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ENVIRONMENT

FIRETHORN DEVELOPMENTS LTD

LINK LOGISTICS PARK, ELLESMERE PORT

Air Quality Assessment

MCP2412

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Notice

EXECUTIVE SUMMARY

BWB Consulting Limited was appointed by Firethorn Developments Ltd to undertake an air quality assessment for a proposed commercial development on North Road, Ellesmere Port.

The proposed development Site is located within the administrative area of Cheshire West and Chester Council and lies adjacent to North Road. The Site is not located within an existing Air Quality Management Area. The closest Air Quality Management Area is located on Whitby Road in Ellesmere Port, 1.5km south of the development. This Air Quality Management Area was designated for the potential exceedance of the annual mean nitrogen dioxide (NO_2) air quality objective.

A qualitative construction phase dust assessment was undertaken in accordance with Institute of Air Quality Management guidance and measures were recommended for inclusion in a Dust Management Plan to minimise emissions during construction activities. With the implementation of these mitigation measures the impact of construction phase dust emissions was considered to be 'not significant' in accordance with Institute of Air Quality Management guidance.

A detailed road traffic emissions assessment was undertaken to consider the impact of development-generated road traffic on local air quality at identified existing receptor locations. Road traffic emissions were modelled using the dispersion model ADMS-Roads and concentrations of nitrogen dioxide and particulate matter (PM_{10} and $PM_{2.5}$) were predicted at identified sensitive receptor locations. The modelling assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance and Institute of Air Quality Management & Environmental Protection UK. The development was not predicted to result in any new exceedances of the relevant air quality objectives and the impact of the development on local air quality was predicted to be 'negligible' overall in accordance with guidance.

Consideration of designated ecological sites was scoped out of the detailed road traffic emissions impact assessment in accordance with relevant guidance and following consultant with the appointed project ecologist.

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1. INTRODUCTION

Appointment & Background

1.1 BWB Consulting Limited was appointed by Firethorn Developments Ltd to undertake an air quality assessment for a proposed commercial development on North Road in Ellesmere Port ('the Site').

1.2 The assessment considers construction phase dust impacts and operational phase road traffic emissions. A qualitative construction phase dust assessment was undertaken in accordance with relevant guidance. A detailed road traffic emissions assessment was undertaken to consider the impact of development-generated road traffic on local air quality at identified receptor locations.

1.3 This report is necessarily technical in nature, so to assist the reader, a glossary of air quality terminology can be found in **Appendix A.**

Site Setting

1.4 The Site is located off North Road and is located within the administrative area of Cheshire West and Chester Council (CWCC). **Figure 1.1** details the location of the proposed development. The Site currently comprises hardstanding.

1.5 The Site is bound to the north by the Manchester Ship Canal with the Mersey Estuary beyond. To the east and west of the Site lie existing commercial and industrial uses. To the south of the Site lie existing commercial uses with the M53 motorway, existing commercial uses and residential dwellings beyond.

1.6 Principal air pollution sources in the vicinity of the proposed development are likely to comprise road traffic emissions. The Site is not located within an existing Air Quality Management Area (AQMA). The closest AQMA to the Site is located on Whitby Road in Ellesmere Port, 1.5km south of the development and was designated for the potential exceedance of the annual mean air quality objective for nitrogen dioxide (NO_2).

Proposed Development

1.7 The proposed development seeks Prior Approval for the erection of 3no. storage and distribution units/general industrial with ancillary offices, associated parking, service yards, landscaping and ancillary structures, and new access from North Road. The proposed development masterplan is detailed in **Appendix B**.

Figure 1.1: Site Location

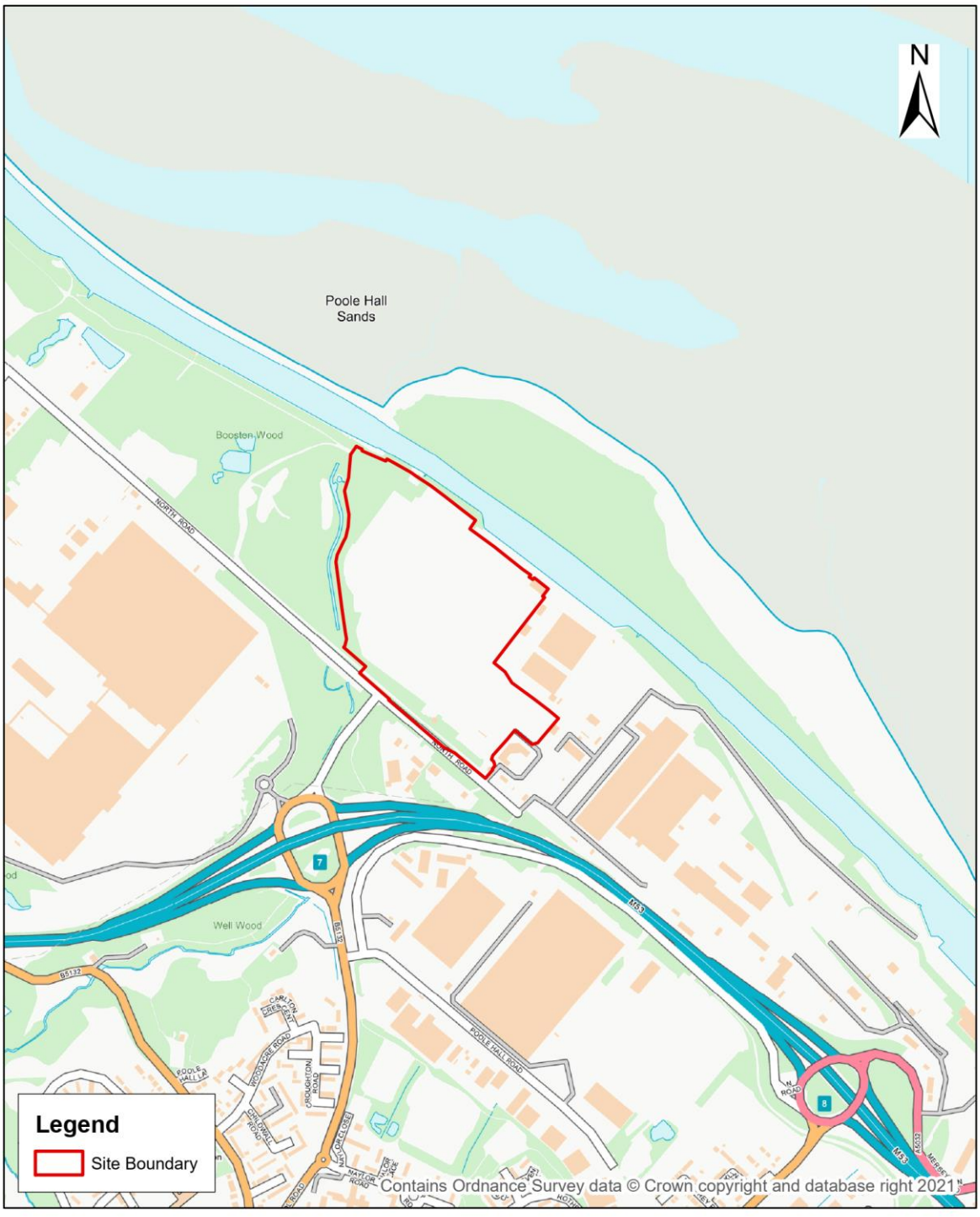

Figure 1.1: Site Location

Drawn by: JH
Date: 10/02/2021

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2. LEGISLATION, PLANNING POLICY & GUIDANCE

National Legislation and Planning Policy

The UK Air Quality Strategy

2.1 European Union (EU) legislation forms the basis of air quality policy and legislation in the UK. The EU 2008 ambient Air Quality Directive[1] sets limits for ambient concentrations of air pollutants including nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$). The air quality standards and objectives are prescribed through the Air Quality (England) Regulations 2000[2], as amended, for the purpose of the Local Air Quality Management Framework.

2.2 The UK Government are required under the Environment Act 1995[3] to produce a national Air Quality Strategy (AQS). The AQS was first published in 1997[4] and was most recently reviewed and updated in 2007[5]. The AQS provides an overview of the Government's ambient air quality policy and sets out the air quality standards and objectives to be achieved and measures to improve air quality.

2.3 Part IV of the Environment Act[3] requires local authorities in the UK to review local air quality within their administrative area and, if relevant air quality standards and objectives are likely to be exceeded, designate Air Quality Management Areas (AQMAs). Following the designation of an AQMA, local authorities are required to publish an Air Quality Action Plan (AQAP) detailing measures to be taken to improve local air quality and work towards meeting the relevant air quality standards and objectives.

National Planning Policy Framework

2.4 The National Planning Policy Framework (NPPF)[6] was amended in February 2019 and sets out the Government's planning policies for England and how these are expected to be applied.

2.5 With regard to assessing cumulative effects the NPPF[6] states:

> *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.*
>
> *[…]"*

2.6 The NPPF[6] recognises air quality within Section 15: Conserving and enhancing the natural environment, and states that:

[1] European Parliament (2008) Council Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe
[2] HMSO (2000) Statutory Instrument 2000 No. 928, The Air Quality (England) Regulations 2000 (as amended), London: HMSO
[3] HMSO (1995) The Environment Act 1995, London: TSO
[4] Department of the Environment (DoE) (1997) The UK National Air Quality Strategy, London: HMSO
[5] Department of the Environment, Food and Rural Affairs (Defra) (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, London: HMSO
[6] Ministry of Housing, Communities & Local Government (2019) National Planning Policy Framework, HMSO London

"Planning policies and decisions should contribute to and enhance the natural and local environment 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 policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.

[…]

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."

Planning Practice Guidance

2.7 The Planning Practice Guidance (PPG) for air quality[7] was updated in November 2019 and provides guiding principles on how the planning process can take account of the impacts of new development on air quality.

2.8 The PPG[7] sets out the following with regard to air quality and planning:

- *"What air quality considerations does planning need to address;*
- *What is the role of plan-making with regard to air quality;*
- *Air quality concerns relevant to neighbourhood planning;*
- *What information is available about air quality;*

[7] Department for Communities and Local Government (2019) Planning Practice Guidance Air Quality

- *When could air quality considerations be relevant to the development management process;*
- *What specific issues may need to be considered when assessing air quality impacts;*
- *How detailed does an air quality assessment need to be; and*
- *How can an impact on air quality be mitigated".*

2.9 The PPG[7] sets out the pollutants for which there are legally binding limits for concentrations and those which the UK also has national emissions reduction commitments.

2.10 The PPG[7] states that development plans may need to consider:

- *"what are the observed trends shown by recent air quality monitoring data and what would happen to these trends in light of proposed development and / or allocations;*
- *the impact of point sources of air pollution (pollution that originates from one place);*
- *the potential cumulative impact of a number of smaller developments on air quality as well as the effect of more substantial developments, including their implications for vehicle emissions;*
- *ways in which new development could be made appropriate in locations where air quality is or is likely to be a concern, and not give rise to unacceptable risks from pollution. This could, for example, entail identifying measures for offsetting the impact on air quality arising from new development including supporting measures in an air quality action plan or low emissions strategy where applicable; and*
- *opportunities to improve air quality or mitigate impacts, such as through traffic and travel management and green infrastructure provision and enhancement".*

2.11 The PPG[7] also states what may be considered relevant to determining a planning application and these include whether a development would:

- *"Lead to changes (including any potential reductions) in vehicle-related emissions in the immediate vicinity of the proposed development or further afield. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speeds or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; could add to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;*
- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass-fuelled*

Combined Heat and Power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area; or extraction systems (including chimneys) which require approval or permits under pollution control legislation;

- *Expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;*
- *Give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations;*
- *Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value".*

2.12 The PPG[7] provides guidance regarding what should be included within an air quality assessment. Examples of potential air quality mitigation measures are also provided.

