Air Quality Assessment

Battlefields Lane South, Holbeach

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Air Quality Assessment

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Executive Summary	
Site Address	**Battlefields Lane South, Holbeach**

An Air Quality Assessment was undertaken to support a planning application for a residential development on land off Battlefields Lane South, Holbeach.

The proposals have the potential to cause air quality impacts as a result of fugitive dust emissions during construction and road vehicle exhaust emissions during operation. As such, an Air Quality Assessment was undertaken to determine baseline conditions and assess potential impacts as a result of the scheme.

Potential construction phase air quality impacts from fugitive dust emissions were assessed as a result of earthworks, construction and trackout activities. It is considered that the use of the identified site specific control measures would provide suitable mitigation for a development of this size and nature and reduce potential impacts to an acceptable level.

Potential impacts during the operational phase of the proposals may occur due to road traffic exhaust emissions associated with changes to vehicle flows in the vicinity of the site. Dispersion modelling was therefore undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the local highway network both with and without the development in place. Results were subsequently verified using local monitoring data.

Review of the dispersion modelling results indicated that air quality impacts as a result of road vehicle exhaust emissions were not predicted to be significant at any sensitive location in the vicinity of the site.

Based on the assessment results, air quality factors are not considered a constraint to planning consent for the development.

TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

1.1 Background

This report has been prepared to support a planning application for a residential development on land off Battlefields Lane South, Holbeach.

The Air Quality Assessment was undertaken by Omnia's partner Redmore Environmental Ltd.

The proposals have the potential to cause air quality impacts as a result of fugitive dust emissions during construction and road vehicle exhaust emissions during operation. As such, an Air Quality Assessment was undertaken to determine baseline conditions and assess potential impacts as a result of the scheme.

1.2 Proposed Development

The site is located on land off Battlefields Lane South, Holbeach, at approximate National Grid Reference (NGR): 536860, 325346. The relevant Local Authority (LA) is South Holland District Council (SHDC). Reference should be made to Figure 1 for a map of the site and surrounding area.

The proposals comprise the construction of 185 dwellings alongside car parking and associated infrastructure.

1.3 Objectives

The proposals have the potential to cause air quality impacts at sensitive locations during the construction and operational phases. As such, an Air Quality Assessment was undertaken to determine baseline conditions and assess potential impacts associated with the scheme. This is detailed in the following report.

1.4 Acronyms

All acronyms used within this report are defined in the Abbreviations listings, set out in Section 7.

1.5 Confidentiality

This report has been prepared solely for the use of the Client. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from Omnia; a charge may be levied against such approval.

2.0 LEGISLATION AND POLICY

2.1 Legislation

The Air Quality Standards Regulations (2010) and subsequent amendments include Air Quality Limit Values (AQLVs) for the following pollutants:

- Nitrogen dioxide (NO_2);
- Sulphur dioxide;
- Lead;
- Particulate matter with an aerodynamic diameter of less than 10µm (PM_{10});
- Particulate matter with an aerodynamic diameter of less than 2.5µm ($PM_{2.5}$);
- Benzene; and,
- Carbon monoxide.

Air Quality Target Values were also provided for several other pollutants. It should be noted that the AQLV for $PM_{2.5}$ stated in the Air Quality Standards Regulations (2010) was amended in the Environment (Miscellaneous Amendments) (EU Exit) Regulations (2020).

The Air Quality Strategy (AQS) was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published on 28th April 2023[1]. The document contains standards, objectives and measures for improving ambient air quality, including a number of Air Quality Objectives (AQOs). These are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

The Environmental Improvement Plan 2023[2] was published in January 2023, providing long term and Interim Targets in order to reduce population exposure to $PM_{2.5}$. The Concentration Target for 2040 was subsequently adopted in the Environmental Targets (Fine Particulate Matter) (England) Regulations (2023).

Table 1 presents the AQOs, Interim Target and Concentration Target for pollutants considered within this assessment.

Table 1 Air Quality Objectives/Interim Target/Concentration Target

Pollutant	Air Quality Objective/Interim Target/Concentration Target	
	Concentration	Averaging Period
NO_2	40	Annual mean
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum
PM_{10}	40	Annual mean
	50	24-hour mean, not to be exceeded on more than 35 occasions per annum
$PM_{2.5}$	12[(a)]	Annual mean
	10[(b)]	Annual mean

[1] AQS: Framework for Local Authority Delivery, DEFRA, 2023.
[2] Environmental Improvement Plan 2023, DEFRA, 2023.

Note: (a) Interim Target to be achieved by end of January 2028.
(b) Concentration Target to be achieved by 2040.

Table 2 summarises the advice provided in DEFRA guidance[3] on where the AQOs for pollutants considered within this report apply.

Table 2 Examples of Where the Air Quality Objectives Apply

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
Annual mean	All locations where members of the public might be regularly exposed Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access Hotels, unless people live there as their permanent residence Gardens of residential properties Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
24-hour mean	All locations where the annual mean objective would apply, together with hotels Gardens of residential properties	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer	Kerbside sites where the public would not be expected to have regular access

2.2 Local Air Quality Management

LAs are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air

[3] Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

quality involves comparing present and likely future pollutant concentrations against the AQOs. If it is predicted that levels at locations of relevant exposure, as summarised in Table 2, are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan, the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.3 Dust

The main requirements with respect to dust control from industrial or trade premises not regulated under the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments, such as construction sites, is that provided in Section 79 of Part III of the Environmental Protection Act (1990). The Act defines nuisance as:

> *"any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance."*

Enforcement of the Act, in regard to nuisance, is currently under the jurisdiction of the local Environmental Health Department, whose officers are deemed to provide an independent evaluation of nuisance. If the LA is satisfied that a statutory nuisance exists, or is likely to occur or happen again, it must serve an Abatement Notice under Part III of the Environmental Protection Act (1990). The only defence is to show that the process to which the nuisance has been attributed and its operation are being controlled according to best practicable means.

2.4 National Planning Policy

The revised National Planning Policy Framework[4] (NPPF) was published in December 2024 and sets out the Government's planning policies for England and how these are expected to be applied.

The purpose of the planning system is to contribute to the achievement of sustainable development. In order to ensure this, the NPPF recognises three overarching objectives, including the following of relevance to air quality:

> *"c) an environmental objective - to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."*

Chapter 15 of the NPPF details objectives in relation to conserving and enhancing the natural environment. It states that:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *[...]*

[4] NPPF, Ministry of Housing, Communities and Local Government, 2024.

> *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 [...]"*

The NPPF specifically recognises air quality as part of delivering sustainable development and states that:

> *"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."*

The implications of the NPPF have been considered throughout this assessment.

2.5 National Planning Practice Guidance

The National Planning Practice Guidance[5] (NPPG) web-based resource was launched by the Department for Communities and Local Government to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:

1. What air quality considerations does planning need to address?
2. What is the role of plan-making with regard to air quality?
3. Are air quality concerns relevant to neighbourhood planning?
4. What information is available about air quality?
5. When could air quality considerations be relevant to the development management process?
6. What specific issues may need to be considered when assessing air quality impacts?
7. How detailed does an air quality assessment need to be?
8. How can an impact on air quality be mitigated?

These were reviewed and the relevant guidance considered as necessary throughout the undertaking of this assessment.

2.6 Local Planning Policy

The South East Lincolnshire Local Plan 2011-2036[6] was adopted by the South East Lincolnshire Joint Strategic Planning Committee, a partnership of Boston Borough Council, SHDC and

[5] https://www.gov.uk/guidance/air-quality--3.

[6] South East Lincolnshire Local Plan 2011-2036, South East Lincolnshire Joint Strategic Planning Committee, 2019.

Lincolnshire County Council, on 8th March 2019. Review of the document indicated the following policy of relevance to this report:

> *"Policy 30: Pollution*
>
> *Development proposals will not be permitted where, taking account of any proposed mitigation measures, they would lead to unacceptable adverse impacts upon: [...]*
>
> *4. Air quality, including fumes and odour; [...]*
>
> *Planning applications, except for development within the curtilage of a dwelling house as specified within Schedule 2, Part 1 of The Town and Country Planning (General Permitted Development) (England) Order 2015, or successor statutory instrument, must include an assessment of: [...]*
>
> *9. Impact on the proposed development from poor air quality from identified sources;*
>
> *10. Impact on air quality from the proposed development; and*
>
> *11. Impact on amenity from existing uses.*
>
> *Suitable mitigation measures will be provided, if required. Proposals will be refused if impacts cannot be suitably mitigated or avoided [...]."*

Consideration was made to the above policy throughout the assessment.

3.0 METHODOLOGY

3.1 Introduction

The proposed development has the potential to cause air quality impacts during the construction and operational phases. These factors have been assessed in accordance with the following methodology.

3.2 Construction Phase Assessment

There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction V2.2'[7].

Activities on the proposed construction site have been divided into three types to reflect their different potential impacts. These are:

- Earthworks;
- Construction; and,
- Trackout.

The potential for dust emissions was assessed for each activity that is likely to take place and considered three separate dust effects:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and,
- The risk of health effects due to a significant increase in exposure to PM_{10}.

The assessment steps are detailed below.

3.2.1 Step 1

Step 1 screens the requirement for a more detailed assessment. Should human receptors be identified within 250m from the boundary or 50m from the construction vehicle route up to 250m from the site entrance, then the assessment proceeds to Step 2. Additionally, should ecological receptors be identified within 50m of the site or the construction vehicle route up to 250m from the site entrance, then the assessment also proceeds to Step 2.

Should sensitive receptors not be present within the relevant distances then **negligible** impacts would be expected and further assessment is not necessary.

3.2.2 Step 2

Step 2 assesses the risk of potential dust impacts. A site is allocated a risk category based on two factors:

[7]Guidance on the Assessment of Dust from Demolition and Construction V2.2, IAQM, 2024.

- The scale and nature of the works, which determines the magnitude of dust arising as: small, medium or large (Step 2A); and,
- The sensitivity of the area to dust impacts, which can be defined as low, medium or high sensitivity (Step 2B).

