review using Google Maps***
2. ***In the absence of 2019 data**, **the most recent monitored results from 2017 were considered to be worst-case***

Table H-1: Sampling Locations

Figure H1 Monitoring Locations and Road Links Used in Verification of the Model



Appendix I Model Verification Details

Model Verification

Model verification is the process of comparing monitored and modelled pollutant concentrations for the same year, at the same locations, and adjusting modelled concentrations wherever necessary to be consistent with monitoring data. This increases the robustness of modelling results.

Discrepancies between modelled and measured concentrations can arise for a number of reasons, for example:

- Traffic data uncertainties
- Background concentration estimates
- Meteorological data uncertainties
- Sources not explicitly included within the model, for example car parks and bus stops
- Overall model limitations, including treatment of roughness and meteorological data, treatment of speeds), and:
- Uncertainty in monitoring data, particularly diffusion tubes

Verification is the process by which uncertainties such as those described above are investigated and minimised. Disparities between modelling and monitoring results are likely to arise as result of a combination of all of these aspects.

Using the guidance provided in Chapter 7 of LAQM.TG (16) , the modelled output has been verified against the closest monitoring locations to the Proposed Development. The data for this has been provided by South Ribble Borough Council.

The performance of the dispersion model was assessed by comparing the modelled concentrations with measured concentrations. Monitoring results, meteorological data, vehicle emission rates and traffic data for 2019 were all used in the model verification process.

The model adjustment was undertaken using methodology which requires the determination of the ratio between the measured and modelled road contributed NO_x at each comparison site. The ratio between them, referred to as the adjustment factor, is applied to the modelled road contributed NOx. The modelled NO_2 is then determined using the Defra NO_x/NO_2 calculator.

Table I-1 presents a summary of the model performance prior to bias adjustment. The model verification is based on Defra EFT V11.0 emission factors.

These comparisons show that the model overpredicted annual mean concentrations of NO_2. However, as a conservative approach, model verification was carried out and an adjustment factor calculated and applied in all scenarios, in accordance with the methodology prescribed in LAQM.TG(16) . A regression analysis was undertaken of modelled and measured road NOx concentrations at these locations. The derived adjustment factor (3.170) was then applied to the modelled road NOx concentrations to adjust for model bias. The comparison of modelled with measured values was then repeated and the results are shown in Table I-2.

Site	Description	Monitored NO_2 ($\mu g/m^3$)	Modelled NO_2 ($\mu g/m^3$)	% Difference (Modelled-Measured) / Measured
1	28-30 Watkin Lane, Lostock Hall	26.1	19.8	-24.1
2	Spar, Watkin Lane, Lostock Hall	32.1	20.8	-35.1
3	13 Brownedge Road, Lostock Hall	38.8	22.3	-42.6
4	Tardy Gate PH, Leyland Rd, Lostock Hall	35.4	23.2	-34.5
5	477 Leyland Road, Lostock Hall	30.5	21.8	-28.6

Table I-1: Model Performance Prior To Bias Adjustment

Site	Description	Monitored NO_2 ($\mu g/m^3$)	Modelled NO_2 ($\mu g/m^3$)	% Difference (Modelled-Measured) / Measured
1	28-30 Watkin Lane, Lostock Hall	26.1	27.5	5.5
2	Spar, Watkin Lane, Lostock Hall	32.1	30.5	-4.9
3	13 Brownedge Road, Lostock Hall	38.8	34.7	-10.6
4	Tardy Gate PH, Leyland Rd, Lostock Hall	35.4	37.2	5.1
5	477 Leyland Road, Lostock Hall	30.5	33.2	9.0

Table I-2: Model Performance After Bias Adjustment

The accuracy of the adjusted model was also considered via the calculation of the Root Mean Square Error (RMSE) and fractional bias.

With the unadjusted model results, the RMSE was 11.5 $\mu g/m^3$, while with the adjusted model results this was reduced to 2.5 $\mu g/m^3$ so the adjustment has reduced the average error or uncertainty in the model results. LAQM.TG (16) states that ideally, an RMSE within 10% of the air quality objective would be derived, which equates to 4 $\mu g/m^3$ for the annual average NO_2 objective. In this respect, the model results are therefore considered robust. The agreement before and after adjustment is illustrated in Figure H1.