Local Planning Policy

Cheshire West and Chester Council Local Plan (Part One) Strategic Policies

2.13 The CWCC Local Plan (Part One)[8] is part of the strategic plan for the borough and was adopted in January 2015. Part One of the Local Plan includes the strategic objectives for the borough and the framework for new development. The following policies relate to air quality:

"Policy SOC 5 Health and well-being

[…]

Development that gives rise to significant adverse impacts on health and quality of life (e.g. soil, noise, water, air or light pollution, and land instability, etc) including residential amenity, will not be allowed."

Cheshire West and Chester Council Local Plan (Part Two) Land Allocations and Detailed Policies

2.14 The CWCC Local Plan (Part Two) Land Allocations and Detailed Policies[9] document was adopted in 2019. It provides further detailed policies and land allocations to support the strategic objectives in the Local Plan (Part One)[8]. The following policies relate to air quality:

"Policy EP 1

Within the defined settlement boundary of Ellesmere Port as identified on the policies map, development proposals will be supported which are in line with the relevant development plan policies and are consistent with the following principles, where relevant, aimed at delivering the Local Plan (Part One) policy STRAT 4:

[8] Cheshire West and Chester Council (2015) Local Plan (Part One) Strategic Policies
[9] Cheshire West and Chester Council (2019) Local Plan (Part Two) Land Allocations and Detailed Policies

[…]

7. do not give rise to significant adverse impact on air quality in line with Local Plan (Part Two) policy DM 31.

Policy DM 2 Impact on residential amenity

In line with Local Plan (Part One) policy SOC 5, all proposals for new development will be expected to safeguard the quality of life for residents within the development and those living nearby. Development will only be supported where it does not result in a significant adverse impact upon the residential amenity of the occupiers of existing properties or future occupiers of the proposed development, including:

- *Outlook*
- *Privacy*
- *Light*
- *Noise*
- *Odour*

In respect of light, regard will be had to loss of sunlight and daylight, and to the impact of artificial light.

Policy DM 31 – Air Quality

In line with Local Plan (Part One) policy SOC 5, development must not give rise to significant adverse impacts on health and quality of life, from air pollution. In particular, development proposals within or adjacent to an Air Quality Management Area will be expected to be designed to mitigate the impact of poor air quality on future occupiers.

An air quality assessment will be required for development proposals that have the potential for significant air quality impacts, including those which:

1. are classed as major development and have the potential, either individually or cumulatively, for significant emissions; or

2. are likely to result in an increase in pollution levels in an Air Quality Management Area (AQMA); or

3. are likely to expose people to existing sources of air pollutants.

Where an air quality assessment identifies an unacceptable impact on or from air quality, an appropriate scheme of mitigation must be submitted, which may take the form of on-site measures or, where appropriate, a financial contribution to off-site measures.

Applicants must demonstrate that appropriate mitigation will be provided to ensure that the new development is appropriate for its location and unacceptable risks are avoided.

Development that is likely to produce an odour should demonstrate that there is no negative impact on residential amenity, in line with Local Plan (Part One) policy SOC 5 and Local Plan (Part Two) policy DM 2."

2.15 The above policies were taken into consideration throughout the undertaking of the assessment.

Air Quality Assessment Guidance

2.16 The following guidance was utilised in the air quality assessment:

- Defra, Local Air Quality Management Technical Guidance (LAQM.TG(16)) (2018)[10];
- Institute of Air Quality Management, Guidance on the assessment of dust from demolition and construction (2014)[11];
- Institute of Air Quality Management and Environmental Protection UK, Land-Use Planning and Development Control: Planning for Air Quality (2017)[12]; and
- Highways England (2019), Design Manual for Roads and Bridges LA 105 Air Quality (2019)[13].

[10] Defra (2018) Local Air Quality Management Technical Guidance LAQM.TG(16)
[11] Institute of Air Quality Management (2014) Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London
[12] Institute of Air Quality Management and Environmental Protection UK (2017) Land-Use Planning and Development Control: Planning for Air Quality
[13] Highways England, (2019), Design Manual for Roads and Bridges LA 105 Air Quality

3. METHODOLOGY

Consultation with Cheshire West and Chester Council

3.1 Consultation was undertaken with the Environmental Protection Department at CWCC, in which the proposed assessment methodology was provided via email and a response was received on 02/02/2021[14].

3.2 It was requested by CWCC that the Local Plan (Part Two)[9] policy DM13 be considered within the assessment.

3.3 The agreed assessment methodology is detailed below:

- Construction Phase – A construction phase assessment was undertaken and relevant measures to mitigate construction phase dust emissions were recommended. The assessment was undertaken in accordance with guidance provided by the Institute of Air Quality Management (IAQM)[11].
- Operational Phase – A detailed operational phase road traffic emissions assessment was undertaken to consider the impact of development-generated traffic on local air quality and predict pollutant concentrations at the proposed development Site. The dispersion model ADMS-Roads was used to model concentrations of oxides of nitrogen (NOx) and particulate matter (PM_{10} and $PM_{2.5}$) at identified existing receptor locations for both without and with development scenarios. The change in pollutant concentrations as a result of development-generated traffic was then calculated. The assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance (LAQM.TG16)[10] and Institute of Air Quality Management and Environmental Protection UK (EPUK)[12].
- Ecological Receptors – The Mersey Estuary and Rivacre Valley Local Nature Reserve are within the vicinity of the Site. The Mersey Estuary was not considered within the air quality assessment as it is not within 200m of an affected road network in accordance with the Design Manual for Roads and Bridges (DMRB) guidance[13]. Following discussion with the project ecologist, the Rivacre Valley Local Nature Reserve was not considered further as it was not requested by Natural England nor the CWCC Ecologist. No consideration of ecological receptors was therefore undertaken within this assessment.

3.4 Full details of the methodology used in the assessment as agreed with CWCC are provided below.

Construction Phase Assessment

3.5 An assessment of the potential impacts arising from the construction of the proposed development was undertaken in accordance with IAQM Guidance[11]. The full assessment methodology is not reproduced within this report but a summary of the assessment steps is provided below.

- Step 1 – screen the requirement for a more detailed assessment. No assessment is required if there are no receptors within a certain distance of the works.
- Step 2 – assess the risk of dust impacts separately for each of the four activities considered (demolition, earthworks, construction and trackout).

[14] Consultation request emails issued to Cheshire West and Chester Council Environmental Protection Department on 26/01/2021.

- Step 2A – determine the potential dust emission magnitude for each of the four activities;
- Step 2B – determine the sensitivity of the area;
- Step 2C – determine the risk of dust impacts by combining the findings of steps 2A and 2B.

- Step 3 – determine the site-specific mitigation for each of the four activities; and
- Step 4 – examine the residual effects and determine significance.

Road Traffic Emissions – Air Dispersion Modelling

3.6 The air dispersion model ADMS-Roads, version 5.0.0.1 was utilised in the assessment to predict concentrations of NOx, PM_{10} and $PM_{2.5}$ at existing receptor locations.

3.7 The assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance[10] and Institute of Air Quality Management and Environmental Protection UK guidance[12].

Assessment Scenarios and Traffic Data

3.8 The following scenarios were considered in the air dispersion modelling:

- Scenario 1: 2019 Verification Year;
- Scenario 2: 2021 Base Year;
- Scenario 3: 2022 Opening Year without development; and
- Scenario 4: 2022 Opening Year with development.

3.9 Traffic data were obtained from Hydrock, the Transport Consultants for the project. 24-hour Annual Average Daily Traffic Data (AADT) and Heavy Duty Vehicle (HDV) proportions were provided for the following roads for use in the assessment:

- M53 motorway including slip roads at junction 7;
- B5132 Netherpool Road; and
- North Road.

3.10 In addition, traffic data for the M53 motorway, between junctions 9 and 10, and A5032 Station Road were obtained from the Department for Transport[15] for use in the verification of the ADMS-Roads model.

3.11 Consideration was given to the speeds at which vehicles are likely to travel within the study area. Free-flowing traffic conditions were modelled at speed limits. The A5032 Whitby Road was modelled at 25mph to account for congestion and parked cars along this road. Queuing sections, including the junction of the M53 motorway and B5132 Netherpool Road were modelled in accordance with Defra guidance[10].

3.12 Sections of the M53 motorway were modelled at height, to account for elevation of the M53 motorway at junctions. Sections of the M53 elevated above junctions were modelled at 5m, the minimum height of road bridges. Intermediate sections were

[15] Department for Transport, traffic counts website https://roadtraffic.dft.gov.uk/ [accessed February 2021]

modelled at 3m to account for the changes in elevation approaching elevated sections.

3.13 Within the Ellesmere Port Air Quality Action Plan[16], A5032 Whitby Road was identified as a street canyon. Therefore within the assessment, A5032 Whitby Road was modelled as a street canyon to account for the narrow road and limited dispersion in this area. The height of the canyon was modelled at 9m to represent the height of the three storey buildings on the eastern side of the street canyon.

3.14 Traffic data used in the air dispersion modelling are provided in **Appendix C.** The road network utilised in dispersion modelling is illustrated in **Figure C1** within **Appendix C.**

ADMS-Roads Model Inputs

3.15 The following model inputs were utilised in the assessment:

- Emission Factors – emission factors were utilised from the Defra Emission Factor Toolkit[17], version 10.1, for the years of assessment (2019, 2021 and 2022).
- Conversion of oxides of nitrogen – concentrations of NOx were predicted using the ADMS-Roads dispersion model. These concentrations were converted to nitrogen dioxide (NO_2) using the Defra NOx to NO_2 calculator[18], version 8.1.
- Meteorological Data – hourly sequential meteorological data for the base year of assessment (2019) were obtained for the Liverpool recording station. This is the closest, most representative recording station to the proposed development Site. The wind rose for 2019 is provided in **Appendix D**.
- Surface roughness and Monin-Obukhov length (MO) – a surface roughness of 0.5 and an MO length of 30 was utilised in the dispersion model. These are representative of the urban conditions of the study area and its proximity to the Mersey Estuary.
- Background pollutant concentrations – background concentrations of NO_2, PM_{10} and $PM_{2.5}$ for the study area were obtained from the pollutant concentrations maps[19] provided by Defra as a 1km x 1km grid of the UK, for the years of assessment (2019, 2021 and 2022).
- Model verification – model verification was undertaken using CWCC monitoring data available for the study area. Full details of the verification procedure are provided in **Appendix E** and an illustration of the model verification locations is provided in **Figure E1** within **Appendix E.**
- Calculation of short term PM_{10} concentrations – the following calculation, as detailed in Defra guidance[10], was utilised to calculate the number of exceedance of the 24-hour mean PM_{10} air quality objective:

  Number of 24-Hour Mean Exceedance = -18.5 + 0.00145 * Annual Mean^3 + (206 / Annual Mean)

- The IAQM released a position statement in July 2018[20] regarding dealing with the uncertainty in vehicle NOx emissions within air quality assessments. This recommends that sensitivity analyses be undertaken and professional judgement be applied to consider the scenario where NOx emissions do not reduce as rapidly as shown by the EFT. Defra released new versions of the air quality assessment tools in August 2020,

[16] Ellesmere Port and Neston Borough Council (2007) Air Quality Action Plan, 2007
[17] Defra (2020) Emission Factor Toolkit [https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html]
[18] Defra (2020) NOx to NO_2 Calculator [https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc]
[19] Defra (2020) background pollutant concentration maps [https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018]
[20] Institute of Air Quality Management (2018) Position Statement: Dealing with Uncertainty in Vehicle NOx Emissions within Air Quality Assessments, Version 1.1

including updated versions of the background concentration maps, Emission Factor Toolkit and NOx to NO_2 Calculator. At the time of writing the IAQM had not released a revised position statement. As such, and to provide a conservative assessment, a sensitivity analysis was undertaken and emission factors, NOx to NO_2 calculator inputs and background concentrations were kept at base year (2021) levels. Details of the sensitivity analysis are provided in **Appendix F**.