The two factors are combined in Step 2C to determine the risk of dust impacts without mitigation applied.

Step 2A defines the potential magnitude of dust emission through the construction phase. The relevant criteria are summarised in Table 3.

Table 3 Construction Dust - Magnitude of Emission

Magnitude	Activity	Criteria
Large	Earthworks	• Total site area greater than 110,000m^2 • Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) • More than 10 heavy earth moving vehicles active at any one time • Formation of bunds greater than 6m in height
	Construction	• Total building volume greater than 75,000m^3 • On site concrete batching • Sandblasting
	Trackout	• More than 50 Heavy Duty Vehicle (HDV) trips per day • Potentially dusty surface material (e.g. high clay content) • Unpaved road length greater than 100m
Medium	Earthworks	• Total site area 18,000m^2 to 110,000m^2 • Moderately dusty soil type (e.g. silt) • 5 to 10 heavy earth moving vehicles active at any one time • Formation of bunds 3m to 6m in height
	Construction	• Total building volume 12,000m^3 to 75,000m^3 • Potentially dusty construction material (e.g. concrete) • On site concrete batching
	Trackout	• 20 to 50 HDV trips per day • Moderately dusty surface material (e.g. high clay content) • Unpaved road length 50m to 100m
Small	Earthworks	• Total site area less than 18,000m^2 • Soil type with large grain size (e.g. sand) • Less than 5 heavy earth moving vehicles active at any one time • Formation of bunds less than 3m in height
	Construction	• Total building volume less than 12,000m^3 • Construction material with low potential for dust release (e.g. metal cladding or timber)

Magnitude	Activity	Criteria
	Trackout	• Less than 20 HDV trips per day • Surface material with low potential for dust release • Unpaved road length less than 50m

Step 2B defines the sensitivity of the area around the development to potential dust impacts. The sensitivities of specific receptors are summarised in Table 4.

Table 4 Construction Dust - Sensitivities of Human and Ecological Receptors

Receptor Sensitivity	Examples	
	Human Receptors	Ecological Receptors
High	• Users expect high levels of amenity • High aesthetic or value property • People expected to be present continuously for extended periods of time • Locations where members of the public are exposed over a time period relevant to the AQO for PM_{10}. e.g. residential properties, hospitals, schools and residential care homes	• Internationally or nationally designated site e.g. Special Area of Conservation
Medium	• Users would expect to enjoy a reasonable level of amenity • Aesthetics or value of their property could be diminished by soiling • People or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land e.g. parks and places of work	• Nationally designated site e.g. Sites of Special Scientific Interest
Low	• Enjoyment of amenity would not reasonably be expected • Property would not be expected to be diminished in appearance • Transient exposure, where people would only be expected to be present for limited periods. e.g. public footpaths, playing fields, shopping streets, farmland, short term car parks and roads	• Locally designated site e.g. Local Nature Reserve

The criteria for determining the sensitivity of the area to dust soiling effects on people and property is summarised in Table 5.

Table 5 Construction Dust - Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		Less than 20	Less than 50	Less than 100	Less than 250
High	More than 100	High	High	Medium	Low
	10 - 100	High	Medium	Low	Low
	1 - 10	Medium	Low	Low	Low
Medium	More than 1	Medium	Low	Low	Low
Low	More than 1	Low	Low	Low	Low

Table 6 outlines the criteria for determining the sensitivity of the area to human health impacts.

Table 6 Construction Dust - Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Background Annual Mean PM_{10} Concentration	Number of Receptors	Distance from the Source (m)			
			Less than 20	Less than 50	Less than 100	Less than 250
High	Greater than 32µg/m^3	More than 100	High	High	High	Medium
		10 - 100	High	High	Medium	Low
		1 - 10	High	Medium	Low	Low
	28 - 32µg/m^3	More than 100	High	High	Medium	Low
		10 - 100	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low
	24 - 28µg/m^3	More than 100	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low
		1 - 10	Medium	Low	Low	Low
	Less than 24µg/m^3	More than 100	Medium	Low	Low	Low
		10 - 100	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
Medium	Greater than 32µg/m^3	More than 10	High	Medium	Low	Low
		1 - 10	Medium	Low	Low	Low
	28 - 32µg/m^3	More than 10	Medium	Low	Low	Low
		1 - 10	Low	Low	Low	Low
	24 - 28µg/m^3	More than 10	Low	Low	Low	Low
		1 -10	Low	Low	Low	Low
	Less than 24µg/m^3	More than 10	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
Low	-	1 or more	Low	Low	Low	Low

Table 7 outlines the criteria for determining the sensitivity of the area to ecological impacts.

Table 7 Construction Dust - Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Source (m)	
	Less than 20	Less than 50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Step 2C combines the dust emission magnitude with the sensitivity of the area to determine the risk of unmitigated impacts.

Table 8 outlines the risk category from earthworks, construction and trackout activities.

Table 8 Construction Dust - Dust Risk Category from Earthworks, Construction and Trackout Activities

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Medium	Low
Low	Low	Low	Negligible

3.2.3 Step 3

Step 3 requires the identification of site-specific mitigation measures within the IAQM guidance[8] to reduce potential dust impacts based upon the relevant risk categories identified in Step 2. For sites with **negligible** risk, mitigation measures beyond those required by legislation are not required. However, additional controls may be applied as part of good practice.

3.2.4 Step 4

Once the risk of dust impacts has been determined and the appropriate mitigation measures identified, the final step is to determine the significance of any residual impacts. For almost all construction activity, the aim should be to control effects through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be **not significant**.

3.3 Operational Phase Assessment

The proposal has the potential to increase concentrations of NO_2, PM_{10} and $PM_{2.5}$ as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site during the operational phase. Potential impacts have therefore been defined by predicting pollutant concentrations at sensitive locations using dispersion modelling for the following scenarios:

- 2023 - Verification;

[8] Guidance on the Assessment of Dust from Demolition and Construction V2.2, IAQM, 2024.

- Opening year Do-Minimum (DM) (predicted traffic flows in 2030 should the proposals not proceed); and,
- Opening year Do-Something (DS) (predicted traffic flows in 2030 should the proposals be completed).

Locations sensitive to potential changes in off-site pollutant concentrations were identified within 200m of the highway network in accordance with the guidance provided within the Design Manual for Roads and Bridges (DMRB)[9] on the likely limits of pollutant dispersion from road sources. The criteria provided within DEFRA guidance[10] on where the AQOs apply, as summarised in Table 2, was utilised to determine worst-case receptor positions in the vicinity of links likely to be affected by changes in traffic flows as a result of the development.

The significance of predicted air quality impacts was determined in accordance with the guidance provided within the IAQM document 'Land-Use Planning & Development Control: Planning for Air Quality'[11]. Using this methodology impacts were defined based on the interaction between the predicted pollutant concentration from the DS scenario and the magnitude of change between the DM and DS scenarios, as outlined in Table 9.

Table 9 Significance of Operational Phase Road Vehicle Exhaust Emissions Impact

Concentration at Receptor in Assessment Year	Predicted Concentration Change as Proportion of AQO/Concentration Target (%)			
	1	2 - 5	6 - 10	> 10
75% or less of AQO/Concentration Target	Negligible	Negligible	Slight	Moderate
76 - 94% of AQO/Concentration Target	Negligible	Slight	Moderate	Moderate
95 - 102% of AQO/Concentration Target	Slight	Moderate	Moderate	Substantial
103 - 109% of AQO/Concentration Target	Moderate	Moderate	Substantial	Substantial
110% or more of AQO/Concentration Target	Moderate	Substantial	Substantial	Substantial

The matrix shown in Table 9 is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which makes it clearer which cell the impact falls within. It should be noted that changes of 0%, i.e. less than 0.5%, are described as **negligible**.

Following the prediction of impacts at discrete receptor locations, the IAQM document[12] provides guidance on determining the overall air quality impact significance of the operation of a development. The following factors are identified for consideration by the assessor:

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

[9] LA 105: Air Quality, National Highways, 2024.
[10] Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.
[11] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.
[12] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

of impacts.

The IAQM guidance states that an assessment must reach a conclusion on the likely significance of the predicted impact. Where the overall effect is **moderate** or **substantial**, the effect is likely to be considered **significant**, whilst if the impact is **slight** or **negligible**, the impact is likely to be considered **not significant**. It should be noted that this is a binary judgement of either it is **significant** or it is **not significant**.

4.0 BASELINE

4.1 Introduction

Existing air quality conditions in the vicinity of the proposed development site were identified in order to provide a baseline for assessment. These are detailed in the following Sections.

4.2 Local Air Quality Management

As required by the Environment Act (1995), as amended by the Environment Act (2021), SHDC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that concentrations of all pollutants considered within the AQS are currently below the relevant AQOs throughout the district. As such, no AQMAs have been designated.

4.3 Air Quality Monitoring

Monitoring of pollutant concentrations is undertaken by SHDC throughout their area of jurisdiction. Recent annual mean NO_2 results recorded in the vicinity of the site, as provided in SHDC's 'Annual Progress Report 2024'[13], are shown in Table 10.

Table 10 Monitoring Results

Monitoring Site		Monitored NO_2 Concentration (µg/m^3)			
		2020	2021	2022	2023
SH4	46 The Hollies	8.9	8.7	9.6	8.2
SH6	Boston Road A17	20.9	23.8	27.6	24.3

As shown in Table 10, annual mean NO_2 concentrations were below the AQO of 40µg/m^3 at both monitoring locations in recent years. Reference should be made to Figure 2 for a map of the survey positions.

Pollutant concentrations during 2020 and 2021 were affected by changes to travel patterns associated with the COVID-19 pandemic. The results should therefore be viewed with caution. However, data for 2022 and beyond is now considered representative of post-pandemic conditions. This is supported by the IAQM[14], who have adopted the following position:

> *"ambient air quality monitoring data for the year 2022 and beyond is generally considered to represent the current post-pandemic baseline."*

Monitoring of PM_{10} or $PM_{2.5}$ concentrations is not undertaken in the vicinity of the site.