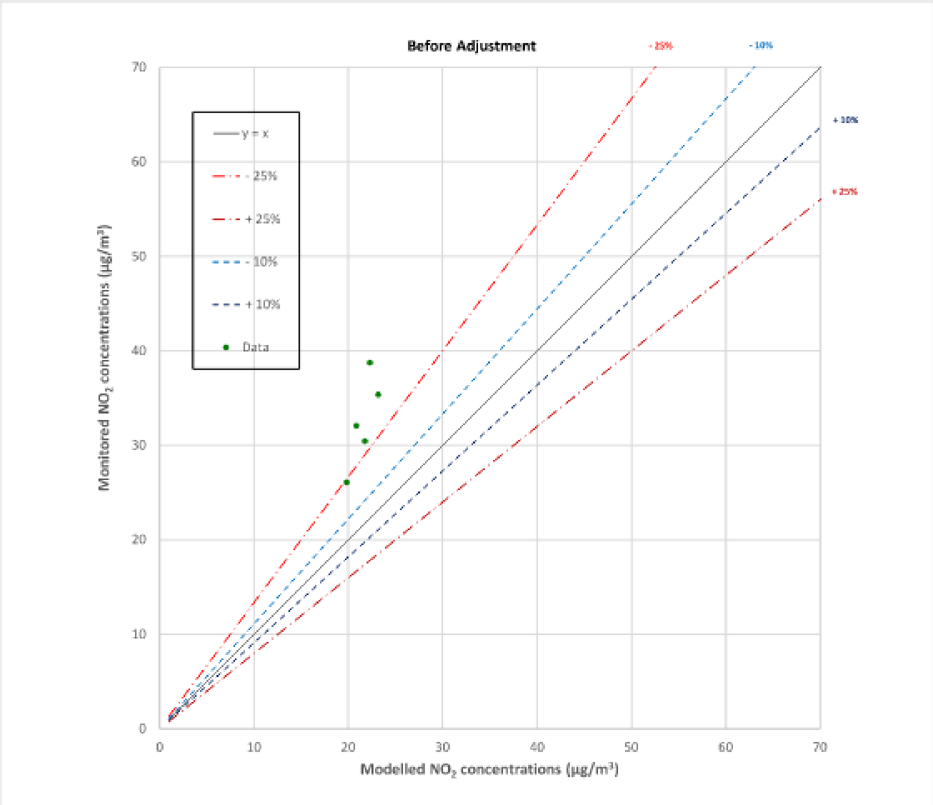
The fractional bias was 0.41 with the unadjusted model, which shows a slight tendency to under-predict, and <0.01 with the adjusted model, which shows that the under prediction has been removed.

The final adjusted total NO_2 concentration predicted at the diffusion tubes sites is within ±25% of the measured values and is therefore considered satisfactory.

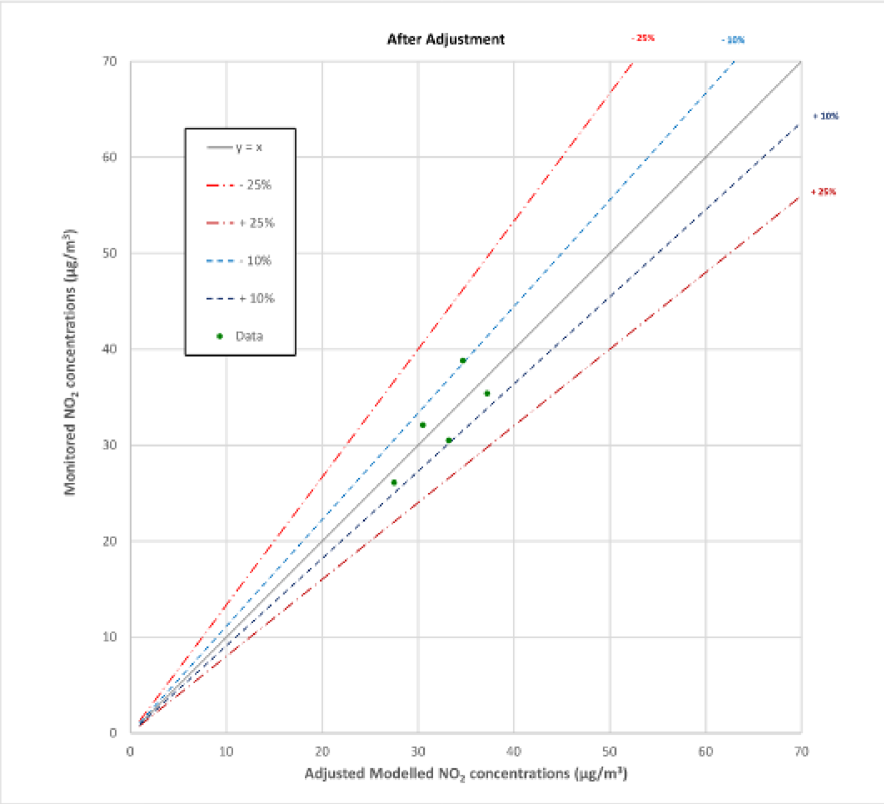
In accordance with Defra guidance TG(16) , the road contributed NO_x adjustment factor was also applied to the road contributed PM concentration. The total PM_{10} and $PM_{2.5}$ concentrations are derived by adding the adjusted road contribution value to the Defra background concentrations.