Consideration of Ecological Receptors

3.16 The Mersey Estuary is located 50m north west of the Site and is designated as a Site of Special Scientific Interest (SSSI), Ramsar site and Special Protection Area (SPA). In addition, the Rivacre Valley Local Nature Reserve (LNR) is located 480m south west of the Site. The DMRB guidance[13] was utilised to consider the need to assess ecological receptors.

3.17 In accordance with DMRB guidance[13], where an ecological designation is located within 200m of an affected road, an assessment of the impact of development-generated road traffic is required. The affected road criteria detailed below was utilised to consider the need to undertake an assessment of ecological receptors.

3.18 DMRB guidance[13] defines the affected road network where:

- The change in AADT flow is 1000 or greater; or
- The change in HDV flow is 200 of greater; or
- There is a change in speed band; or
- There is a change in carriageway alignment by 5m.

Limitations and Assumptions

3.19 There are uncertainties associated with both measured and predicted concentrations. The model (ADMS-Roads) used in this assessment relies on input data, which are also subject to uncertainty. The model itself simplifies complex physical systems into a range of algorithms. In addition, local micro-climatic conditions may affect the concentrations of pollutants that ADMS-Roads model will not take into account.

3.20 To reduce the uncertainty associated with predicted pollutant concentrations, model verification was carried out following guidance set out in Defra guidance[10]. Monitoring locations within the study area were not considered representative of some receptors considered in the assessment due to the presence of monitoring within a street canyon, and set away from the M53 motorway which is a significant emission source in the study area. As there are no other monitoring locations within Ellesmere Port, these locations were utilised within model verification as agreed during consultation with CWCC. With the use of local monitoring data and the model adjusted accordingly during model verification, there can be reasonable confidence in the predicted concentrations.

Assessment Criteria

3.21 Predicted pollutant concentrations were compared to the relevant air quality objectives. The current relevant air quality standards and objectives are detailed in **Table 3.1.**

Table 3.1: Air Quality Standards and Objectives (England)

Pollutant	Averaging Period	Air Quality Objective (µg.m^{-3})	Date to Achieve by
NO_2	Annual Mean	40	31 December 2005
	1-hour mean not to be exceeded more than 18 times per year	200	31 December 2005
PM_{10}	Annual Mean	40	31 December 2004
	24-hour mean not to be exceeded more than 35 times per year	50	31 December 2004
$PM_{2.5}$	Annual mean target (15% cut in annual mean (urban background exposure)	25	2010 - 2020

3.22 Guidance is provided by the Institute of Air Quality Management and Environmental Protection UK[12] to determine the significance of the impact of development-generated road traffic emissions on local air quality. The impact descriptors at receptor locations are detailed in **Table 3.2.** These impact descriptors consider the predicted magnitude of change in pollutant concentrations and the concentration in relation to the relevant air quality objectives.

Table 3.2: Impact Descriptors for Individual Receptors

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

Note: Figures rounded up to the nearest whole number, therefore any value less than 1% after rounding (effectively less than 0.5%) will be described as negligible.

4. BASELINE CONDITIONS

Local Air Quality Management

4.1 The proposed development is not located within an existing AQMA designation. The closest AQMA to the Site is located on Station Road in Ellesmere Port, 1.6km south east. This AQMA was designated by CWCC for the potential exceedance of the annual mean NO_2 air quality objective.

Local Air Quality Monitoring

Nitrogen Dioxide (NO_2)

4.2 CWCC undertakes monitoring within its administrative boundary using a network of automatic monitoring locations and diffusion tubes. The closest monitoring locations to the proposed development Site are located 2km south east of the Site on Station Road and Whitby Road in Ellesmere Port. There are no other monitoring locations within Ellesmere Port.

4.3 Bias adjusted NO_2 monitoring results, for the locations in the vicinity of the proposed development Site, are detailed in **Table 4.1.**

Table 4.1: CWCC NO_2 Monitoring Data in 2015 – 2019

Location	Grid Reference		Monitoring Site Type	Monitored Annual Average Concentration ($\mu g.m^{-3}$)				
				2015	2016	2017	2018	2019
Station Road (Ellesmere Port) (SR)	340435	376790	Roadside	35.7	36.5	34.3	33.8	31.0
Newsagent Station Road (NS)	340406	376724	Roadside	35.9	36.2	35.0	38.0	-
Whitby Road Automatic Analyser (WH)	340197	376363	Roadside	**40.0**	**40.0**	36.0	37.0	35.0
Whitby Road (WH)	340197	376363	Roadside	34.7	34.4	32.3	35.7	31.4
Richfield Recruitment (RR)	340180	376338	Roadside	39.1	39.9	36.8	36.5	35.2

4.4 Monitored concentrations in Ellesmere Port were below the annual mean air quality objective for NO_2 of 40$\mu g.m^{-3}$ at all monitoring locations between 2017 and 2019. Monitored concentrations of NO_2 show a decreasing trend across the most recent five years of data. The monitoring locations detailed in **Table 4.1** are the closest locations to the study area.

4.5 The monitoring locations detailed in **Table 4.1** are considered to be representative of the existing receptors modelled on Station Road within the Ellesmere Port AQMA. The monitoring locations are situated within a street canyon, as identified in the Ellesmere Port Air Quality Action Plan[16], and therefore pollutant dispersion will be influenced by

the proximity of tall buildings relative to the width of the road. Whilst the monitoring locations in **Table 4.1** are considered to be representative of conditions in the AQMA, where receptors R12 – R14 are located, they are not considered representative of conditions within the wider study area. This is due to the proximity of existing receptors, within the study area, to the M53 which is considered to be a primary source of road traffic emissions for the majority of the study area.

4.6 The monitoring locations detailed in **Table 4.1** were utilised within the model verification which is detailed in **Appendix E**. The exception to this is the Station Road (SR) monitoring location, as this location is situated opposite a petrol filling station and the localised effects of the traffic movements at this location could not be accounted for in the model.

4.7 The use of the AQMA monitoring locations within the model verification was agreed with CWCC, in the absence of representative monitoring data for the wider study area.

Particulate Matter (PM_{10} and $PM_{2.5}$)

4.8 CWCC do not undertake PM_{10} or $PM_{2.5}$ monitoring within Ellesmere Port.

Background Pollutant Concentrations

4.9 No background air quality monitoring is undertaken by CWCC within the study area. Background pollutant concentrations were therefore obtained from the latest Defra background concentration maps[19], which are provided for the UK as a 1km x 1km grid network. The latest maps are based on 2018 monitoring and meteorological data. Background concentrations of NO_2, PM_{10} and $PM_{2.5}$ were obtained for the grid squares covering the study area for the years of assessment (2019, 2021 and 2022). The background concentrations used in the assessment are detailed in **Table 4.2.**

Table 4.2: Background Pollutant Concentrations used in the Assessment

Pollutant	Grid Square	Receptors	Concentration (µg.m^{-3})		
			2019	2021	2022
NO_2	338500, 377500	R1 – R3	12.5	11.5	11.1
PM_{10}			11.0	10.6	10.5
$PM_{2.5}$			7.4	7.2	7.1
NO_2	337500, 378500	R4 – R5	19.1	17.6	17.0
PM_{10}			12.9	12.5	12.4
$PM_{2.5}$			8.4	8.2	8.1
NO_2	340500, 377500	R6 – R11	17.1	16.0	15.5

Pollutant	Grid Square	Receptors	Concentration (µg.m^{-3})		
			2019	2021	2022
PM_{10}			11.5	11.1	11.0
$PM_{2.5}$			7.7	7.4	7.4
NO_2	340500, 376500	R12 – R14, monitoring locations WH and RR	16.2	14.9	14.4
PM_{10}			12.2	11.8	11.7
$PM_{2.5}$			8.2	7.9	7.9

4.10 2019, 2021 and 2022 background concentrations are below the relevant annual mean air quality objectives for NO_2, PM_{10} and $PM_{2.5}$.

5. CONSTRUCTION PHASE ASSESSMENT

5.1 The construction phase of the proposed development will involve a number of activities which have the potential to impact on local air quality. These include emissions of dust generated through demolition, excavation, construction, earthworks and trackout activities, exhaust pollutant emissions from construction traffic on the local highways network, and exhaust emissions from non-road mobile machinery (NRMM) within the construction site itself.

5.2 The location of sensitive receptors in relation to construction activities will affect the potential for such construction activities to cause dust soiling, nuisance and local air quality impacts. Meteorological conditions and the use of control measures will also contribute to the effects experienced.

Step 1: Screen the Need for a Detailed Assessment

5.3 Step 1 of the IAQM guidance[11] involves a screening assessment to consider whether a more detailed construction phase dust assessment is required.

5.4 In accordance with the guidance, a detailed assessment is required if:

- Human receptors are located within 350m of the boundary of the site or 50m of routes used by construction vehicles on the public highways, up to 500m from the site entrances; or
- Ecological receptors are located within 50m of the boundary of the site or 50m of routes used by construction vehicles on the public highways, up to 500m from the site entrances.

5.5 From a review of the Multi Agency Geographic Information for the Countryside (MAGIC) website[21], the Mersey Estuary is designated as a SSSI, Ramsar site and SPA and is located within 50m of the proposed development. The Rivacre Valley LNR is within 50m of the routes which may be used by construction vehicles, within 500m of the Site. Human receptors are located within 350m of the Site boundary, with the closest of these receptors located off North Road. A construction phase assessment was therefore undertaken.

Step 2: Assess the Risk of Dust Impacts

Step 2A: Define the Potential Dust Emission Magnitude

5.6 The dust emission magnitudes for the construction activities were defined using the criteria detailed in the IAQM guidance[11]. Demolition is not proposed as part of the development and therefore wasn't considered further in the assessment. The criteria and the dust emission magnitude defined for the proposed development are detailed in **Table 5.1**.