4.4 Background Pollutant Concentration Predictions

Predictions of NO_2, PM_{10} and $PM_{2.5}$ concentrations on a 1km by 1km grid basis have been produced by DEFRA. These maps cover the entire of the UK to assist LAs in their Review and

[13] Annual Progress Report 2024, SHDC, 2024.
[14] Use of 2020 and 2021 Monitoring Datasets - IAQM Position Statement V1.1, IAQM, 2023.

Assessment of air quality. The proposed development site is partially located in two grid squares. Data for this location was downloaded from the DEFRA website[15] for the purpose of the assessment and is summarised in Table 11.

Table 11 Background Pollutant Concentration Predictions

NGR (m)	Predicted Background Pollutant Concentration (µg/m^3)								
	NO_2			PM_{10}			$PM_{2.5}$		
	2023	2025	2030	2023	2025	2030	2023	2025	2030
536500, 325500	6.39	13.85	6.67	5.99	13.63	6.46	4.97	13.23	6.11
537500, 325500	13.68	6.27	5.84	13.52	6.12	4.87	13.12	5.77	13.68

As shown in Table 11, predicted background NO_2, PM_{10} and $PM_{2.5}$ concentrations are below the relevant AQOs and Concentration Target at the development site.

4.5 Sensitive Receptors

A sensitive receptor is defined as any location which may be affected by changes in air quality as a result of a development. These have been defined for construction dust and road vehicle exhaust emission impacts in the following Sections.

4.5.1 Construction Phase Sensitive Receptors

Receptors sensitive to potential dust impacts during earthworks and construction were identified from a desk-top study of the area up to 250m from the development boundary. These are summarised in Table 12.

Table 12 Earthworks and Construction Dust Sensitive Receptors

Distance from Site Boundary (m)	Approximate Number of Human Receptors	Approximate Number of Ecological Receptors
Up to 20	More than 100	0
Up to 50	More than 100	0
Up to 100	More than 100	-
Up to 250	More than 100	-

Receptors sensitive to potential dust impacts from trackout were identified from a desk-top study of the area up to 50m from the road network within 250m of the site access. These are summarised in Table 13.

Table 13 Trackout Dust Sensitive Receptors

Distance from Site Access Route (m)	Approximate Number of Human Receptors	Approximate Number of Ecological Receptors
Up to 20	More than 100	0
Up to 50	More than 100	0

[15] https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2021.

There are no ecological receptors within 50m of the development boundary or access route within 250m of the site entrance. As such, ecological impacts have not been assessed further within this report.

Based on the criteria shown in Table 4, the sensitivity of the receiving environment to potential dust impacts was determined as **high**. This was because the identified receptors included residential properties.

The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria shown in Section 3.2, is shown in Table 14.

Table 14 Sensitivity of the Surrounding Area to Potential Dust Impacts

Potential Impact	Sensitivity of the Surrounding Area		
	Earthworks	Construction	Trackout
Dust Soiling	High	High	High
Human Health	Medium	Medium	Medium

4.5.2 Operational Phase Sensitive Receptors

Locations sensitive to potential operational phase road vehicle exhaust emission impacts were identified from a desk-top study and are summarised in Table 15.

Table 15 Operational Phase Road Vehicle Exhaust Emission Sensitive Receptor Locations

Receptor		NGR (m)	
		X	Y
R1	Residential - 3 Battlefields Lane South	536328.8	325268.5
R2	Residential - 10 Battlefields Lane South	536476.6	325331.6
R3	Residential - 65 Battlefields Lane South	536748.2	325396.5
R4	Residential - 88 Battlefields Lane South	536862.4	325417.0
R5	Residential - 1 Low Lane	536943.0	325533.6
R6	Residential – A17 Washway Road	538424.3	325336.8
R7	Residential - Hurn Road	537735.4	325530.7
R8	Residential - 47 Low Lane	536549.5	325607.1
R9	Residential - Penny Hill Road	536126.9	325601.6
R10	Holbeach Primary Academy	535673.5	325520.3
R11	Residential - Wellbourne Lane East	535424.7	325664.0
R12	Residential - 75 Boston Road South	535609.6	325443.6
R13	Residential - 78 Boston Road South	535683.0	325396.2
R14	Residential - 40 Boston Road	535750.2	325142.0
R15	Residential - 12A West End	535768.1	324847.6
R16	Residential - 59 Foxes Low Road	536196.9	324765.4
R17	Residential - 13 Foxes Low Road	536745.1	324911.5
R18	Residential - 3 Foxes Low Road	536929.5	325037.2
R19	Residential - 1 Foxes Low Road	537180.9	325174.9
R20	Residential - 1 Foxes Low Road, opposite site entrance	537293.7	325264.3

Receptor		NGR (m)	
		X	Y
R21	Residential - 16 Fleet Road	536869.8	324828.8
R22	Residential - 42 Fleet Road	537239.4	324903.3
R23	Residential - 65 Fleet Road	537390.6	324991.1

Reference should be made to Figure 4 for a graphical representation of road vehicle exhaust emission sensitive receptor locations.

5.0 ASSESSMENT

5.1 Introduction

There is the potential for air quality impacts as a result of the construction and operation of the proposed development. These are assessed in the following Sections.

5.2 Construction Phase Assessment

5.2.1 Step 1

The undertaking of activities such as ground works, cutting, construction, concrete batching and storage of materials has the potential to result in fugitive dust emissions throughout the construction phase. Vehicle movements both on-site and on the local road network also have the potential to result in the re-suspension of dust from haul roads and highway surfaces.

The potential for impacts at sensitive locations depends significantly on local meteorology during the undertaking of dust generating activities, with the most significant effects likely to occur during dry and windy conditions.

The desk-study undertaken to inform the baseline identified a number of sensitive receptors within 250m of the site boundary. As such, a detailed assessment of potential dust impacts was required.

5.2.2 Step 2a

5.2.2.1 Earthworks

Earthworks will primarily involve excavating material, haulage, tipping and stockpiling, as well as site levelling and landscaping. The area of the development site is between 18,000m^2 and 110,000m^2. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from earthworks activities is therefore **medium**.

5.2.2.2 Construction

The total building volume to be constructed is estimated to be between 12,000m^3 and 75,000m^3. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from construction is therefore **large.**

5.2.2.3 Trackout

Based on the site area, it is anticipated that the unpaved road length may be greater than 100m during certain stages of construction. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from trackout is therefore **large**.

5.2.3 Step 2b

5.2.3.1 Dust Soiling

Table 12 shows that there more than 100 **high** sensitivity receptors within 20m of the site boundary. The sensitivity of the area with respect to dust soiling from earthworks and construction, as defined using the criteria summarised in Table 5 is therefore considered to be **high**.

Table 13 shows that there are between more than 100 **high** sensitivity receptors within 20m of the road network within 250m of the site access. The sensitivity of the area with respect to dust soiling from trackout, as defined using the criteria summarised in Table 5, is therefore considered **high.**

5.2.3.2 Human Health

Table 11 shows the annual mean PM_{10} background concentration at the site is 12.35µg/m^3. As shown in Table 6, where the background annual mean PM_{10} concentration is below 24µg/m^3 and there are more than 100 **high** sensitivity receptors within 20m of the site boundary, the sensitivity of the area with respect to human health from earthworks and construction is considered to be **medium**.

There are more than 100 **high** sensitivity receptors within 20m of the road network within 250m of the site access. The sensitivity of the area with respect to human health from trackout, as defined using the criteria summarised in Table 6, is therefore considered to be **medium**.

5.2.4 Step 2c

A summary of the risk from each dust generating activity is provided in Table 16.

Table 16 Summary of Potential Unmitigated Dust Risks

Potential Impact	Risk		
	Earthworks	Construction	Trackout
Dust Soiling	Medium	High	High
Human Health	Medium	Medium	Medium

As indicated in Table 16, the potential risk of dust soiling is **high** from construction and trackout and **medium** from earthworks. The potential risk of human health impacts is **medium** from earthworks, construction and trackout.

It should be noted that the potential for impacts depends significantly on the distance between the dust generating activity and receptor location. Risk was predicted based on a worst-case scenario of works being undertaken at the site boundary closest to each sensitive area. Therefore, actual risk is likely to be lower than that predicted during the majority of the construction phase.

5.2.5 Step 3

The IAQM guidance[16] provides potential mitigation measures to reduce impacts as a result of fugitive dust emissions during the construction phase. These have been adapted for the development site as summarised in Table 17. These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan or similar if required by the LA.

Table 17 Fugitive Dust Emission Mitigation Measures

Issue	Comment
Communications	• Develop and implement a stakeholder communications plan that includes community engagement before work commences on site • Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager • Display the head or regional office contact information • A Dust Management Plan (DMP) will be implemented as part of the proposals which includes measures to control other emissions
Site management	• Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken • Make the complaints log available to the LA upon request • Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book • Hold regular liaison meetings with other high risk construction sites within 250m of the site boundary
Monitoring	• Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority upon request • Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the LA upon request • Increase the frequency of site inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions

[16] Guidance on the Assessment of Dust from Demolition and Construction V2.2, IAQM, 2024.

Issue	Comment
Site preparation	• Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible • Erect solid screens or barriers around dusty activities or the site • Fully enclose site or specific operations where there is a high potential for dust production and they are active for an extensive period • Avoid site runoff of water or mud • Keep site fencing, barriers and scaffolding clean using wet methods • Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used • Cover, seed or fence stockpiles to prevent wind whipping
Operating vehicle/machinery and sustainable travel	• Ensure all vehicles switch off engines when stationary - no idling vehicles • Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable • Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials
Operations	• Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques • Ensure an adequate water supply on the site for effective dust suppression, using non-potable water where possible and appropriate • Use enclosed chutes and conveyors and covered skips • Minimise drop heights and use fine water sprays wherever appropriate • Ensure equipment is available to clean any dry spillages, and clean up spillages as soon as reasonably practicable using wet cleaning methods
Waste management	• Avoid bonfires or burning of waste materials
Construction	• Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out
Trackout	• Use water-assisted dust sweeper on access and local roads, if required • Avoid dry sweeping of large areas • Ensure vehicles entering and leaving site are covered to prevent escape of materials • Implement a wheel washing system, if required • Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits • Access gates to be located at least 10m from receptors where possible

5.2.6 Step 4

Assuming the relevant mitigation measures outlined in Table 17 are implemented, the residual impacts from all dust generating activities is predicted to be **not significant**, in accordance with the IAQM guidance[17].