Figure I1 Model Verification

Before adjustment



After adjustment



Appendix J Dispersion Modelling Results Scenario 1 Non-Event Days

Long-Term NO_2 Concentrations- Emissions from Road Traffic

The effect of the operation phase road traffic emissions is presented in Table J-1. Results are presented for two different scenarios:

a) 2019 Background with 2024 traffic flows and 2024 emission factors (best case)
b) 2019 Background with 2024 traffic flows and 2019 emission factors (worst case)

Receptor ID	Sensitivity Test: Best Case (2024 flows, 2019 backgrounds, 2024 emission factors)				Sensitivity Test: Worst Case (2024 flows, 2019 backgrounds, 2019 emission factors)			
	Annual Mean NO_2 Concentration µg/m^3			Impact Descriptor	Annual Mean NO_2 Concentration µg/m^3			Impact Descriptor
	DM	DS	DS-DM		DM	DS	DS-DM	
R1	17.6	17.6	<0.1	Negligible	18.6	18.6	<0.1	Negligible
R2	21.2	21.2	<0.1	Negligible	24.6	24.6	<0.1	Negligible
R3	23.1	23.2	<0.1	Negligible	28.0	28.1	0.1	Negligible
R4	35.6	35.7	0.1	Negligible	47.6	47.7	0.2	Negligible
R5	31.6	31.6	<0.1	Negligible	40.6	40.7	<0.1	Negligible
R6	24.0	24.0	<0.1	Negligible	29.1	29.1	<0.1	Negligible
R7	22.1	22.1	<0.1	Negligible	26.3	26.3	<0.1	Negligible
R8	31.9	31.9	<0.1	Negligible	41.4	41.5	<0.1	Negligible
R9	35.0	35.1	<0.1	Negligible	45.8	45.8	<0.1	Negligible

Table J-1: NO_2 Impacts Associated with Proposed Development additional traffic movements

Interpretation of best-case data indicates that concentrations of NO_2 are likely to meet the annual mean NO_2 objective at all receptors.

The sensitivity test demonstrates that if pollutant background concentrations and national emission factors all fail to improve in line with Defra predictions, the impact at all receptors is still predicted to be negligible.

Long-Term PM_{10} Concentrations- Emissions from Road Traffic

Receptor ID	Sensitivity Test: Best Case (2024 flows, 2019 backgrounds, 2024 emission factors)				Sensitivity Test: Worst Case (2024 flows, 2019 backgrounds, 2019 emission factors)			
	Annual Mean PM_{10} Concentration µg/m^3 (exceedances of 24-hour mean in brackets)			Impact Descriptor	Annual Mean PM_{10} Concentration µg/m^3 (exceedances of 24-hour mean in brackets)			Impact Descriptor
	DM	DS	DS-DM		DM	DS	DS-DM	
R1	12.8 (1)	12.8 (1)	<0.1	Negligible	12.8 (1)	12.8 (1)	<0.1	Negligible
R2	14.0 (0)	14.0 (0)	<0.1	Negligible	14.1 (0)	14.1 (0)	<0.1	Negligible
R3	14.6 (0)	14.6 (0)	<0.1	Negligible	14.8 (0)	14.8 (0)	<0.1	Negligible
R4	19.1 (2)	19.1 (2)	<0.1	Negligible	19.4 (3)	19.5 (3)	<0.1	Negligible
R5	17.5 (1)	17.5 (1)	<0.1	Negligible	17.8 (1)	17.8 (1)	<0.1	Negligible
R6	14.9 (0)	14.9 (0)	<0.1	Negligible	15.0 (0)	15.0 (0)	<0.1	Negligible
R7	14.4 (0)	14.4 (0)	<0.1	Negligible	14.5 (0)	14.5 (0)	<0.1	Negligible
R8	16.4 (0)	16.4 (0)	<0.1	Negligible	16.6 (1)	16.6 (1)	<0.1	Negligible
R9	18.3 (2)	18.3 (2)	<0.1	Negligible	18.5 (2)	18.5 (2)	<0.1	Negligible