[21] Defra, Multi Agency Geographic Information for the Countryside (MAGIC) [http://magic.defra.gov.uk/]

Table 5.1: Dust Emission Magnitude Criteria and Definition

Activity	IAQM Dust Emission Magnitude	IAQM Dust Emission Magnitude Criteria	Project Defined Dust Emission Magnitude
Earthworks	Large	Total site area >10,000m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes.	Large: Total Site area greater than 10,000m^2.
	Medium	Total site area 2,500m^2 – 10,000m^2, moderately dusty soil type (e.g. silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 4m - 8m in height, total material moved 20,000 tonnes – 100,000 tonnes.	
	Small	Total site area <2,500m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height, total material moved <20,000 tonnes, earthworks during wetter months.	
Construction	Large	Total building volume >100,000m^3, on site concrete batching, sandblasting.	Large: Total building volume greater than 100,000m^3.
	Medium	Total building volume 25,000m^3 – 100,000m^3, potentially dusty construction material (e.g. concrete), on site concrete batching.	
	Small	Total building volume <25,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).	
Trackout	Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m.	Medium: 10 – 50 HDV movements anticipated per day.
	Medium	10 - 50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m.	
	Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.	

Step 2B: Define the Sensitivity of the Area

5.7 The sensitivity of the study area takes into account the specific receptors in the vicinity of the Site, the proximity and number of those receptors, the local background concentration of PM_{10} and site-specific factors. **Figure 5.1** was utilised to determine the number of receptors located within the distance bands provided in the IAQM guidance[11] for determining receptor sensitivity. The assessment requires the determination of the sensitivity of the area for the purposes of dust soiling, human health and ecological impacts and these are presented in **Table 5.2**.

5.8 According to Institute of Air Quality Management (IAQM) guidance[11], the main potential impacts on ecological receptors resulting from dust emissions are direct physical effects in the form of *"reduced photosynthesis, respiration and transpiration*

through smothering". Other impacts, such as chemical changes to soil *"are likely to occur only as a result of long-term demolition and construction works"*. Unless species particularly sensitive to these effects are present, ecological receptors are likely to be less sensitive than human receptors. It was advised by the Project Ecologist, E3P that the Mersey Estuary which is designated as a SSSI, a Ramsar site and a SPA, designated for wildfowl and wader birds, is not sensitive to dust deposition and therefore would be classed as low sensitivity.

Table 5.2: Determination of the Sensitivity of the Area

Potential Impact	Justification	Sensitivity		
		Earthworks	Construction	Trackout
Dust Soiling	The closest sensitive receptors to the Site are places of work, which are classed as medium sensitivity receptors in accordance with IAQM guidance[11]. There are 1 - 10 medium sensitive receptors within 20m of the proposed development.	Medium	Medium	Medium
Human Health	The closest sensitive receptors to the Site are places of work which are classes as medium sensitivity receptors in accordance with IAQM guidance[11]. There are 1 – 10 medium sensitive receptors within 20m of the proposed development. The 2021 background concentration of PM_{10} is less than 24µg.m^{-3}.	Low	Low	Low
Ecological Receptors	The Mersey Estuary is within 50m of the Site boundary. The Project Ecologist has advised that this would have a low sensitivity to dust deposition. In addition, the Rivacre LNR is within 50m of roads which may be used by construction vehicles accessing the Site. In accordance with the IAQM guidance[11], the sensitivity of ecological receptors was considered to be low sensitivity.	Low	Low	Low

Figure 5.1: Construction Phase Assessment Dust Distance Buffers

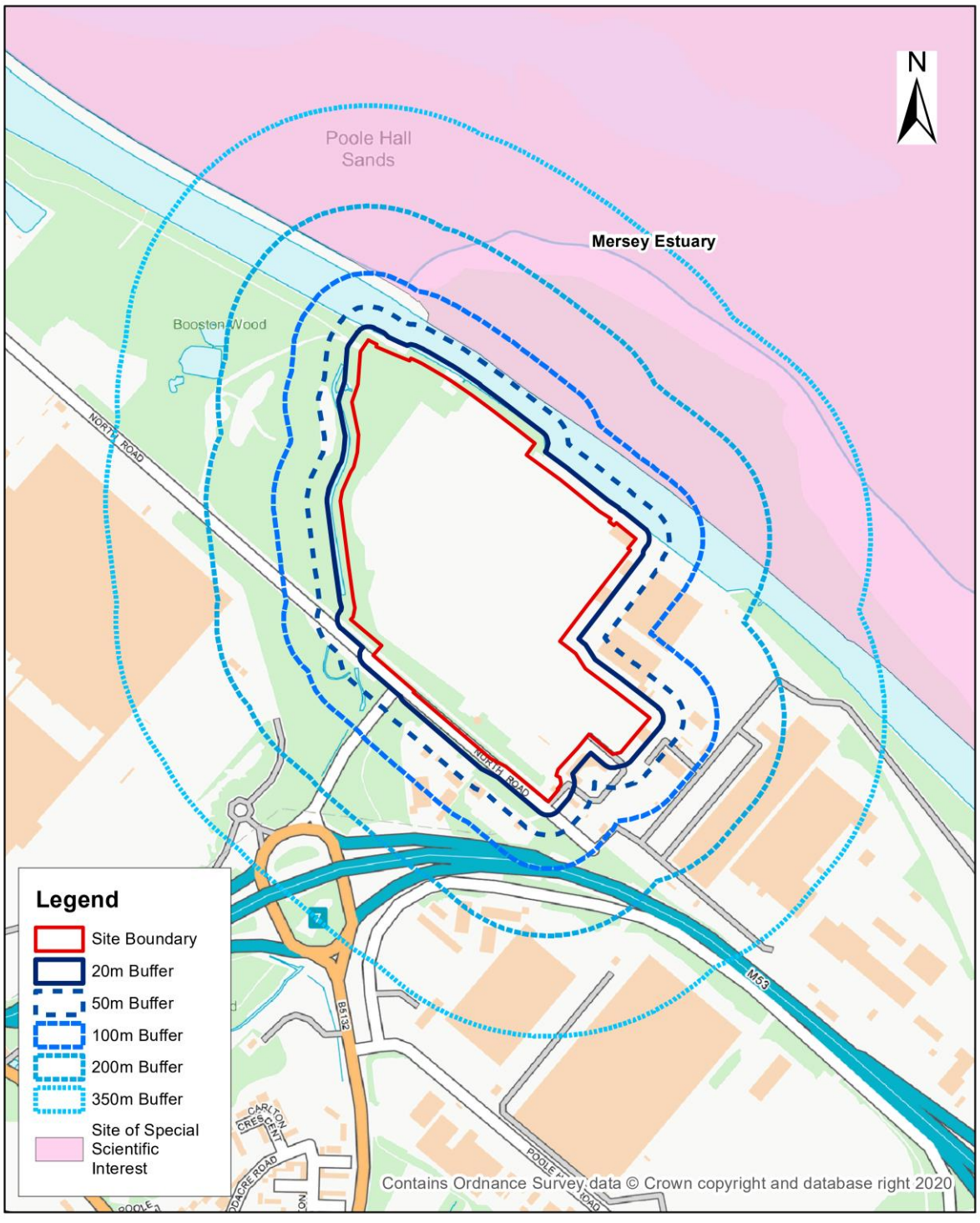

Figure 5.1: Construction Phase Dust Assessment Distance Buffers

Drawn by: JH
Date: 10/02/2021

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Step 2C: Define the Risk of Impacts

5.9 The dust emission magnitude determined in Step 2A is then combined with the sensitivity of the area determined in Step 2B to define the risk of dust impacts with no mitigation applied. The results of this assessment are detailed in **Table 5.3.**

Table 5.3: Summary Dust Risk Table to Define Site Specific Risk

Activity	Step 2A: Dust Emission Magnitude	Step 2B: Sensitivity of the Area	Step 2C: Risk of Dust Impacts
Dust Soiling Effects on People and Property			
Earthworks	Large	Medium	Medium Risk
Construction	Large	Medium	Medium Risk
Trackout	Medium	Medium	Low Risk
Human Health Impacts			
Earthworks	Large	Low	Low Risk
Construction	Large	Low	Low Risk
Trackout	Medium	Low	Low Risk
Ecological Impacts			
Earthworks	Large	Low	Low Risk
Construction	Large	Low	Low Risk
Trackout	Medium	Low	Low Risk

Step 3: Site-Specific Mitigation

5.10 The risk of dust impacts defined in Step 2C is used to determine the measures required to mitigate construction phase dust impacts. The mitigation measures are detailed in **Section 7** of this report.

Step 4: Determine Significant Effects

5.11 In accordance with IAQM guidance[11], with the implementation of the mitigation measures detailed in **Section 7**, the residual impacts from the construction phase are considered to be 'not significant'.

6. OPERATIONAL PHASE ROAD TRAFFIC EMISSIONS ASSESSMENT

Existing Human Receptor Locations

6.1 Existing receptor locations were identified within close proximity of the road links detailed in paragraph 3.9 and considered in the operational phase road traffic emissions assessment. Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at the identified existing receptor locations for the assessment scenarios detailed in paragraph 3.8. Where possible the closest receptors to those road links were considered, as these receptors are likely to experience the greatest change in pollutant concentrations as a result of the proposed development. Receptors heights were modelled at 1.5m.

6.2 The existing receptor locations are detailed in **Table 6.1** and **Figure 6.1.**

6.3 From a review of online mapping, R7 on Elm Street is a residential dwelling which may not currently be inhabited. To provide a conservative assessment this receptor was included within the assessment as it could become habitable in the future.