5.3 Operational Phase Assessment

The development has the potential to increase concentrations of NO_2, PM_{10} and $PM_{2.5}$ as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site during the operational phase. An assessment was therefore undertaken using dispersion modelling in order to quantify potential changes in pollutant concentrations at sensitive locations in the vicinity of the site.

The assessment considered the following scenarios:

- 2023 - Verification;
- 2030 - DM; and,
- 2030 - DS.

The DM scenario (i.e. without development) included baseline traffic data, inclusive of anticipated growth for the relevant assessment year. The DS scenario (i.e. with development) included baseline traffic data, inclusive of anticipated growth and committed developments for the relevant assessment year, in addition to predicted vehicle trips associated with the operation of the proposals.

For the purpose of the assessment, traffic data for 2030 was utilised as the development opening year. Air quality is predicted to improve in the future. However, in order to provide a robust assessment, emission factors for 2023 were utilised within the dispersion model. The use of 2030 traffic data and 2023 emission factors is considered to provide a worst-case scenario and therefore a sufficient level of confidence can be placed within the predicted pollution concentrations.

Reference should be made to Appendix 1 for full assessment input details.

5.3.1 Predicted Concentrations

Annual mean NO_2 concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 18.

Table 18 Predicted Annual Mean NO_2 Concentrations

Receptor		Predicted Annual Mean NO_2 Concentration (µg/m^3)		
		DM	DS	Change
R1	Residential - 3 Battlefields Lane South	9.95	10.12	0.17
R2	Residential - 10 Battlefields Lane South	9.78	9.90	0.12

[17] Guidance on the Assessment of Dust from Demolition and Construction V2.2, IAQM, 2024.

Receptor		Predicted Annual Mean NO_2 Concentration (µg/m^3)		
		DM	DS	Change
R3	Residential - 65 Battlefields Lane South	10.33	10.53	0.20
R4	Residential - 88 Battlefields Lane South	10.16	10.29	0.13
R5	Residential - 1 Low Lane	13.61	13.76	0.15
R6	Residential – A17 Washway Road	10.93	10.97	0.04
R7	Residential - Hurn Road	12.60	12.68	0.08
R8	Residential - 47 Low Lane	15.74	15.86	0.12
R9	Residential - Penny Hill Road	15.04	15.16	0.12
R10	Holbeach Primary Academy	14.57	14.70	0.13
R11	Residential - Wellbourne Lane East	20.10	20.26	0.16
R12	Residential - 75 Boston Road South	14.21	14.40	0.19
R13	Residential - 78 Boston Road South	13.84	14.03	0.19
R14	Residential - 40 Boston Road	13.37	13.57	0.20
R15	Residential - 12A West End	13.19	13.40	0.21
R16	Residential - 59 Foxes Low Road	11.18	11.39	0.21
R17	Residential - 13 Foxes Low Road	10.37	10.67	0.30
R18	Residential - 3 Foxes Low Road	9.86	10.13	0.27
R19	Residential - 1 Foxes Low Road	10.30	10.66	0.36
R20	Residential - 1 Foxes Low Road, opposite site entrance	9.95	10.16	0.21
R21	Residential - 16 Fleet Road	12.70	12.89	0.19
R22	Residential - 42 Fleet Road	11.17	11.29	0.12
R23	Residential - 65 Fleet Road	11.66	11.80	0.14

As indicated in Table 18, predicted annual mean NO_2 concentrations were below the AQO of 40µg/m^3 at all sensitive receptors in both the DM and DS scenarios.

Annual mean PM_{10} concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 19.

Table 19 Predicted Annual Mean PM_{10} Concentrations

Receptor		Predicted Annual Mean PM_{10} Concentration (µg/m^3)		
		DM	DS	Change
R1	Residential - 3 Battlefields Lane South	12.79	12.83	0.05
R2	Residential - 10 Battlefields Lane South	12.73	12.77	0.03
R3	Residential - 65 Battlefields Lane South	12.87	12.92	0.05
R4	Residential - 88 Battlefields Lane South	12.81	12.85	0.03
R5	Residential - 1 Low Lane	13.57	13.61	0.04
R6	Residential – A17 Washway Road	12.96	12.97	0.01
R7	Residential - Hurn Road	13.33	13.35	0.02
R8	Residential - 47 Low Lane	14.05	14.08	0.03
R9	Residential - Penny Hill Road	13.89	13.92	0.03
R10	Holbeach Primary Academy	13.71	13.74	0.03
R11	Residential - Wellbourne Lane East	15.03	15.07	0.04
R12	Residential - 75 Boston Road South	13.71	13.75	0.05

Receptor		Predicted Annual Mean PM_{10} Concentration (µg/m³)		
		DM	DS	Change
R13	Residential - 78 Boston Road South	13.64	13.69	0.05
R14	Residential - 40 Boston Road	13.57	13.62	0.05
R15	Residential - 12A West End	13.78	13.85	0.06
R16	Residential - 59 Foxes Low Road	13.23	13.30	0.06
R17	Residential - 13 Foxes Low Road	12.96	13.05	0.09
R18	Residential - 3 Foxes Low Road	12.80	12.87	0.07
R19	Residential - 1 Foxes Low Road	12.90	13.01	0.10
R20	Residential - 1 Foxes Low Road, opposite site entrance	12.79	12.85	0.06
R21	Residential - 16 Fleet Road	13.77	13.84	0.06
R22	Residential - 42 Fleet Road	13.26	13.30	0.04
R23	Residential - 65 Fleet Road	13.42	13.46	0.05

As indicated in Table 19, predicted annual mean PM_{10} concentrations were below the AQO of 40µg/m³ at all sensitive receptors in both the DM and DS scenarios.

Annual mean $PM_{2.5}$ concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 20.

Table 20 Predicted Annual Mean $PM_{2.5}$ Concentrations

Receptor		Predicted Annual Mean $PM_{2.5}$ Concentration (µg/m³)		
		DM	DS	Change
R1	Residential - 3 Battlefields Lane South	6.76	6.78	0.02
R2	Residential - 10 Battlefields Lane South	6.73	6.75	0.02
R3	Residential - 65 Battlefields Lane South	6.81	6.84	0.03
R4	Residential - 88 Battlefields Lane South	6.78	6.80	0.02
R5	Residential - 1 Low Lane	7.25	7.27	0.02
R6	Residential – A17 Washway Road	6.88	6.89	0.01
R7	Residential - Hurn Road	7.11	7.12	0.01
R8	Residential - 47 Low Lane	7.55	7.57	0.02
R9	Residential - Penny Hill Road	7.45	7.46	0.02
R10	Holbeach Primary Academy	7.27	7.29	0.02
R11	Residential - Wellbourne Lane East	8.10	8.12	0.02
R12	Residential - 75 Boston Road South	7.26	7.28	0.03
R13	Residential - 78 Boston Road South	7.22	7.25	0.03
R14	Residential - 40 Boston Road	7.17	7.20	0.03
R15	Residential - 12A West End	7.29	7.32	0.03
R16	Residential - 59 Foxes Low Road	6.99	7.03	0.03
R17	Residential - 13 Foxes Low Road	6.85	6.89	0.05
R18	Residential - 3 Foxes Low Road	6.76	6.80	0.04
R19	Residential - 1 Foxes Low Road	6.82	6.87	0.05
R20	Residential - 1 Foxes Low Road, opposite site entrance	6.76	6.79	0.03
R21	Residential - 16 Fleet Road	7.28	7.32	0.03

Receptor		Predicted Annual Mean $PM_{2.5}$ Concentration (µg/m³)		
		DM	DS	Change
R22	Residential - 42 Fleet Road	7.01	7.03	0.02
R23	Residential - 65 Fleet Road	7.09	7.12	0.02

As indicated in Table 20, predicted annual mean $PM_{2.5}$ concentrations were below the Concentration Target of 10µg/m³ at all sensitive receptors in both the DM and DS scenarios.

5.3.2 Predicted Impacts

Predicted impacts on annual mean NO_2 concentrations at the sensitive receptor locations are summarised in Table 21.

Table 21 Predicted Impacts - NO_2

Receptor		Predicted Annual Mean NO_2 Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - 3 Battlefields Lane South	Below 75% of AQO	0	Negligible
R2	Residential - 10 Battlefields Lane South	Below 75% of AQO	0	Negligible
R3	Residential - 65 Battlefields Lane South	Below 75% of AQO	1	Negligible
R4	Residential - 88 Battlefields Lane South	Below 75% of AQO	0	Negligible
R5	Residential - 1 Low Lane	Below 75% of AQO	0	Negligible
R6	Residential – A17 Washway Road	Below 75% of AQO	0	Negligible
R7	Residential - Hurn Road	Below 75% of AQO	0	Negligible
R8	Residential - 47 Low Lane	Below 75% of AQO	0	Negligible
R9	Residential - Penny Hill Road	Below 75% of AQO	0	Negligible
R10	Holbeach Primary Academy	Below 75% of AQO	0	Negligible
R11	Residential - Wellbourne Lane East	Below 75% of AQO	0	Negligible
R12	Residential - 75 Boston Road South	Below 75% of AQO	0	Negligible
R13	Residential - 78 Boston Road South	Below 75% of AQO	0	Negligible
R14	Residential - 40 Boston Road	Below 75% of AQO	1	Negligible

Receptor		Predicted Annual Mean NO_2 Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R15	Residential - 12A West End	Below 75% of AQO	1	Negligible
R16	Residential - 59 Foxes Low Road	Below 75% of AQO	1	Negligible
R17	Residential - 13 Foxes Low Road	Below 75% of AQO	1	Negligible
R18	Residential - 3 Foxes Low Road	Below 75% of AQO	1	Negligible
R19	Residential - 1 Foxes Low Road	Below 75% of AQO	1	Negligible
R20	Residential - 1 Foxes Low Road, opposite site entrance	Below 75% of AQO	1	Negligible
R21	Residential - 16 Fleet Road	Below 75% of AQO	0	Negligible
R22	Residential - 42 Fleet Road	Below 75% of AQO	0	Negligible
R23	Residential - 65 Fleet Road	Below 75% of AQO	0	Negligible

As indicated in Table 21, impacts on annual mean NO_2 concentrations as a result of the proposed development were predicted to be **negligible** at all receptors.