Table J-2: PM_{10} Impacts Associated with Proposed Development additional traffic movements

Long Term $PM_{2.5}$ Concentrations: Operation Phase Road Traffic Emissions

Receptor ID	Sensitivity Test: Best Case (2024 flows, 2019 backgrounds, 2024 emission factors)				Sensitivity Test: Worst Case (2024 flows, 2019 backgrounds, 2019 emission factors)			
	Annual Mean $PM_{2.5}$ Concentration µg/m^3			Impact Descriptor	Annual Mean $PM_{2.5}$ Concentration µg/m^3			Impact Descriptor
	DM	DS	DS-DM		DM	DS	DS-DM	
R1	8.5	8.5	<0.1	Negligible	8.5	8.5	<0.1	Negligible
R2	9.2	9.2	<0.1	Negligible	9.3	9.3	<0.1	Negligible
R3	9.5	9.5	<0.1	Negligible	9.6	9.6	<0.1	Negligible
R4	12.0	12.0	<0.1	Negligible	12.3	12.4	<0.1	Negligible
R5	11.1	11.1	<0.1	Negligible	11.4	11.4	<0.1	Negligible
R6	9.6	9.6	<0.1	Negligible	9.8	9.8	<0.1	Negligible
R7	9.4	9.4	<0.1	Negligible	9.5	9.5	<0.1	Negligible
R8	10.5	10.5	<0.1	Negligible	10.8	10.8	<0.1	Negligible
R9	11.5	11.5	<0.1	Negligible	11.8	11.8	<0.1	Negligible

Table J-3: $PM_{2.5}$ Impacts Associated with Proposed Development additional traffic movements

Interpretation of best-case data indicates that concentrations of PM_{10} and $PM_{2.5}$ are likely to meet the annual mean and short-term PM_{10} objective and annual mean $PM_{2.5}$ objective at all receptors.

The sensitivity test demonstrates that if pollutant background concentrations and national emission factors all fail to improve in line with Defra predictions, the impact at all receptors is still predicted to be negligible.

Appendix K Dispersion Modelling Results Scenario 2- Event Days

Long-Term NO_2 Concentrations- Emissions from Road Traffic

The effect of the operation phase road traffic emissions is presented in Table K-1. Results are presented for two different scenarios:

a) 2019 Background with 2024 traffic flows and 2024 emission factors (best case)
b) 2019 Background with 2024 traffic flows and 2019 emission factors (worst case)

Receptor ID	Sensitivity Test: Best Case (2024 flows, 2019 backgrounds, 2024 emission factors)				Sensitivity Test: Worst Case (2024 flows, 2019 backgrounds, 2019 emission factors)			
	Annual Mean NO_2 Concentration µg/m^3			Impact Descriptor	Annual Mean NO_2 Concentration µg/m^3			Impact Descriptor
	DM	DS	DS-DM		DM	DS	DS-DM	
R1	17.6	17.6	<0.1	Negligible	18.6	18.6	<0.1	Negligible
R2	21.2	21.2	<0.1	Negligible	24.6	24.6	<0.1	Negligible
R3	23.1	23.2	0.1	Negligible	28.0	28.2	0.2	Negligible
R4	35.6	35.8	0.2	Negligible	47.6	47.9	0.4	Moderate
R5	31.6	31.6	0.1	Negligible	40.6	40.7	0.1	Negligible
R6	24.0	24.0	<0.1	Negligible	29.1	29.1	<0.1	Negligible
R7	22.1	22.1	<0.1	Negligible	26.3	26.3	<0.1	Negligible
R8	31.9	31.9	<0.1	Negligible	41.4	41.5	0.1	Negligible
R9	35.0	35.1	<0.1	Negligible	45.8	45.9	0.1	Negligible
Site	-	-	-	-	-	22.1	-	-

Table K-1: NO_2 Impacts Associated with Proposed Development additional traffic movements

Interpretation of best-case data indicates that concentrations of NO_2 are likely to meet the annual mean NO_2 objective at all receptors.