Table 6.1: Existing Sensitive Receptor Locations

Receptor	Grid Reference		Details
	X	Y	
R1	338700	377825	Residential dwelling on Woodacre Avenue
R2	338687	377669	Residential dwelling on Croughton Road
R3	338710	377588	Residential dwelling on Naylor Close
R4	337406	378315	Lowland Court (Assisted Residence), Bracken Way
R5	337253	378559	Residential dwelling on Rivacre Road
R6	340100	377305	Residential dwelling on Stanley Road
R7	340116	377347	Residential dwelling on Elm Street
R8	340173	377236	Residential dwelling on Stanley Road
R9	340283	377229	Residential dwelling on Dock Street
R10	340482	377084	Residential dwelling on Grosvenor Wharf Road
R11	340557	377040	Residential dwelling on Grosvenor Wharf Road
R12	340468	376878	Residential dwelling on Station Road

Receptor	Grid Reference		Details
	X	Y	
R13	340382	376632	Residential dwelling on Station Road
R14	340425	376763	Residential dwelling on Station Road

Figure 6.1: Existing Receptor Locations

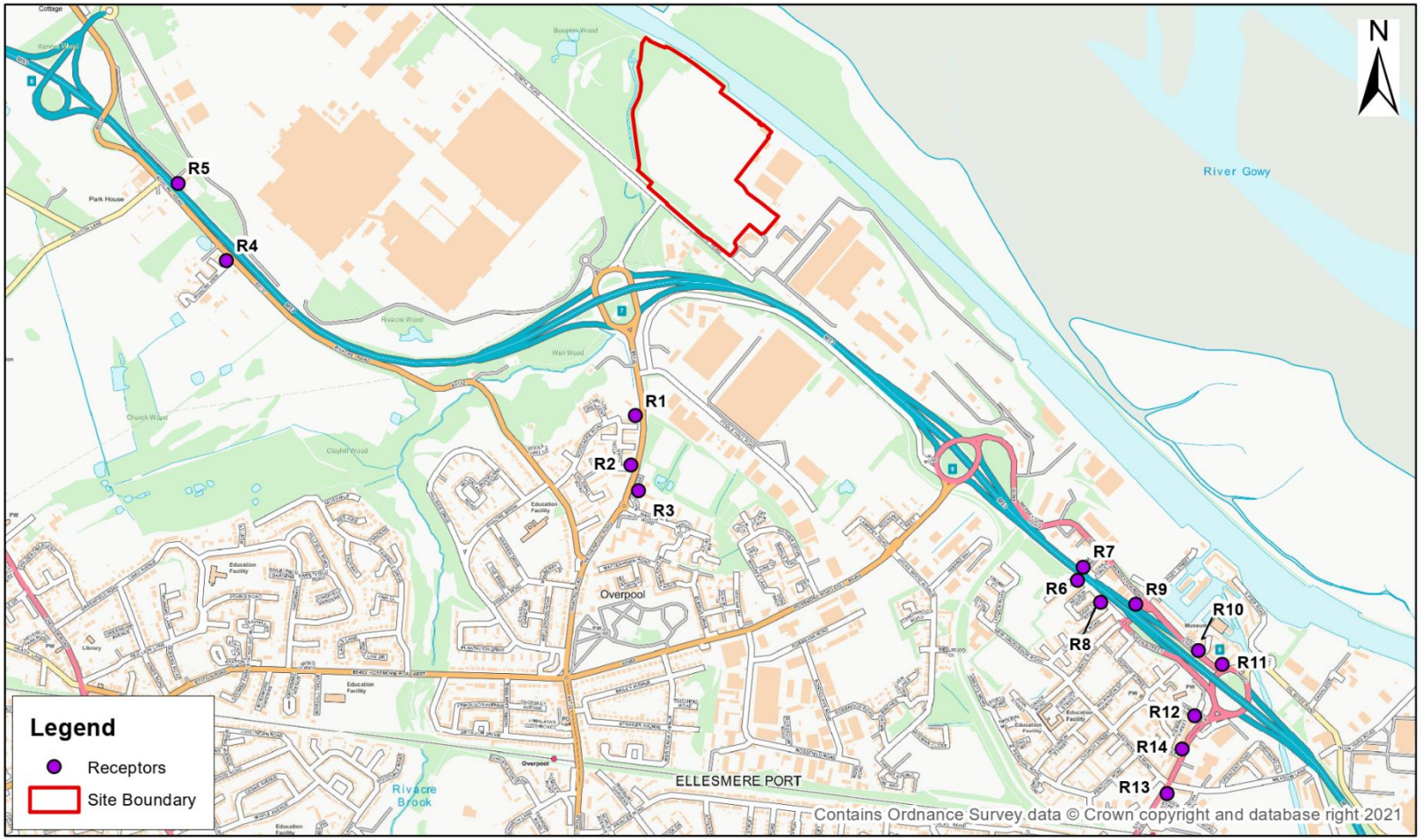

Figure 6.1: Operational Phase Road Traffic Impact Assessment - Existing Receptors

Drawn by: ET
Date: 19/02/2021

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Existing Ecological Receptors

6.4 Mersey Estuary is a designated SSSI, Ramsar site and SPA and located 50m north west from the Site. The Mersey Estuary was designated for the importance of the Estuary for wildfowl and wader birds with large areas of mudflats and intertidal sand. In addition, the Rivacre Valley Local Nature Reserve is approximately 480m south west of the Site.

6.5 DMRB[13] guidance was utilised to consider the need to assess the potential impact of the proposed development on ecological receptors. The Mersey Estuary was not located within 200m of an affected road and therefore in accordance with DMRB[13] guidance, consideration of the impact of the proposed development on the River Mersey ecological designation was not required.

6.6 The Rivacre LNR was identified to lie within 200m of the affected road network however, following discussions with the project ecologist, the Rivacre Valley LNR was not considered further as it was not requested by Natural England or the CWCC Ecologist. No consideration of ecological receptors was therefore undertaken within this assessment.

Baseline Assessment

6.7 Pollutant concentrations were predicted at the identified existing sensitive receptor locations using the dispersion model ADMS-Roads. Predicted pollutant concentrations for Scenario 2: 2021 Base Year and Scenario 3: 2022 Opening Year without development are detailed in **Table 6.2.**

Table 6.2: Predicted Annual Mean Pollutant Concentrations for Scenario 2: 2021 Base Year and Scenario 3: 2022 Opening Year Without Development at Existing Receptor Locations

Receptor	Scenario 2: 2021 Base Year ($\mu g.m^{-3}$)			Scenario 3: 2022 Opening Year Without Development ($\mu g.m^{-3}$)		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
R1	14.1	11.1	7.4	13.6	11.0	7.3
R2	14.1	11.1	7.4	13.6	11.0	7.4
R3	13.7	11.0	7.4	13.3	10.9	7.3
R4	25.6	13.4	8.7	24.3	13.2	8.6
R5	**42.3**	15.3	10.0	39.5	15.2	9.8
R6	34.0	13.1	8.8	32.3	13.0	8.7
R7	**47.4**	14.8	9.9	**44.4**	14.7	9.7
R8	27.4	12.3	8.2	26.4	12.3	8.2

Receptor	Scenario 2: 2021 Base Year (µg.m^{-3})			Scenario 3: 2022 Opening Year Without Development (µg.m^{-3})		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
R9	29.3	12.5	8.4	28.2	12.5	8.3
R10	25.5	12.1	8.1	26.1	12.3	8.2
R11	23.0	11.8	7.9	28.0	13.0	8.6
R12	16.6	12.0	8.1	19.6	12.6	8.4
R13	15.5	11.8	8.0	19.8	12.8	8.5
R14	15.8	11.9	8.0	22.5	13.4	8.9

6.8 The baseline assessment for Scenario 2 and Scenario 3 indicates that predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ are below the respective annual mean air quality objectives at the majority of receptors considered. There are exceedances of the annual mean NO_2 objective at R5 and R7 in Scenario 2 and at R7 in Scenario 3. These receptors are adjacent to the M53 motorway which experiences a high daily traffic volume as part of the strategic road network. R7 is a residential dwelling which may not be inhabited currently and the inclusion of this receptor within the assessment is considered to be conservative as it could become habitable in the future.

6.9 With regard to short term air quality objectives for NO_2 and PM_{10}, the predicted annual mean NO_2 concentrations are less than 60µg.m^{-3} and therefore in accordance with Defra guidance[10] it may be assumed that exceedance of the 1-hour mean objective is unlikely. The calculation detailed in paragraph 3.15 was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

Impact Assessment

Detailed Operational Phase Road Traffic Emissions Assessment

6.10 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at identified existing receptor locations for Scenario 4: 2022 Opening Year with development, to consider the impact of development-generated vehicles on local air quality.

6.11 Predicted pollutant concentrations are detailed in **Tables 6.3**, **6.4** and **6.5** for NO_2, PM_{10} and $PM_{2.5}$ respectively together with Scenario 3: 2022 Opening Year without development concentrations for comparison purposes. The predicted change in pollutant concentrations resulting from development-generated traffic, and the associated impact are also provided. Exceedances of the relevant annual mean air quality objective are shown in bold.

Table 6.3: Predicted Annual Mean NO_2 Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted NO_2 Concentration ($\mu g.m^{-3}$)			Impact
	Scenario 3: 2022 Without Development	Scenario 4: 2022 With Development	Change*	
R1	13.6	13.7	+0.1	Negligible
R2	13.6	13.6	+0.1	Negligible
R3	13.3	13.3	+0.1	Negligible
R4	24.3	24.4	+0.1	Negligible
R5	39.5	39.7	+0.3	Slight Adverse
R6	32.3	32.4	+0.1	Negligible
R7	**44.4**	**44.6**	+0.2	Negligible
R8	26.4	26.5	+0.1	Negligible
R9	28.2	28.3	+0.1	Negligible
R10	26.1	26.1	+0.1	Negligible
R11	28.0	28.1	+0.1	Negligible
R12	19.6	19.7	0.0	Negligible
R13	19.8	19.8	0.0	Negligible
R14	22.5	22.5	0.0	Negligible

** Discrepancies in changes due to rounding effects*

Table 6.4: Predicted Annual Mean PM_{10} Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted PM_{10} Concentration ($\mu g.m^{-3}$)			Impact
	Scenario 3: 2022 Without Development	Scenario 4: 2022 With Development	Change*	
R1	11.0	11.0	0.0	Negligible
R2	11.0	11.0	0.0	Negligible
R3	10.9	11.0	0.0	Negligible
R4	13.2	13.3	0.0	Negligible
R5	15.2	15.2	+0.1	Negligible
R6	13.0	13.0	0.0	Negligible
R7	14.7	14.7	+0.1	Negligible
R8	12.3	12.3	0.0	Negligible
R9	12.5	12.5	0.0	Negligible
R10	12.3	12.3	0.0	Negligible
R11	13.0	13.0	0.0	Negligible
R12	12.6	12.6	0.0	Negligible
R13	12.8	12.8	0.0	Negligible
R14	13.4	13.4	0.0	Negligible

** Discrepancies in changes due to rounding effects*

Table 6.5: Predicted Annual Mean $PM_{2.5}$ Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted $PM_{2.5}$ Concentration ($\mu g.m^{-3}$)			Impact
	Scenario 3: 2022 Without Development	Scenario 4: 2022 With Development	Change*	
R1	7.3	7.4	0.0	Negligible
R2	7.4	7.4	0.0	Negligible

Receptor	Predicted $PM_{2.5}$ Concentration ($\mu g.m^{-3}$)			Impact
	Scenario 3: 2022 Without Development	Scenario 4: 2022 With Development	Change*	
R3	7.3	7.3	0.0	Negligible
R4	8.6	8.6	0.0	Negligible
R5	9.8	9.9	0.0	Negligible
R6	8.7	8.7	0.0	Negligible
R7	9.7	9.8	0.0	Negligible
R8	8.2	8.2	0.0	Negligible
R9	8.3	8.3	0.0	Negligible
R10	8.2	8.2	0.0	Negligible
R11	8.6	8.6	0.0	Negligible
R12	8.4	8.4	0.0	Negligible
R13	8.5	8.5	0.0	Negligible
R14	8.9	8.9	0.0	Negligible

** Discrepancies in changes due to rounding effects*

6.12 The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for Scenario 3: 2022 Opening Year without development and Scenario 4: 2022 Opening Year with development are below the relevant annual mean air quality objectives for the majority of receptors with the exception of annual mean NO_2 concentrations at receptor R7. R7 is situated in close proximity to the M53 motorway which experiences a high daily traffic flow and therefore elevated concentrations are anticipated. From a review of online mapping R7 is currently uninhabited and therefore the inclusion of this receptor within the assessment is considered to be conservative.