Predicted impacts on annual mean PM_{10} concentrations at the sensitive receptor locations are summarised in Table 22.

Table 22 Predicted Impacts - PM_{10}

Receptor		Predicted Annual Mean PM_{10} Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - 3 Battlefields Lane South	Below 75% of AQO	0	Negligible
R2	Residential - 10 Battlefields Lane South	Below 75% of AQO	0	Negligible
R3	Residential - 65 Battlefields Lane South	Below 75% of AQO	0	Negligible
R4	Residential - 88 Battlefields Lane South	Below 75% of AQO	0	Negligible
R5	Residential - 1 Low Lane	Below 75% of AQO	0	Negligible
R6	Residential – A17 Washway Road	Below 75% of AQO	0	Negligible

Receptor		Predicted Annual Mean PM_{10} Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R7	Residential - Hurn Road	Below 75% of AQO	0	Negligible
R8	Residential - 47 Low Lane	Below 75% of AQO	0	Negligible
R9	Residential - Penny Hill Road	Below 75% of AQO	0	Negligible
R10	Holbeach Primary Academy	Below 75% of AQO	0	Negligible
R11	Residential - Wellbourne Lane East	Below 75% of AQO	0	Negligible
R12	Residential - 75 Boston Road South	Below 75% of AQO	0	Negligible
R13	Residential - 78 Boston Road South	Below 75% of AQO	0	Negligible
R14	Residential - 40 Boston Road	Below 75% of AQO	0	Negligible
R15	Residential - 12A West End	Below 75% of AQO	0	Negligible
R16	Residential - 59 Foxes Low Road	Below 75% of AQO	0	Negligible
R17	Residential - 13 Foxes Low Road	Below 75% of AQO	0	Negligible
R18	Residential - 3 Foxes Low Road	Below 75% of AQO	0	Negligible
R19	Residential - 1 Foxes Low Road	Below 75% of AQO	0	Negligible
R20	Residential - 1 Foxes Low Road, opposite site entrance	Below 75% of AQO	0	Negligible
R21	Residential - 16 Fleet Road	Below 75% of AQO	0	Negligible
R22	Residential - 42 Fleet Road	Below 75% of AQO	0	Negligible
R23	Residential - 65 Fleet Road	Below 75% of AQO	0	Negligible

As indicated in Table 22, impacts on annual mean PM_{10} concentrations as a result of the proposed development were predicted to be **negligible** at all receptors.

Predicted impacts on annual mean $PM_{2.5}$ concentrations at the sensitive receptor locations are summarised in Table 23.

Table 23 Predicted Impacts - $PM_{2.5}$

Receptor		Predicted Annual Mean $PM_{2.5}$ Concentration	Predicted Concentration Change as Proportion of Concentration Target (%)	Impact Significance
R1	Residential - 3 Battlefields Lane South	Below 75% of Concentration Target	0	Negligible
R2	Residential - 10 Battlefields Lane South	Below 75% of Concentration Target	0	Negligible
R3	Residential - 65 Battlefields Lane South	Below 75% of Concentration Target	0	Negligible
R4	Residential - 88 Battlefields Lane South	Below 75% of Concentration Target	0	Negligible
R5	Residential - 1 Low Lane	Below 75% of Concentration Target	0	Negligible
R6	Residential – A17 Washway Road	Below 75% of Concentration Target	0	Negligible
R7	Residential - Hurn Road	Below 75% of Concentration Target	0	Negligible
R8	Residential - 47 Low Lane	76 - 94% of Concentration Target	0	Negligible
R9	Residential - Penny Hill Road	Below 75% of Concentration Target	0	Negligible
R10	Holbeach Primary Academy	Below 75% of Concentration Target	0	Negligible
R11	Residential - Wellbourne Lane East	76 - 94% of Concentration Target	0	Negligible
R12	Residential - 75 Boston Road South	Below 75% of Concentration Target	0	Negligible
R13	Residential - 78 Boston Road South	Below 75% of Concentration Target	0	Negligible
R14	Residential - 40 Boston Road	Below 75% of Concentration Target	0	Negligible

Receptor		Predicted Annual Mean $PM_{2.5}$ Concentration	Predicted Concentration Change as Proportion of Concentration Target (%)	Impact Significance
R15	Residential - 12A West End	Below 75% of Concentration Target	0	Negligible
R16	Residential - 59 Foxes Low Road	Below 75% of Concentration Target	0	Negligible
R17	Residential - 13 Foxes Low Road	Below 75% of Concentration Target	0	Negligible
R18	Residential - 3 Foxes Low Road	Below 75% of Concentration Target	0	Negligible
R19	Residential - 1 Foxes Low Road	Below 75% of Concentration Target	1	Negligible
R20	Residential - 1 Foxes Low Road, opposite site entrance	Below 75% of Concentration Target	0	Negligible
R21	Residential - 16 Fleet Road	Below 75% of Concentration Target	0	Negligible
R22	Residential - 42 Fleet Road	Below 75% of Concentration Target	0	Negligible
R23	Residential - 65 Fleet Road	Below 75% of Concentration Target	0	Negligible

As indicated in Table 23, impacts on annual mean $PM_{2.5}$ concentrations as a result of the proposed development were predicted to be **negligible** at all receptors.

5.3.3 Overall Impact Significance

The overall significance of operational phase road traffic emission impacts was determined as **negligible**. This was based on the overall predicted impacts at discrete receptor locations and the considerations outlined previously. Further justification is provided in Table 24.

Table 24 Overall Impact Significance of Operational Phase Road Vehicle Exhaust Emissions

Guidance	Comment
The existing and future air quality in the absence of the development	Predicted annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations were below the relevant AQOs and Concentration Target at all locations in the DM scenario It is considered unlikely that future air quality conditions will change significantly in the absence of the development given the relatively established nature of the area
The extent of current and future population exposure to the impacts	The development is not predicted to affect the population exposed to exceedences of the AQOs and Concentration Target
The influence and validity of any assumptions adopted when undertaking the prediction of impacts	It was assumed that vehicle exhaust emission rates and background pollution levels will not reduce in future years. This provides worst-case results when compared with the DEFRA and National Highways methodologies Due to the adopted assumptions it is considered the presented results are sufficiently robust for an assessment of this nature

The IAQM guidance[18] states that only if the impact is greater than **slight**, the effect is considered **significant**. As impacts were predicted to be **negligible**, overall effects are considered **not significant,** in accordance with the stated methodology.

Interim Planning Guidance for $PM_{2.5}$

Interim Planning Guidance[19] on the consideration of the $PM_{2.5}$ targets identified in the Environment Act (2021) in planning decisions has been produced by DEFRA. This requires evidence that the key sources of air pollution within a development have been identified and appropriate action to minimise emissions of $PM_{2.5}$ and its precursors as far as is reasonably practicable be provided in support of planning applications. To assist the process, two questions and associated considerations are provided. These are summarised in Table 25, along with the development response.

[18] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.
[19] https://uk-air.defra.gov.uk/pm25targets/planning.

Table 25 Interim Planning Guidance Questions

Question	Response
How has exposure to $PM_{2.5}$ been considered when selecting the development site? Factors to consider include: • Site proximity to people (particularly large populations and/or vulnerable groups, e.g. schools, hospitals, care homes, areas of deprivation) and the impact of the development on these • Site proximity to pollution sources and the impact of these on users of the development • Exposure and emissions during both construction and in-use	The site is located in a predominantly residential setting. Local properties have been considered within the assessment as R1 - R5, respectively, and concentrations are predicted to be below the Concentration Target with the proposed development in place The site is distanced from any major pollutant sources, approximately 30m south of the A17. As such, users of the development are unlikely to be exposed to any existing air quality issues As outlined in Table 16, a number of mitigation measures will be used throughout the construction phase in order to reduce fugitive dust emissions as far as practicable. This will control potential exposure at off-site locations
What actions and/or mitigations have been considered to reduce $PM_{2.5}$ exposure for development users and nearby receptors and to reduce emissions of $PM_{2.5}$ and its precursors? • Factors to consider include: • Site layout • The development's design • Technology used in the construction or installed for use in the development • Construction and future use of the development	A number of mitigation measures have been incorporated into the design of the scheme in order to reduce $PM_{2.5}$ exposure for future residents. These include the following: • Residential units are distanced from major road sources and associated vehicle exhaust emissions • Trees will be retained along the northern and southern site boundary. This will aid in the dispersion of particulates from road sources In order to reduce emissions of $PM_{2.5}$ with associated impacts at nearby receptors, the following measures have also been included: • Provision of sustainable transport modes • There are public footpaths in the vicinity of the site • Easy access to local bus stops, to reduce reliance on private vehicles Further to the above, in order to reduce emissions during the construction phase, a number of mitigation measures will be used to minimise dust generation from associated activities

Based on the responses provided in Table 25 and the assessment results, it is considered that the development has identified key sources of air pollution and taken appropriate action to minimise emissions of $PM_{2.5}$.

6.0 SUMMARY

This report has been prepared to support a planning application for a residential development on land off Battlefields Lane South, Holbeach.

The proposals have the potential to cause air quality impacts as a result of fugitive dust emissions during construction and road vehicle exhaust emissions during operation. As such, an Air Quality Assessment was undertaken to determine baseline conditions and assess potential impacts as a result of the scheme.