The sensitivity test demonstrates that if pollutant background concentrations and national emission factors all fail to improve in line with Defra predictions and remain at 2019 levels, the impact at all receptors is still predicted to be negligible at all receptors, except for R4, where a worse case increase of 0.4 µg/m^3 could be expected. This would be classified as a moderate impact; however, increases are expected to be lower as there is already anecdotal evidence to suggest that national background pollutant concentrations and vehicle emission rates have already improved significantly since 2019.

Long-Term PM_{10} Concentrations- Emissions from Road Traffic

Receptor ID	Sensitivity Test: Best Case (2024 flows, 2019 backgrounds, 2024 emission factors)				Sensitivity Test: Worst Case (2024 flows, 2019 backgrounds, 2019 emission factors)			
	Annual Mean PM_{10} Concentration μg/m³ (exceedances of 24-hour mean in brackets)			Impact Descriptor	Annual Mean PM_{10} Concentration μg/m³ (exceedances of 24-hour mean in brackets)			Impact Descriptor
	DM	DS	DS-DM		DM	DS	DS-DM	
R1	12.8 (1)	12.8 (1)	<0.1	Negligible	12.8 (1)	12.8 (1)	<0.1	Negligible
R2	14.0 (0)	14.0 (0)	<0.1	Negligible	14.1 (0)	14.1 (0)	<0.1	Negligible
R3	14.6 (0)	14.7 (0)	<0.1	Negligible	14.8 (0)	14.8 (0)	<0.1	Negligible
R4	19.1 (2)	19.2 (2)	0.1	Negligible	19.4 (3)	19.5 (3)	0.1	Negligible
R5	17.5 (1)	17.5 (1)	<0.1	Negligible	17.8 (1)	17.8 (1)	<0.1	Negligible
R6	14.9 (0)	14.9 (0)	<0.1	Negligible	15.0 (0)	15.0 (0)	<0.1	Negligible
R7	14.4 (0)	14.4 (0)	<0.1	Negligible	14.5 (0)	14.5 (0)	<0.1	Negligible
R8	16.4 (0)	16.4 (0)	<0.1	Negligible	16.6 (1)	16.6 (1)	<0.1	Negligible
R9	18.3 (2)	18.3 (2)	<0.1	Negligible	18.5 (2)	18.5 (2)	<0.1	Negligible
Site	-	-	-	-	-	13.6(0)	-	-

Table K-2: PM_{10} Impacts Associated with Proposed Development additional traffic movements

Long Term $PM_{2.5}$ Concentrations: Operation Phase Road Traffic Emissions

Receptor ID	Sensitivity Test: Best Case (2024 flows, 2019 backgrounds, 2024 emission factors)				Sensitivity Test: Worst Case (2024 flows, 2019 backgrounds, 2019 emission factors)			
	Annual Mean $PM_{2.5}$ Concentration μg/m³			Impact Descriptor	Annual Mean $PM_{2.5}$ Concentration μg/m³			Impact Descriptor
	DM	DS	DS-DM		DM	DS	DS-DM	
R1	8.5	8.5	<0.1	Negligible	8.5	8.5	<0.1	Negligible
R2	9.2	9.2	<0.1	Negligible	9.3	9.3	<0.1	Negligible
R3	9.5	9.5	<0.1	Negligible	9.6	9.6	<0.1	Negligible
R4	12.0	12.0	0.1	Negligible	12.3	12.4	<0.1	Negligible
R5	11.1	11.1	<0.1	Negligible	11.4	11.4	<0.1	Negligible
R6	9.6	9.7	<0.1	Negligible	9.8	9.8	<0.1	Negligible
R7	9.4	9.4	<0.1	Negligible	9.5	9.5	<0.1	Negligible
R8	10.5	10.5	<0.1	Negligible	10.8	10.8	<0.1	Negligible
R9	11.5	11.5	<0.1	Negligible	11.8	11.8	<0.1	Negligible
Site	-	-	-	-	-	8.9	-	-

Table K-3: $PM_{2.5}$ Impacts Associated with Proposed Development additional traffic movements

Interpretation of best-case data indicates that concentrations of PM_{10} and $PM_{2.5}$ are likely to meet the annual mean and short-term PM_{10} objective and annual mean $PM_{2.5}$ objective at all receptors.

The sensitivity test demonstrates that if pollutant background concentrations and national emission factors all fail to improve in line with Defra predictions, the impact at all receptors is still predicted to be negligible.