6.13 The proposed development does not lead to any additional exceedances of the annual mean air quality objectives.

6.14 Predicted changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations are less than 0.5% of the relevant annual mean air quality objectives and therefore considered to be negligible in accordance with IAQM and EPUK guidance[12] with the exception of receptor R5. The predicted change at R5 is 1% of the annual mean NO_2 objective and the total annual mean NO_2 concentration is 99% of the annual mean NO_2 objective. The impact of the proposed development at R5 was therefore considered to be slight adverse in accordance with the IAQM and EPUK guidance[12].

6.15 With regard to short term air quality objectives for NO_2 and PM_{10}, the predicted annual mean NO_2 concentrations are less than 60µg.m^{-3} and therefore in accordance with Defra guidance[10] it may be assumed that exceedance of the 1-hour mean objective is unlikely. The calculation detailed in paragraph 3.15 was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

Impact Significance Summary

6.16 Relevant guidance and legislation and professional judgement was utilised to determine the significance of the air quality assessment. The air quality assessment was supervised by a full member of the Institute of Air Quality Management. A summary of the impact significance and justification of this are provided below.

6.17 The impact of the proposed development on air quality is considered to be 'negligible':

- Consideration was given to local planning policies[8,9] and the development proposals are considered to be in accordance with this policy with regard to air quality.
- Existing concentrations of NO_2, PM_{10} and $PM_{2.5}$ in the study area are predicted to be below the relevant air quality objectives with the exception of R7. No new exceedance of the relevant air quality objectives result from development-generated road traffic emissions.
- The air quality assessment undertaken utilised robust model inputs including slowing traffic sections at junctions, appropriate meteorological data and surface roughness and cumulative traffic flows.
- The impact of development-generated road traffic on local air quality is defined as negligible overall in accordance with IAQM and EPUK guidance[12].
- In addition, a sensitivity analysis was undertaken and provided in **Appendix F** considering the conservative scenario of NOx concentrations not decreasing from baseline levels in line with projected emission factors. The findings of this sensitivity analysis also predict the impact of development-generated road traffic on local air quality as negligible with the exception of R5 which is predicted to experience a moderate impact, in accordance with IAQM and EPUK guidance[12]. The sensitivity analysis is a conservative assessment and therefore the overall impact is negligible in the sensitivity analysis.
- The overall impact of the development, considering all existing receptors within the study area is considered to be negligible in accordance with the IAQM and EPUK guidance[12] and therefore does not lead to an unacceptable impact on air quality in accordance with CWCC Local Plan policy DM13[9].

7. MITIGATION

Construction Phase Assessment

Step 3: Site-specific Mitigation

7.1 The risk of dust impacts, defined in Step 2C of the assessment, is used to determine the mitigation measures required to minimise the emission of dust during construction phase activities. The IAQM guidance[11] provides details of highly recommended and desirable mitigation measures which are commensurate with the risk of dust impacts defined in Step 2C for construction, earthworks and track out activities. Where the mitigation measures are general in nature, the highest risk category was applied in accordance with the guidance[11]. The highest risk category identified was 'Medium Risk' and the recommended mitigation taken from the IAQM guidance[11] is detailed in **Table 7.1** and **Table 7.2**.

Table 7.1: Mitigation Measures for a Medium Risk Site

Category	Mitigation Measures	
	Highly Recommended	**Desirable**
Communication	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	None
	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environmental manager/engineer or the site manager.	
	Display the head or regional office contact information.	
	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority.	
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.	None
	Make the complaints log available to the local authority when asked.	
	Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.	
Monitoring	Carry out regular site inspections to monitor compliance with the DMP, record inspections results, and make an inspection log available to the local authority when asked.	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling
	Increase the frequency of site inspections by the person accountable for air quality	

Category	Mitigation Measures	
	Highly Recommended	**Desirable**
	and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	checks of surfaces such as street furniture, cars and window sills within 100m of the site boundary, with cleaning to be provided as necessary.
Preparing and maintaining the site	Plan the site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	None
	Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	
	Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extended period.	
	Avoid site runoff of water or mud.	
	Keep site fencing, barriers and scaffolding clean using wet methods.	
	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.	
	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.	Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
	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.	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
Operations	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.	None
	Ensure an adequate water supply on site for effective dust/particulate matter suppression/mitigation, using non-	

Category	Mitigation Measures	
	Highly Recommended	**Desirable**
	potable water where possible and appropriate.	
	Use enclosed chutes and conveyors and covered skips.	
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	
	Ensure equipment is readily available on site to clean and dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	
Waste Management	Avoid bonfires and burning of waste materials.	None

Table 7.2: Mitigation Measures Specific to Earthworks, Construction and Trackout

Category	Mitigation Measures	
	Highly Recommended	**Desirable**
Earthworks (Medium Risk Site)	None	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
		Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
		Only remove the cover in small areas during work and not all at once.
Construction (Medium Risk Site)	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.	Avoid scabbling (roughening of concrete surfaces) if possible.
		Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
		For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.
Trackout (Low Risk Site)	None	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any materials tracked out of the site. This may require the sweeper being continuously in use.
		Avoid dry sweeping of large areas.
		Ensure vehicles entering and leaving the sites are covered to prevent escape of materials during transport.

Category	Mitigation Measures	
	Highly Recommended	Desirable
		Record all inspections of haul routes and any subsequent action in a site log book.
		Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

Road Traffic Emissions

7.2 Electric Vehicle (EV) charging points will be included within the proposed development. The development will include 39 EV charging spaces for cars within the initial development and will include the infrastructure to support 39 additional EV car parking spaces to meet future demand. The proposed development will also include the infrastructure to support 12 EV HGV charging bays in the future as demand increases for electric HGVs.

7.3 A Travel Plan will be prepared for the development to encourage the use of public transport and sustainable transport methods such as cycling and walking. The development will include 168 cycle parking spaces and an internal cycle path to connect the Site to North Road. A welcome pack will be provided to employees detailing cycling and walking routes and public transport links nearby. Car sharing will be encouraged and promoted to employees to reduce the single car occupancy.

7.4 Heating and cooling within the development will be provided by electric sources and no combustion processes to provide energy are proposed on Site. Air Source Heat Pumps will be utilised within the development with the office uses within the development.

7.5 The mitigation measures proposed were not quantified within the assessment but will benefit air quality and reduce emissions associated with the development. The air quality assessment is therefore considered to be conservative and the impact of the development is expected to be lower than predicted with the mitigation in place.

8. CONCLUSIONS

8.1 An air quality impact assessment was undertaken for the proposed commercial development on North Road, Ellesmere Port.

8.2 A qualitative construction phase assessment was undertaken and measures were recommended for inclusion in a DMP to minimise emissions during construction activities. With the implementation of these mitigation measures the impact of construction phase dust emissions is considered to be 'not significant' in accordance with IAQM guidance[11].

8.3 No assessment of ecological receptors was undertaken as the Mersey Estuary SSSI, Ramsar site and SPA is not within 200m of the affected road network in accordance with DMRB guidance[13] and the project ecologist advised that consideration of the Rivacre Valley LNR was not required.

8.4 A detailed road traffic emissions assessment was undertaken to consider the impact of development-generated road traffic on local air quality at identified existing receptor locations. Road traffic emissions were modelled using the dispersion model ADMS-Roads and concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at identified sensitive receptor locations. The modelling assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance[10]. The development was not predicted to result in any new exceedances of the relevant air quality objectives however there is a predicted exceedance of the annual mean NO_2 at R7 in 2022 in both the with and without development scenarios. The impact of the development on local air quality was predicted to be 'negligible' at all receptors with the exception of R5. Overall in accordance with IAQM and EPUK guidance[12] the impact of the development is predicted to be 'negligible' in accordance with IAQM and EPUK guidance[12].

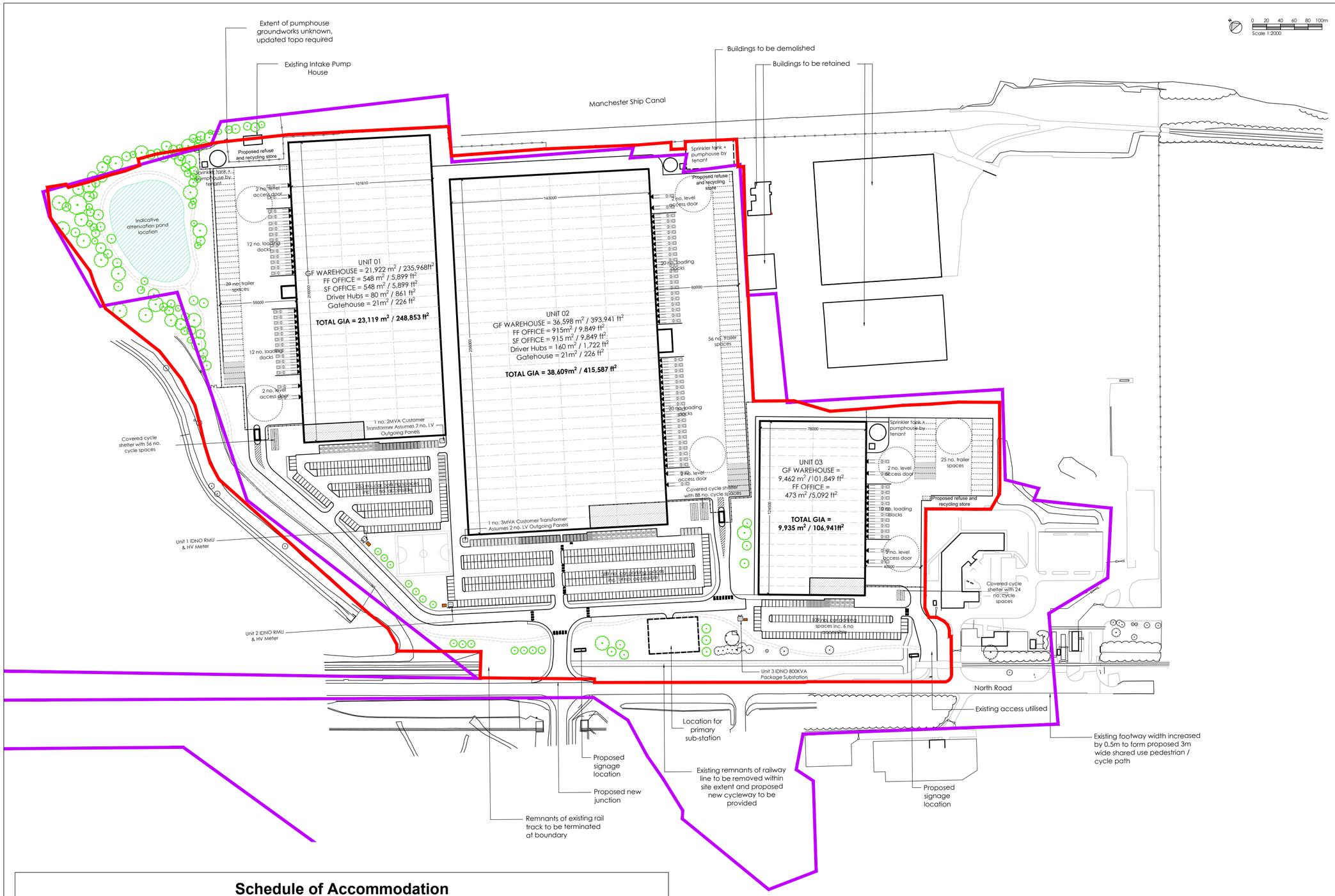
8.5 The development will include 41 EV charging space and travel plan measures which will benefit air quality and lead to reductions in emissions. The development will also include the provision of infrastructure to support further EV charging spaces in the future to reduce emissions associated with the development.