During the construction phase of the development there is the potential for air quality impacts as a result of fugitive dust emissions from the site. These were assessed in accordance with the IAQM methodology. Site-specific dust control measures were subsequently determined. Following implementation, the residual significance of potential air quality impacts from dust generated by earthworks, construction and trackout activities are predicted to be **not significant**.

Potential impacts during the operational phase of the proposals may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the site. Dispersion modelling was therefore undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the highway network both with and without the development in place. Results were subsequently verified using local monitoring data.

Review of the dispersion modelling results indicated that impacts on annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations as a result of traffic generated by the development were predicted to be **negligible** at all sensitive receptor locations. Following consideration of the relevant issues, air quality impacts as a result of the operation of the development were considered to be **not significant,** in accordance with the IAQM guidance.

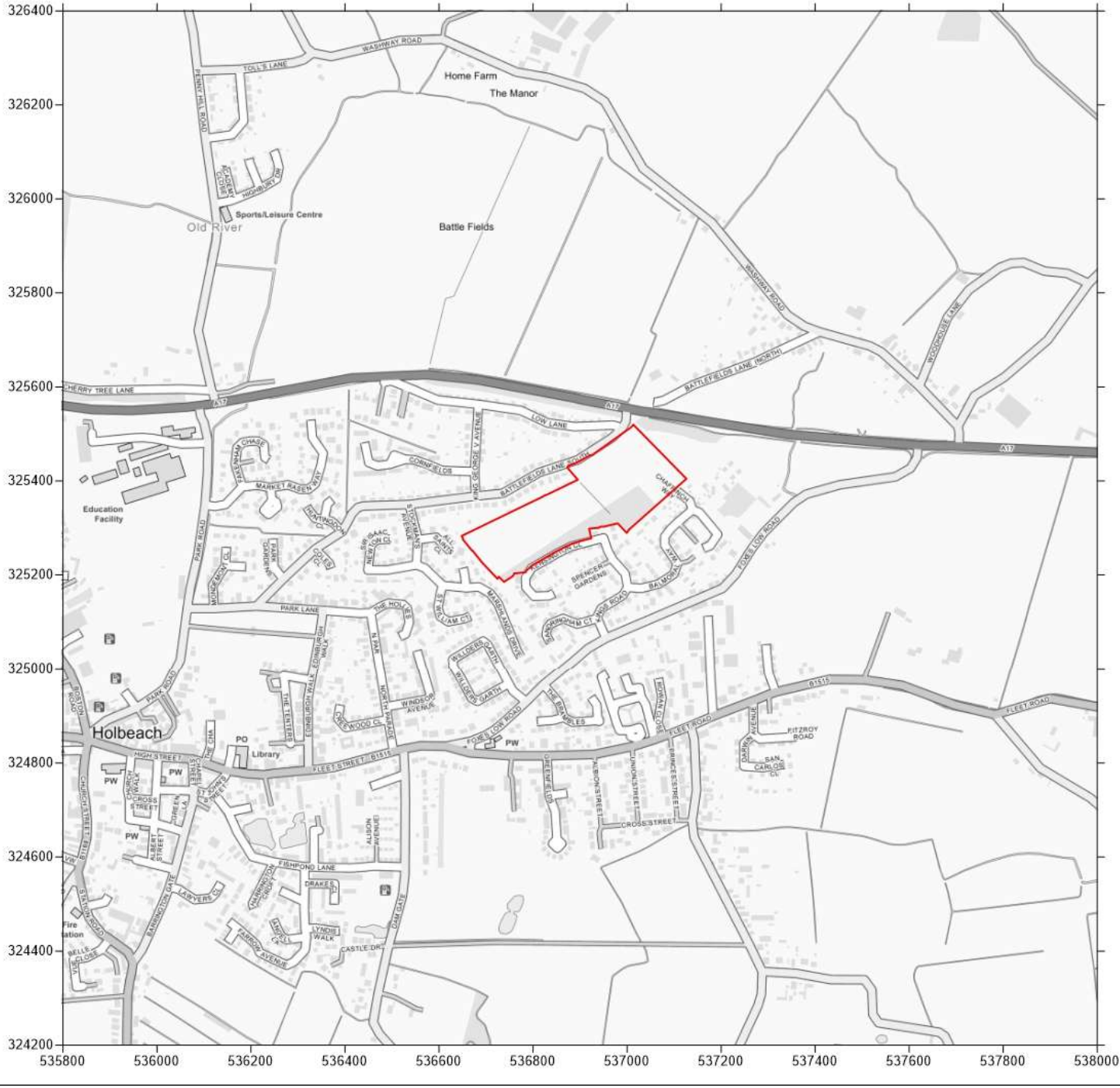
Based on the assessment results, air quality issues are not considered a constraint to planning consent for the development.

7.0 ABBREVIATIONS

AADT Annual Average Daily Traffic
AQLV Air Quality Limit Value
AQMA Air Quality Management Area
AQO Air Quality Objective
AQS Air Quality Strategy
CERC Cambridge Environmental Research Consultants
DEFRA Department for Environment, Food and Rural Affairs
DMP Dust Management Plan
DMRB Design Manual for Roads and Bridges
HDV Heavy Duty Vehicle
IAQM Institute of Air Quality Management
LA Local Authority
LAQM Local Air Quality Management
NB Northbound
NGR National Grid Reference
NO_2 Nitrogen dioxide
NPPF National Planning Policy Framework
NPPG National Planning Policy Guidance
PM_{10} Particulate matter with an aerodynamic diameter of less than 10µm
$PM_{2.5}$ Particulate matter with an aerodynamic diameter of less than 2.5µm
SB Southbound
SHDC South Holland District Council
SP Slow Phase
z_0 Roughness Length