Appendix L Mitigation Measures for Construction

Primary measures are those that will be implemented at all times; Secondary measures will be implemented as necessary (in agreement with the local authority), while n/a measures are not required for a given level of risk.

<table>
<tr><th colspan="2">Site Management</th><th>Low Risk</th><th>Medium Risk</th><th>High Risk</th></tr>
<tr><td>1.</td><td>Display the name and contact details of person(s) accountable for air quality pollutant emissions and dust issues on the site boundary.</td><td colspan="3">Primary</td></tr>
<tr><td>2.</td><td>Display the head or regional office contact information.</td><td colspan="3">Primary</td></tr>
<tr><td>3.</td><td>Record and respond to all dust and air quality pollutant emissions complaints.</td><td colspan="3">Primary</td></tr>
<tr><td>4.</td><td>Make a complaint log available to the local authority.</td><td colspan="3">Primary</td></tr>
<tr><td>5.</td><td>Carry out regular site inspections to monitor compliance with air quality and dust control procedures, record inspection results, and make an inspection log available to the local authority.</td><td colspan="3">Primary</td></tr>
<tr><td>6.</td><td>Increase the frequency of site inspections by those accountable for dust and air quality pollutant emissions issues when activities with a high potential to produce dust and emissions and dust are being carried out, and during prolonged dry, or windy conditions.</td><td colspan="3">Primary</td></tr>
<tr><td>7.</td><td>Record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and the action taken to resolve the situation is recorded in the logbook.</td><td colspan="3">Primary</td></tr>
<tr><td>8.</td><td>Develop and implement a stakeholder communications plan that includes community engagement before work commences on-site.</td><td>n/a</td><td colspan="2">Primary</td></tr>
<tr><td>9.</td><td>Develop a dust management plan (DMP).</td><td>n/a</td><td colspan="2">Primary</td></tr>
<tr><td>10.</td><td>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.</td><td colspan="2">n/a</td><td>Primary</td></tr>
</table>

Table L-1: Construction Mitigation Measures- Site Management

Preparing and Maintaining the Site	Low Risk	Medium Risk	High Risk
11. Plan site layout: machinery and dust causing activities will be located away from receptors.	Primary		
12. Erect solid screens or barriers around dust activities or the site boundary that are, at least, as high as any stockpiles on-site.	Primary		
13. Avoid site runoff of water or mud.	Primary		
14. Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.	Secondary	Primary	
15. Keep site fencing, barriers, and scaffolding clean using wet methods.	Secondary	Primary	
16. Remove materials from site as soon as possible.	Secondary	Primary	
17. Cover, seed, or fence stockpiles to prevent wind whipping.	Secondary	Primary	
18. Agree monitoring locations with the local authority.	n/a	Primary	
19. Where possible, commence baseline monitoring at least three months before phase begins.	n/a	Primary	
20. Put in place real-time dust and air quality pollutant monitors across the site and ensure they are checked regularly.	n/a	Primary	
21. Carry out regular dust soiling checks of buildings within 100 m of site boundary and, if necessary, cleaning to be provided.	n/a	Secondary	Primary
22. Consider, if practical, installation of green walls, screens, or other green infrastructure to minimise the impact of dust and pollution.	n/a	Secondary	

Table L-2: Construction Mitigation Measures- Preparing and Maintaining the Site

Operating Vehicle/Machinery and Sustainable Travel	Low Risk	Medium Risk	High Risk
23. Ensure all non-road mobile machinery (NRMM) complies with relevant local standards.	Primary		
24. Ensure all vehicles switch off engines when stationary – no idling vehicles.	Primary		
25. Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment.	Primary		
26. Implement a **Travel Plan** that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	n/a	Secondary	Primary
27. Produce a **Construction Logistics Plan** to manage the sustainable delivery of goods and materials.	n/a	Primary	
28. Impose and signpost a maximum-speed-limit of 10 mph on surfaced haul routes 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).	Secondary		Primary

Table L-3: Construction Mitigation Measures- Operating Vehicle/Machinery and Sustainable Travel