APPENDICES

APPENDIX A: GLOSSARY OF TERMS

Term	Definition
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between two years, which is useful for pollutants that have higher concentrations during the winter months.
AQAP	Air Quality Action Plan.
AQMA	Air Quality Management Area.
AQS	Air Quality Strategy.
Defra	Department for Environment, Food and Rural Affairs.
Exceedance	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
HDV	Heavy Duty Vehicles, (HGVs + buses)
HGV	Heavy Goods Vehicles.
IAQM	Institute of Air Quality Management.
LAQM	Local Air Quality Management.
LDV	Light Duty Vehicles (motorbikes, cars, vans and small trucks)
NO	Nitrogen monoxide, a.k.a. nitric oxide.
NO_2	Nitrogen dioxide.
NO_x	Nitrogen oxides.
O_3	Ozone.
Percentile	The percentage of results below a given value.
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
micrograms per cubic metre ($\mu g.m^{-3}$)	A measure of concentration in terms of mass per unit volume. A concentration of $1\mu g.m^{-3}$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
UK-AIR	UK Air Information Resource – A source of air quality information provided by Defra.
UKAQS	United Kingdom Air Quality Strategy.

APPENDIX B: PROPOSED DEVELOPMENT MASTERPLAN



Schedule of Accommodation

Unit	Ground Floor GIA	Office GIA	Gatehouse	Driver Hubs	TOTAL UNIT GIA	Car Parking (Accessible)	Parking Ratio (/m²)	EV Charging Spaces (Hatched Dark Grey)	Future EV Charging Spaces (Hatched Light Grey)	Ducting for HGV EV Charging (Hatched Light Grey)
Unit 1	21,922m² / 235,968ft²	1,096m² / 11,798ft²	21m² / 226ft²	80m² / 861ft²	**23,119m² / 248,853ft²**	253 (12)	1:91	13	13	4
Unit 2	36,598m² / 393,941ft²	1,830m² / 19,698ft²	21m² / 226ft²	160m² / 1,722ft²	**38,609m² / 402,779ft²**	389 (14)	1:99	20	20	6
Unit 3	9,462m² / 101,849ft²	473m² / 5,092ft²	-	-	**9,935m² / 106,941ft²**	109 (6)	1:92	6	6	3
TOTAL SITE GIA					**71,663m² / 771,381ft²**	751 (32)		39	39	12

NOTES

AEWTP027C

- All dimensions and levels are to be checked on site.
- Any discrepancies are to be reported to the architect before any work commences
- This drawing shall not be scaled to ascertain any dimensions. Work to figured dimensions only.
- This drawing shall not be reproduced without express written permission from AEW.
- Title overlay drawings and ownership boundaries are produced using all reasonable endeavors. AEW cannot be responsible for the accuracy or scale discrepancy of base plans supplied to them.
- All works are to be undertaken in accordance with Building Regulations and the latest British Standards.
- All proprietary materials and products are to be used strictly in accordance with the manufacturers recommendations.

CDM 2015

Client notified of duties:

Principal Designer:

Unless noted below, all known hazards have been highlighted on the drawing:

Note

- Exact boundaries to be confirmed with reference to land registry plans and topographical survey.
- HGV circulation subject to tracking analysis.

Site Boundary
44.69 acres / 18.09 ha

LDO Boundary taken from Cheshire West and Chester
Drawing: North Road Industrial Area - LDO Area
(DWG required for accuracy)

GAS MP Gas Kiosk

REV	Date	Drawn by: -	Checked by: -
P3	02/03/21	KS	AS
Cycle path amended at proposed site access			
P2	25/02/21	KS	AS
Red line boundary updated			
P1	24/02/21	KS	AS
Initial Issue			

Status: S2 For Comment

drawing stage: **Feasibility**

client: **Firethorn Trust**

project: **Port Cheshire North Road Ellesmere Port**

drawing title: **Feasibility Site Plan Proposed 3 Unit scheme**

date: 24/02/21 drawn: KS

scale@A2: 1:2000 checked: AS

Rev P3

Job No 11915-AEW-XX-XX-DR-A-0038

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APPENDIX C: TRAFFIC DATA UTILISED IN THE AIR QUALITY ASSESSMENT

Traffic Data Utilised in the Air Dispersion Modelling Assessment

Road Link	Speed	Scenario 1: 2019 Verification Year		Scenario 2: 2021 Base Year		Scenario 3: 2022 Opening Year Without Development		Scenario 4: 2022 Opening Year With Development	
	Km.hr^{-1}	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow
North Road (east)	48	1,763	303	1,815	312	1,836	315	2,118	409
North Road (west)	48	898	46	925	47	1,543	100	1,543	100
North Road, north of M53 motorway	48	2,368	131	2,437	135	3,073	189	4,868	685
M53 motorway slip road eastbound	80	1,995	85	2,053	88	2,180	97	2,529	222
M53 motorway junctions 7 - 8	LDV 112 HDV 96	71,378	4,766	72,534	4,843	73,574	4,917	74,275	5,165
M53 motorway slip road westbound	80	1,678	48	1,728	49	1,843	58	2,195	181
B5132 Netherpool Road	48	7,639	62	7,865	64	8,101	77	8,406	77
M53 motorway slip road westbound	80	2,842	23	2,926	24	3,090	35	3,483	160
M53 motorway junctions 6 - 7	LDV 112 HDV 96	53,795	3,340	54,666	3,394	55,561	3,456	56,351	3,704

Road Link	Speed	Scenario 1: 2019 Verification Year		Scenario 2: 2021 Base Year		Scenario 3: 2022 Opening Year Without Development		Scenario 4: 2022 Opening Year With Development	
	Km.hr^{-1}	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow
M53 motorway eastbound slip road	80	2,441	19	2,513	20	2,672	31	3,069	154
M53 motorway junctions 8 - 9	LDV 112 HDV 96	77,609	5413	78,866	5,501	79,781	5,564	80,428	5,812
M53 motorway junction 9-10	LDV 112 HDV 96	66,522	4933	68,484	5,079	69,279	5,137	69,903	5,379
A5032 Station Road/Whitby Road	40	13,444	435	13,841	448	14,001	453	14,049	453

Kilometers
0 2 4

Figure C1: Modelled Road Network in ADMS-Roads

Drawn by: ET
Date: 19/02/2021

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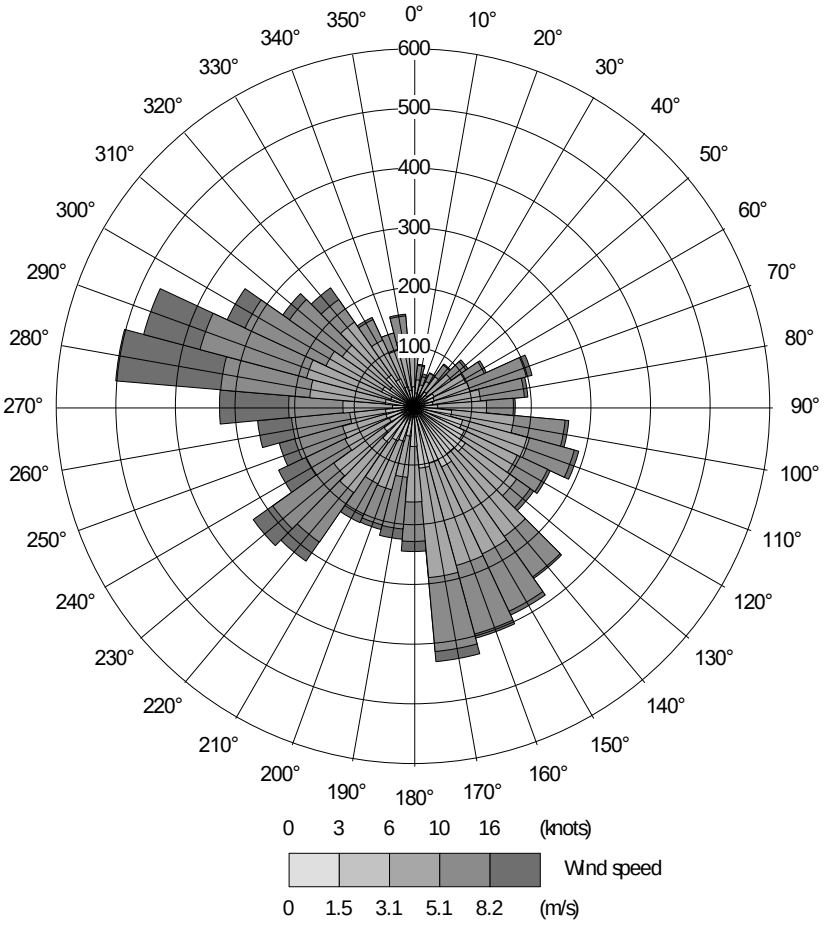
APPENDIX D: WIND ROSE FOR 2019 FOR LIVERPOOL METEOROLOGICAL RECORDING STATION

Meteorological data for 2019 Verification Year scenario for the Liverpool recording station was obtained for use in the air dispersion modelling assessment. The wind rose for 2019 is detailed below and illustrates a predominant wind direction from the north west and south east.



APPENDIX E: MODEL VERIFICATION

Whilst ADMS-Roads is widely validated for use in this type of assessment, model verification for the area around the Site will not have been included. To determine model performance at a local level, a comparison of modelled results with monitored results in the study area was done in accordance with the methodology provided by Defra[10]. This process of verification aims to minimise modelling uncertainty by correcting modelled results by an adjustment factor to give greater confidence to the results.

The model was run for Scenario 1: 2019 Verification Year to predict the 2019 annual mean road contributions of NOx at the monitoring locations in the study area. The model NOx outputs at this location were compared to the 2019 monitored concentrations to provide an adjustment factor. **Tables E1** presents the verification process for NOx.

Please note NO_2 diffusion tube monitoring location Station Road (SR) was excluded from the verification process due to its location opposite a petrol filling station which could not be accounted for within the traffic data available or within the model.

Whitby Road was modelled as a street canyon, following review of the Ellesmere Port Air Quality Action Plan[16] which identifies Whitby Rad a street canyon. The street canyon was modelled at a height of 9m, to represent the three storey buildings on the eastern side of the road.

No monitoring of PM_{10} or $PM_{2.5}$ is undertaken within the study area. Therefore the adjustment factor calculated during the NOx verification process was utilised to adjust predicted concentrations of PM_{10} and $PM_{2.5}$.