APPENDIX I

Drawings



Legend

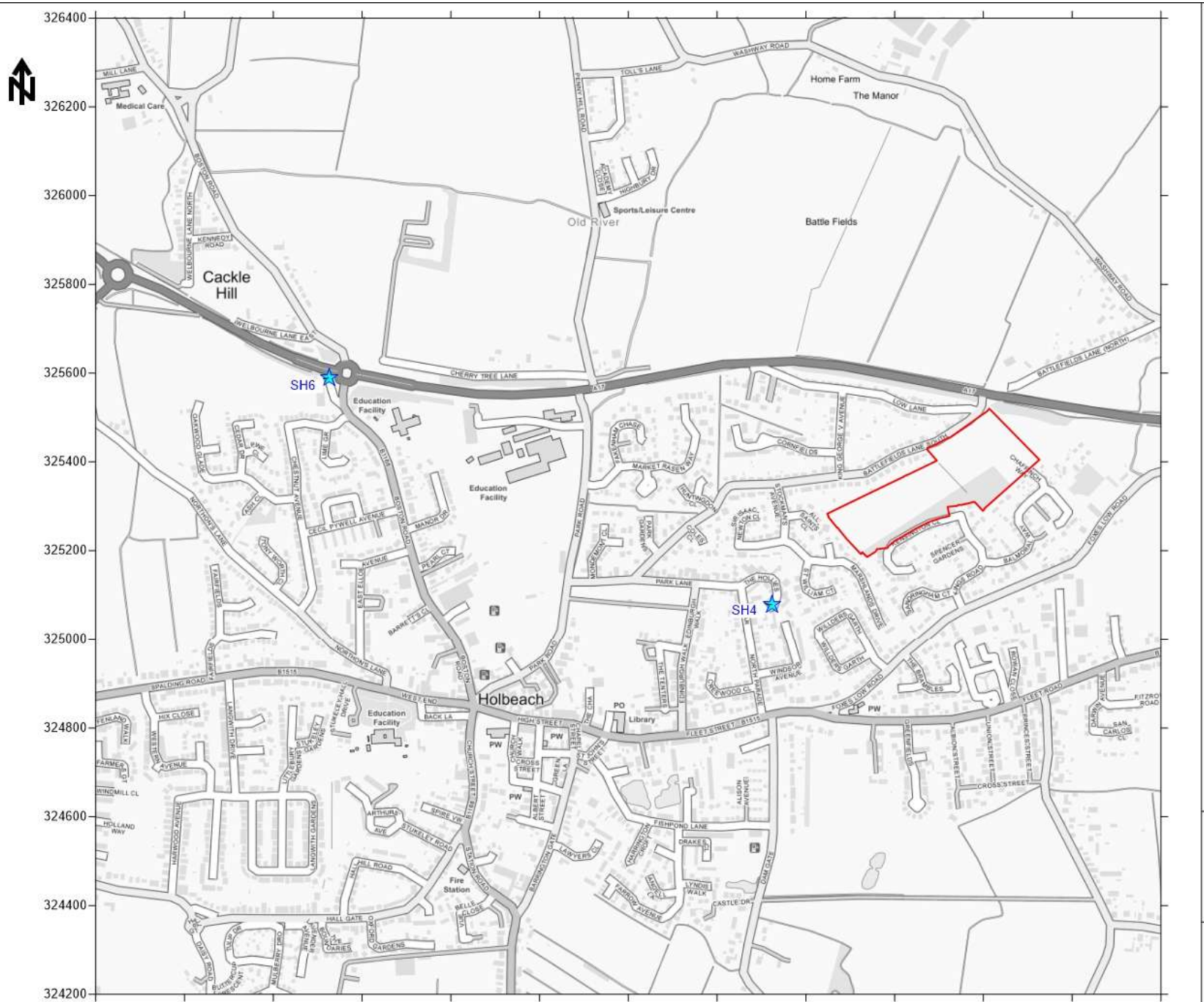
Site Boundary

Title

Figure 1 - Site Location Plan

Project

Air Quality Assessment
Battlefields Lane South, Holbeach



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Site Boundary

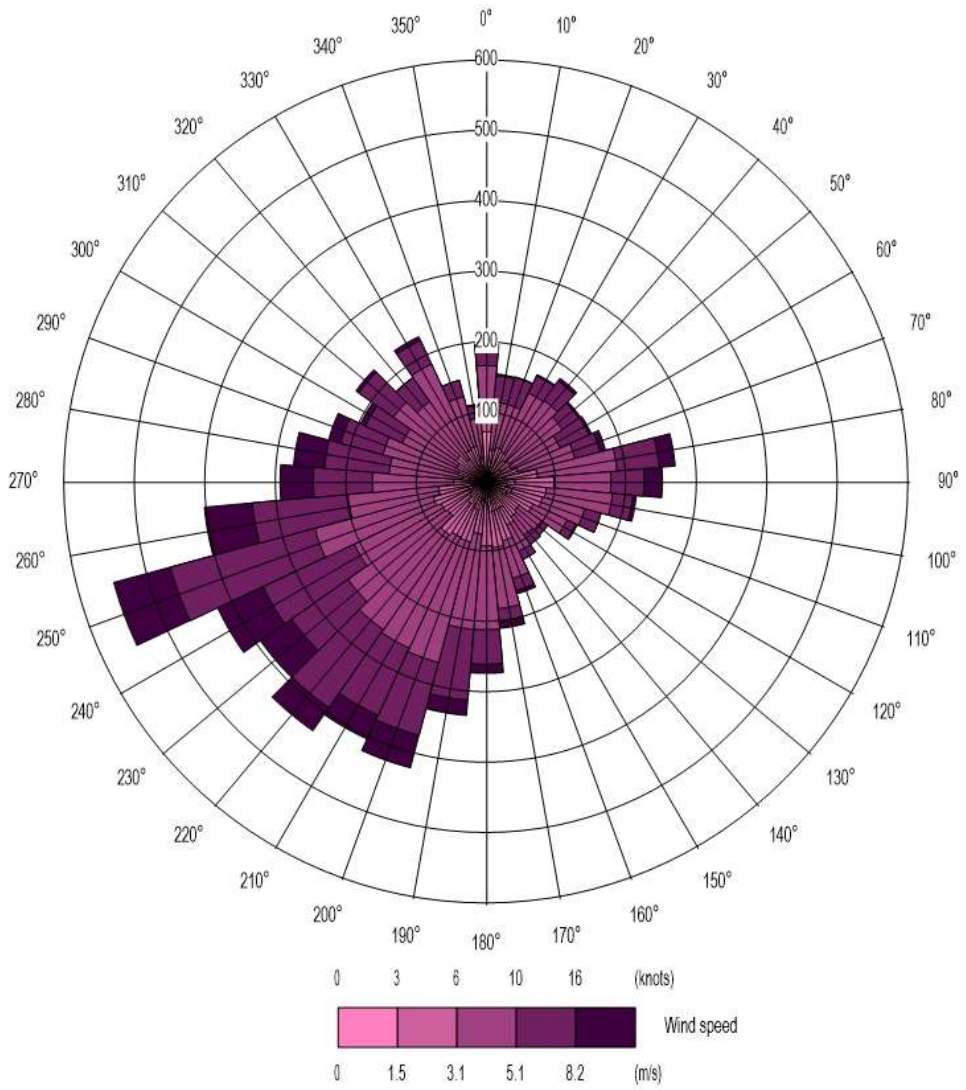
Monitor

Title

Figure 2 - Monitoring Locations

Project

Air Quality Assessment
Battlefields Lane South, Holbeach



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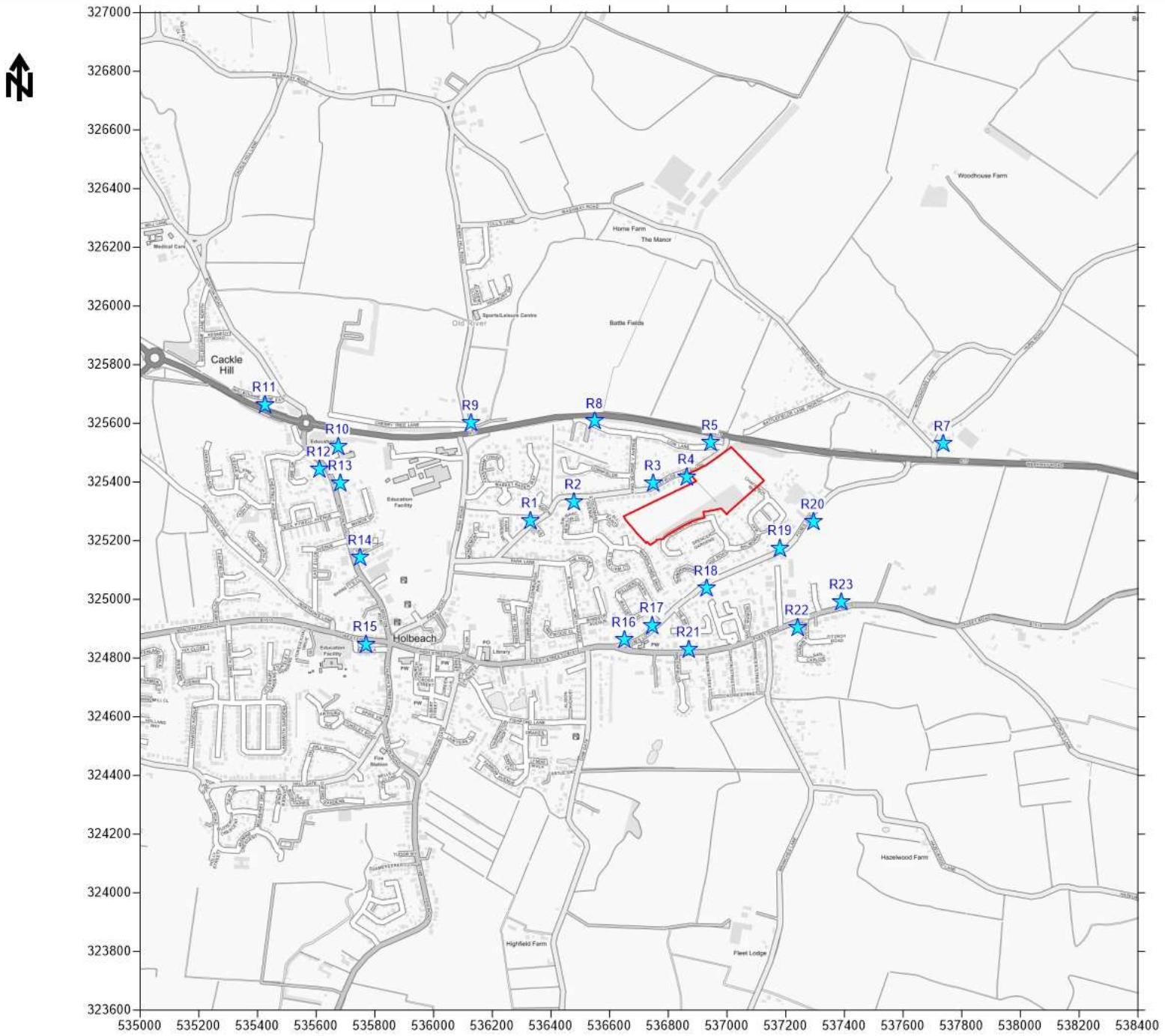
Title
Figure 3 - Wind Rose of 2023
Coningsby Meteorological Data