<table>
<tr><th colspan="2">Operations</th><th>Low Risk</th><th>Medium Risk</th><th>High Risk</th></tr>
<tr><td>29.</td><td>Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suiTable Local exhaust ventilation systems.</td><td colspan="3">Primary</td></tr>
<tr><td>30.</td><td>Ensure an adequate water supply on the site for effective dust/particulate matter mitigation (using recycled water).</td><td colspan="3">Primary</td></tr>
<tr><td>31.</td><td>Use enclosed chutes, conveyors, and covered skips.</td><td colspan="3">Primary</td></tr>
<tr><td>32.</td><td>Minimise drop heights from conveyors, loading shovels, hoppers, and other loading, or handling equipment, and use fine water sprays on such equipment.</td><td colspan="3">Primary</td></tr>
<tr><td>33.</td><td>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.</td><td>n/a</td><td colspan="2">Primary</td></tr>
</table>

Table L-4: Construction Mitigation Measures- Operations

<table>
<tr><th colspan="2">Waste Management</th><th>Low Risk</th><th>Medium Risk</th><th>High Risk</th></tr>
<tr><td>34.</td><td>Reuse and recycle waste to reduce dust from waste materials</td><td colspan="3">Primary</td></tr>
<tr><td>35.</td><td>Avoid bonfires and burning of waste materials.</td><td colspan="3">Primary</td></tr>
</table>

Table L-5: Construction Mitigation Measures- Waste Management Activities

<table>
<tr><th colspan="2">Measurement Specific to Demolition</th><th>Low Risk</th><th>Medium Risk</th><th>High Risk</th></tr>
<tr><td>36.</td><td>Ensure water suppression is used during demolition operations.</td><td colspan="3">Primary</td></tr>
<tr><td>37.</td><td>Avoid explosive blasting, using appropriate manual, or mechanical alternatives.</td><td colspan="3">Primary</td></tr>
<tr><td>38.</td><td>Bag and remove any biological debris or damp down such material before demolition.</td><td colspan="3">Primary</td></tr>
<tr><td>39.</td><td>Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).</td><td colspan="2">Secondary</td><td>Primary</td></tr>
</table>

Table L-6: Construction Mitigation Measures- Demolition Activities

<table>
<tr><th colspan="2">Measurement Specific to Earthworks</th><th>Low Risk</th><th>Medium Risk</th><th>High Risk</th></tr>
<tr><td>40.</td><td>Consider re-vegetating earthworks and exposed areas/soil stockpiles to stabilise surfaces.</td><td>n/a</td><td>Secondary</td><td>Primary</td></tr>
<tr><td>41.</td><td>Consider the use of hessian, mulches, or trackifiers where it is not possible to re-vegetate or cover with topsoil.</td><td>n/a</td><td>Secondary</td><td>Primary</td></tr>
<tr><td>42.</td><td>Only remove secure covers in small areas during work and not all at once.</td><td>n/a</td><td>Secondary</td><td>Primary</td></tr>
</table>

Table L-7: Construction Mitigation Measures- Earthworks Activities

<table>
<tr><th colspan="2">Measurement Specific to Construction</th><th>Low Risk</th><th>Medium Risk</th><th>High Risk</th></tr>
<tr><td>43.</td><td>Ensure sand and other aggregates are stored in bunded 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.</td><td>Secondary</td><td colspan="2">Primary</td></tr>
<tr><td>44.</td><td>Avoid scabbling (roughening of concrete surfaces) if possible</td><td colspan="2">Secondary</td><td>Primary</td></tr>
<tr><td>45.</td><td>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.</td><td>n/a</td><td>Secondary</td><td>Primary</td></tr>
<tr><td>46.</td><td>For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.</td><td>n/a</td><td colspan="2">Secondary</td></tr>
</table>

Table L-8: Construction Mitigation Measures- Construction Activities

Measures Specific To Trackout	Low Risk	Medium Risk	High Risk
47. Regularly use a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site.	Secondary	Primary	
48. Avoid dry sweeping of large areas.	Secondary	Primary	
49. Ensure vehicles entering and leaving sites are securely covered to prevent escape of materials during transport.	Secondary	Primary	
50. Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site).	Secondary	Primary	
51. Record all inspections of haul routes and any subsequent action in a site logbook.	Secondary	Primary	
52. Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems and regularly cleaned.	n/a	Primary	
53. Inspect haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;	n/a	Primary	
54. 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.	n/a	Primary	
55. Access gates to be located at least 10 m from receptors where possible.	n/a	Primary	
56. Apply dust suppressants to locations where a large volume of vehicles enters and exit the construction site.	n/a	Secondary	Primary

Table L-9: Construction Mitigation Measures- Trackout Activities

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