Table E1: NOx Verification Process

Model Verification Steps	Whitby Road Automatic (WH)	Whitby Road Diffusion Tubes (WH)	Richfield Recruitment (RR)
2019 monitored total NO_2 ($\mu g.m^{-3}$)	35.0	31.4	35.2
2019 background NO_2 concentration ($\mu g.m^{-3}$)	16.2	16.2	16.2
Monitored road contribution NOx ($\mu g.m^{-3}$)	37.3	29.7	37.7
Modelled road contribution NOx ($\mu g.m^{-3}$)	14.3	14.3	15.3
Ratio of monitored road NOx to modelled road NOx	2.6	2.1	2.5
Adjustment factor for modelled road contribution NOx	**2.3875**		
Adjusted modelled road contribution NOx ($\mu g.m^{-3}$)	34.1	34.1	36.5
Modelled total NO_2 concentration ($\mu g.m^{-3}$)	33.5	31.4	35.2
Monitored total NO_2 concentration ($\mu g.m^{-3}$)	35.0	31.4	35.2
% difference between modelled and monitored total NO_2	-4.4	6.3	-1.6

Model Verification Steps	Whitby Road Automatic (WH)	Whitby Road Diffusion Tubes (WH)	Richfield Recruitment (RR)
RMSE % (should be less than 25% and ideally less than 10%)	3.8		

** Road-NOx component, determined from NOx to NO_2 calculator*

A road-NOx factor of **2.3875** was determined as the slope of the best fit line between the 'measured' road contribution and the model derived road contribution, forced through zero. This factor was then applied to the modelled road-NOx concentration at each receptor, before conversion to NO_2 concentrations using the NO_x to NO_2 calculator[18] provided by Defra and the NO_2 background concentration.

The monitoring locations are not considered to be representative of the wider study area due to the location within a street canyon and there are no monitoring locations adjacent to the M53 motorway. Whitby Road was modelled as a 9m high street canyon and the verification factor was used within the assessment as agreed with CWCC during consultation.

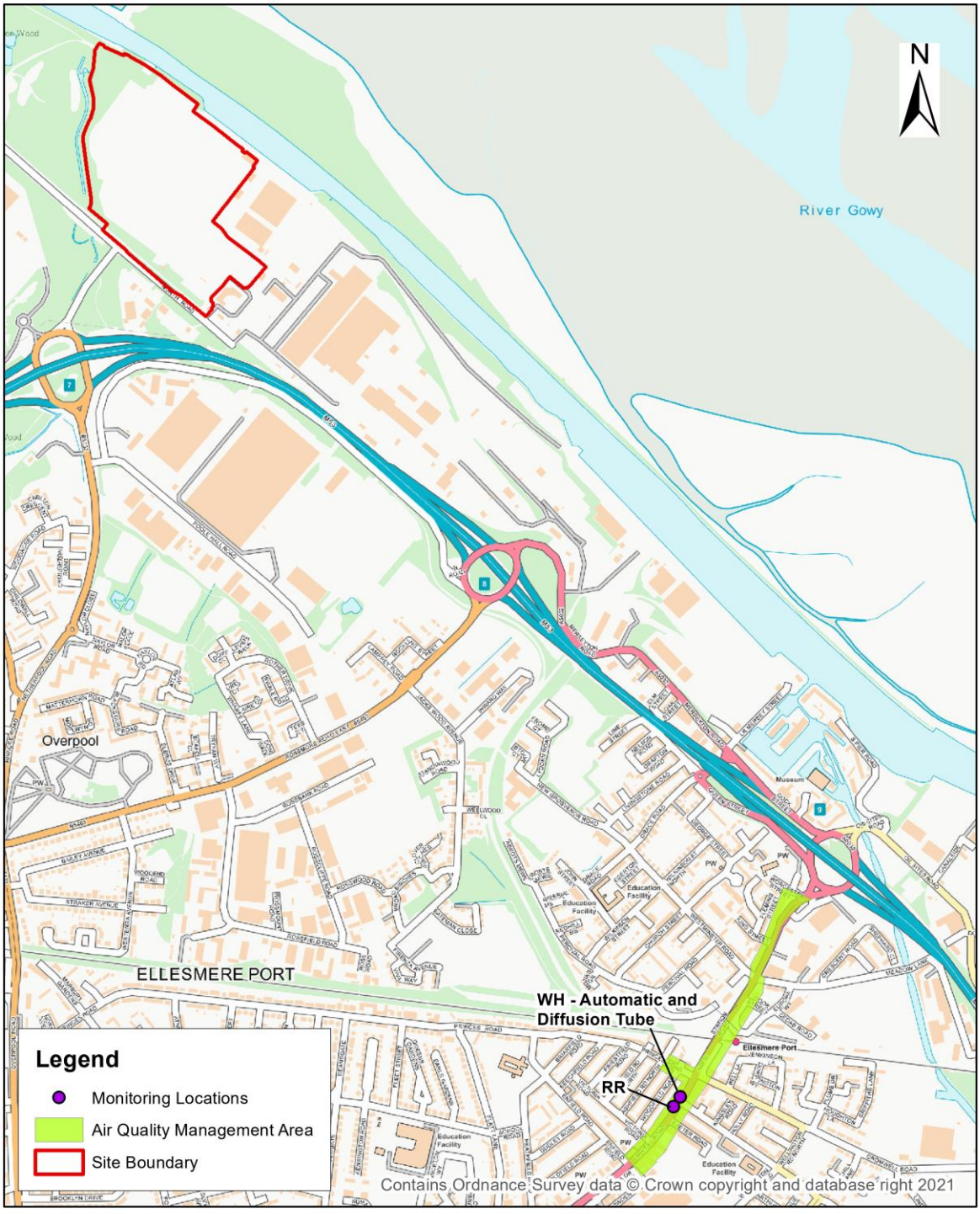


Figure E1: Model Verification Locations

Drawn by: ET
Date: 19/02/2021

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APPENDIX F: SENSITIVITY ANALYSIS

SENSITIVITY ANALYSIS

A sensitivity analysis was undertaken to consider a scenario where pollutant background concentrations do not decrease with future years. Therefore base year (2021) background concentrations, NOx to NO_2 calculator inputs and emission factors were utilised for the 2022 Opening Year scenarios. The results of the assessment for the existing receptor locations identified are provided in **Tables F1 – F3**. Exceedances of the relevant annual mean air quality objective are shown in bold.

Table F1: Predicted Annual Mean NO_2 Concentrations and Development Impact at Existing Receptor Locations

Existing Receptor	Predicted NO_2 Concentrations ($\mu g.m^{-3}$)			Impact
	Scenario 2: 2020 Without Development	Scenario 3: 2020 With Development	Change	
R1	14.3	14.4	+0.1	Negligible
R2	14.3	14.3	+0.1	Negligible
R3	13.9	14.0	+0.1	Negligible
R4	25.8	25.9	+0.3	Negligible
R5	**42.7**	**43.0**	+0.1	Moderate
R6	34.7	34.9	+0.2	Negligible
R7	**48.1**	**48.3**	+0.1	Negligible
R8	28.2	28.3	+0.1	Negligible
R9	30.2	30.3	+0.1	Negligible
R10	27.8	27.9	+0.1	Negligible
R11	29.9	30.0	0.0	Negligible
R12	20.8	20.8	0.0	Negligible
R13	20.9	21.0	0.0	Negligible
R14	23.9	24.0	+0.1	Negligible

** Discrepancies in changes due to rounding effects*

Table F2: Predicted Annual Mean PM_{10} Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted PM_{10} Concentrations ($\mu g.m^{-3}$)			Impact
	Scenario 3: 2022 Without Development	Scenario 4: 2022 With Development	Change	
R1	11.1	11.1	0.0	Negligible
R2	11.1	11.2	0.0	Negligible
R3	11.1	11.1	0.0	Negligible
R4	13.4	13.4	0.0	Negligible
R5	15.3	15.4	+0.1	Negligible
R6	13.2	13.2	0.0	Negligible
R7	14.9	15.0	+0.1	Negligible
R8	12.4	12.4	0.0	Negligible
R9	12.7	12.7	0.0	Negligible
R10	12.5	12.5	0.0	Negligible
R11	13.1	13.2	0.0	Negligible
R12	12.7	12.7	0.0	Negligible
R13	12.9	12.9	0.0	Negligible
R14	13.6	13.6	0.0	Negligible

** Discrepancies in changes due to rounding effects*

Table F3: Predicted Annual Mean $PM_{2.5}$ Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted $PM_{2.5}$ Concentrations ($\mu g.m^{-3}$)			Impact
	Scenario 2: 2022 Without Development	Scenario 3: 2022 With Development	Change	
R1	7.4	7.5	0.0	Negligible

Receptor	Predicted $PM_{2.5}$ Concentrations ($\mu g.m^{-3}$)			Impact
	Scenario 2: 2022 Without Development	Scenario 3: 2022 With Development	Change	
R2	7.5	7.5	0.0	Negligible
R3	7.4	7.4	0.0	Negligible
R4	8.7	8.7	0.0	Negligible
R5	10.0	10.0	0.0	Negligible
R6	8.8	8.8	0.0	Negligible
R7	9.9	10.0	0.0	Negligible
R8	8.3	8.3	0.0	Negligible
R9	8.5	8.5	0.0	Negligible
R10	8.3	8.3	0.0	Negligible
R11	8.7	8.7	0.0	Negligible
R12	8.5	8.5	0.0	Negligible
R13	8.6	8.6	0.0	Negligible
R14	9.0	9.0	0.0	Negligible

** Discrepancies in changes due to rounding effects*

The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for Scenario 3: 2022 Opening Year without development and Scenario 4: 2022 Opening Year with development are below the relevant annual mean air quality objectives at the majority of receptors with the exception of receptors R5 and R7. Receptors R5 and R7 are located adjacent to the M53 motorway which experiences high daily traffic flows as part of the strategic road network and therefore higher concentrations are anticipated. From a review of online mapping, R7 is currently uninhabited and therefore the inclusion of this receptor within the assessment is conservative.

The proposed development does not lead to any additional exceedances of the annual mean air quality objectives.

Predicted changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations are less than 0.5% of the relevant annual mean air quality objectives and therefore considered to be negligible in accordance with IAQM and EPUK guidance[12] with the exception of R5.

At receptor R5 the predicted change in the annual mean NO_2 concentration is 1% and the total predicted annual mean NO_2 concentration is 107% of the annual mean NO_2 air quality

objective. The impact at this receptor is therefore considered to be moderate adverse in accordance with the IAQM and EPUK guidance[12].

With regard to short term air quality objectives for NO_2 and PM_{10} at the residential development, the predicted annual mean NO_2 concentrations are less than 60µg.m^{-3} and therefore in accordance with Defra guidance[10] it may be assumed that exceedances of the 1-hour mean objective is unlikely. The calculation detailed in paragraph 3.15 was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

The overall impact of the development on local air quality in the sensitivity analysis was considered to be negligible however, the sensitivity analysis was considered to represent a highly conservative assessment which considers the scenario where emissions do not decrease in line with Defra predictions. In real world conditions the concentrations are expected to be closer to those predicted in the main assessment.

The proposed development includes 41 EV charging spaces and infrastructure to support additional EV charging spaces to meet future demand. A travel plan with measures to promote sustainable transport methods will be included with the submission to further reduce emissions associated with the development and mitigate the impact of the development on air quality. Overall the development is not predicted to have a significant impact on air quality.

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