Project
Air Quality Assessment
Battlefields Lane South, Holbeach



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Site Boundary

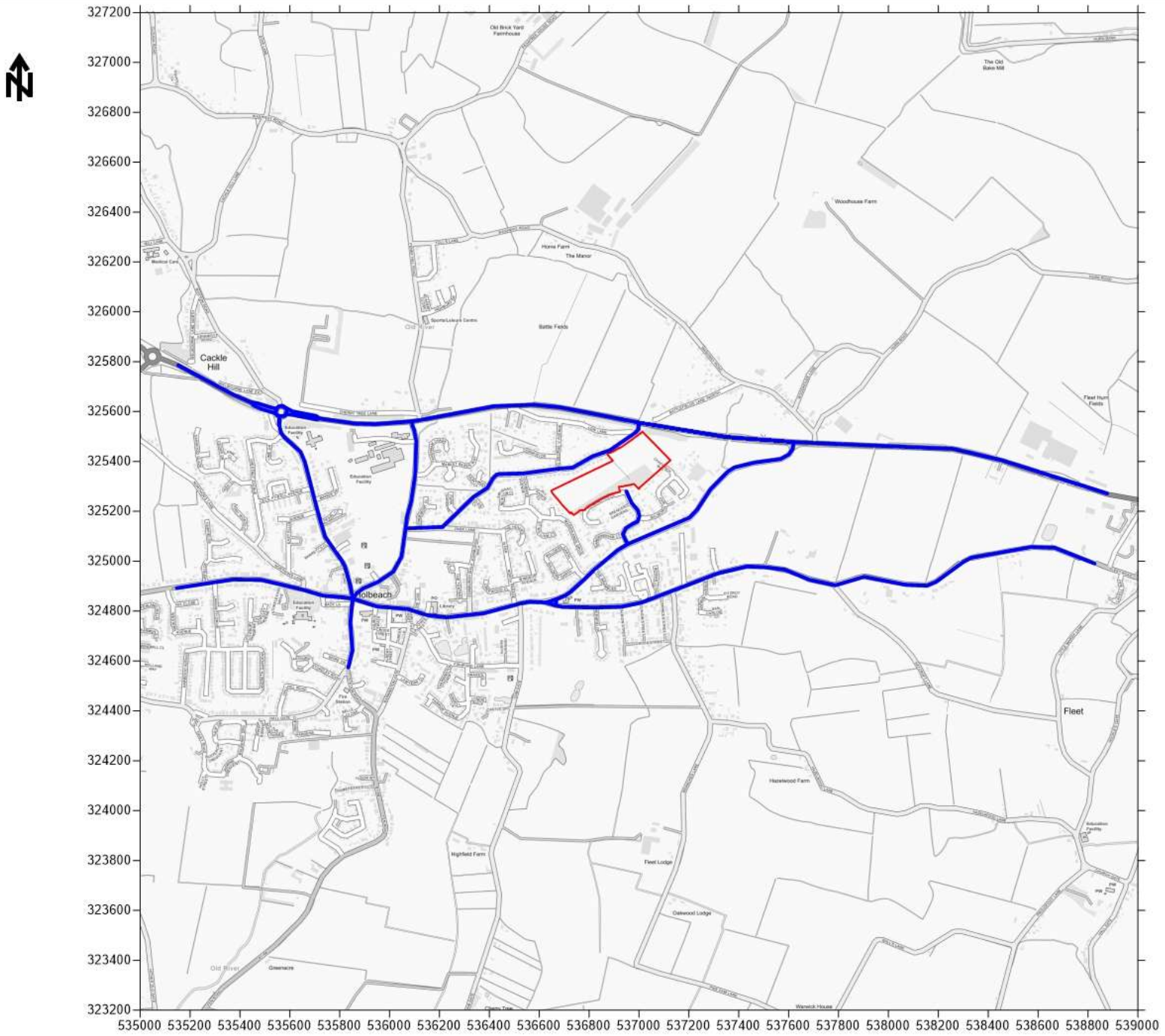
Receptor

Title

Figure 4 - Road Vehicle Exhaust Emissions Sensitive Receptor Locations

Project

Air Quality Assessment
Battlefields Lane South, Holbeach



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Site Boundary

Road Link

Title

Figure 5 - ADMS-Roads Inputs

Project

Air Quality Assessment
Battlefields Lane South, Holbeach

APPENDIX II

ASSESSMENT INPUT DATA

Introduction

The proposed development has the potential to cause air quality impacts as a result of emissions associated with vehicles travelling to and from the site. In order to assess NO_2, PM_{10} and $PM_{2.5}$ concentrations at sensitive locations, detailed dispersion modelling was undertaken in accordance with the following methodology.

Dispersion Model

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 5.0.1.3). ADMS-Roads is developed by Cambridge Environmental Research Consultants (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and DEFRA.

The model requires input data that details the following parameters:

- Traffic flow data;
- Vehicle emission factors;
- Spatial co-ordinates of emissions;
- Street width;
- Meteorological data;
- Roughness length (z_0); and,
- Monin-Obukhov length.

The relevant inputs are detailed in the following Sections.

Traffic Flow Data

Traffic data for use in the assessment, including 24-hour Average Annual Daily Traffic (AADT) flows and fleet composition as HDV proportion, was provided by the Transport Consultants for the scheme.

A summary of the traffic flow data is provided in Table A1.1.

Table A1.1 Traffic Data

Link		24-hour AADT Flow			HDV Prop. Of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		Verif.	2030 DM	2030 DS			
L1	Battlefields Lane South	1,336	1,465	1,751	0.00	6.6	20
L2	Battlefields Lane South	1,336	1,465	1,751	0.00	6.6	20
L3	A17, east of roundabout	23,901	26,207	26,578	16.08	10.2	90
L4	A17 Westbound (WB), Slow Phase (SP)	11,275	12,363	12,527	16.08	20.1	20
L5	A17 WB Slow Phase (SP)	11,275	12,363	12,527	16.08	8.2	20
L6	A17, west of roundabout	23,901	26,207	26,578	16.08	6.2	90
L7	A17, east of Battlefields Lane South	23,901	26,207	26,578	16.08	9.9	90

Link		24-hour AADT Flow			HDV Prop. Of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		Verif.	2030 DM	2030 DS			
L8	A17, east of Foxes Low Road	23,901	26,207	26,578	16.08	10.2	90
L9	Foxes Low Road	1,168	1,507	1,969	6.45	5.1	30
L10	Foxes Low Road	1,168	1,507	1,969	6.45	5.1	30
L11	Foxes Low Road, Southbound (SB) - SP	756	829	1,200	6.45	4.5	20
L12	Foxes Low Road, Northbound (NB) - SP	412	678	769	6.45	10.8	20
L13	Fleet Road	8,260	9,056	9,439	5.99	8.8	50
L14	Fleet Road	8,260	9,056	9,439	5.99	8.2	50
L15	Fleet Street	8,260	9,056	9,439	5.99	9.4	50
L16	High Street - SP	8,260	9,056	9,439	5.99	8.5	20
L17	West End, SP	8,260	9,056	9,439	5.99	10.2	20
L18	Shalding Road	8,260	9,056	9,439	5.99	9.1	50
L19	Boston Road	8,260	9,056	9,439	5.99	15.2	20
L20	Boston Road	8,260	9,056	9,439	5.99	6.1	20
L21	Boston Road - SP	8,260	9,056	9,439	5.99	17.8	20
L22	Boston Road - SP	8,260	9,056	9,439	5.99	8.5	20
L23	Church Street	8,260	9,056	9,439	5.99	8.1	20
L24	Park Road	1,336	1,465	1,751	0.00	11.2	20
L25	Park Road	1,336	1,465	1,751	0.00	5.6	30
L26	Park Road - SP	1,336	1,465	1,751	0.00	12.6	20
L27	Kings Road	687	753	1,258	0.00	7.6	20
L28	A17 Eastbound (EB), SP	12,626	13,845	14,051	16.08	7.1	20
L29	A17 Roundabout	14,015	15,368	15,649	16.08	11.5	20
L30	A17 EB, SP	12,626	13,845	14,051	16.08	7.6	20

Reference should be made to Figure 5 for a graphical representation of the road link locations.

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 12.1). This has been produced by DEFRA and incorporates COPERT 5.6 vehicle emission factors and fleet information.

There is current uncertainty over NO_2 concentrations within the UK, with the implementation of new vehicle emission standards not resulting in the previously expected reduction in roadside levels. Therefore, 2023 emission factors were utilised in preference to the development opening year in order to provide robust model outputs. As predictions for 2023 were verified, it is considered the results are a robust indication of worst-case concentrations for the future year.

Meteorological Data

Meteorological data used in the assessment was taken from Coningsby meteorological station over the period 1st January 2023 to 31st December 2023 (inclusive). Coningsby meteorological station is located at NGR: 522784, 356757, which is approximately 35.2km north-west of the

development. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

All meteorological records used in the assessment were provided by Atmospheric Dispersion Modelling (ADM) Ltd, which is an established distributor of data within the UK. Reference should be made to Figure 3 for a wind rose of the utilised meteorological data.

Roughness Length

The z_0 is a modelling parameter applied to allow consideration of surface height roughness elements. A z_0 of 0.3m was used to describe the modelling extents. This value is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'agricultural area (max)'.

A z_0 of 0.2m was used to describe the meteorological site. This value is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'agricultural areas (min)'.

Monin-Obukhov Length

The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 10m was used to describe the modelling extents. This value is considered appropriate for the nature of the area and is suggested within ADMS-Roads as being suitable for 'small towns <50,000'.

A minimum Monin-Obukhov length of 1m was used to describe the meteorological site. This value is considered appropriate for the nature of the area and is suggested within ADMS-Roads as being suitable for 'rural areas'.

Background Concentrations

A review of DEFRA data and local monitoring results was undertaken in order to identify an appropriate background value for use in the assessment. This indicated the annual mean NO_2 concentration recorded at the SH4 - 46 The Hollies monitoring site during 2023 was 8.2µg/m^3, higher than the DEFRA background for the grid square containing the development, as shown in Table 11. As such, the monitoring result was used to represent existing annual mean NO_2 concentrations within the vicinity of the site without the contribution from road vehicle exhaust emissions in order to provide robust predictions.

Background monitoring of PM_{10} and $PM_{2.5}$ concentrations is not undertaken by SHDC. As such, annual mean concentrations for these species were taken from the DEFRA grid square containing the site, as shown in Table 11.

Similarly to emission factors, background concentrations from 2023 were utilised throughout the assessment in preference to the development opening year. This provided a robust assessment and is likely to overestimate pollutant concentrations during the operation of the proposal.

NO_x to NO_2 Conversion

Predicted annual mean NO_x concentrations were converted to NO_2 concentrations using the spreadsheet (version 9.1) provided by DEFRA, which is the method detailed within DEFRA guidance[20].

Verification

The results from a dispersion model may differ from measures concentrations for a large number of reasons, including:

- Estimates of background concentrations;
- Uncertainties in source activity data such as traffic flows and emission factors;
- Variations in meteorological conditions;
- Overall model limitations; and,
- Uncertainties associated with monitoring data, including locations.

Model verification is the process by which these and other uncertainties are investigated and where possible minimised. In reality, the differences between modelled and monitored results are likely to be a combination of all of these aspects.

For the purpose of the assessment, model verification was undertaken for 2023 using traffic data, meteorological data and monitoring results from this year.

Monitoring of NO_2 concentrations was undertaken at one location within the vicinity of roads included within the model during 2023. The result was obtained and the road contribution to total NO_x concentration calculated following the methodology contained within DEFRA guidance[21]. The monitored annual mean NO_2 concentration and calculated road NO_x concentration are summarised in Table A1.2.

Table A1.2 NO_x Verification - Monitoring Result

Monitoring Location		Monitored NO_2 Concentration ($\mu g/m^3$)	Calculated Road NO_x Concentration ($\mu g/m^3$)
SH6	Boston Road A17	24.30	37.09

The annual mean road NO_x concentration predicted from the dispersion model and the 2023 road NO_x concentration calculated from the monitoring result are summarised in Table A1.3.

Table A1.3 NO_x Verification - Modelling Result

Monitoring Location		Calculated Road NO_x Concentration ($\mu g/m^3$)	Modelled Road NO_x Concentration ($\mu g/m^3$)
SH6	Boston Road A17	37.09	18.55

The monitored and modelled road NO_x concentrations were compared to calculate the associated ratio. This indicated that a verification factor of 1.9993 was required to be applied to all modelling results.

[20] Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.
[21] Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

Monitoring of PM_{10} and $PM_{2.5}$ concentrations is not undertaken within the assessment extents. The NO_x verification factor was therefore used to adjust model predictions of these species in lieu of more accurate data in accordance with DEFRA guidance[22].

[22] Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.